

SIGNAL STRENGTH MEASUREMENTS

See Page 366

Practical and Amateur Wireless

3^d
EVERY
WEDNESDAY

Edited by F.J. CAMM

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July 1st, 1939.

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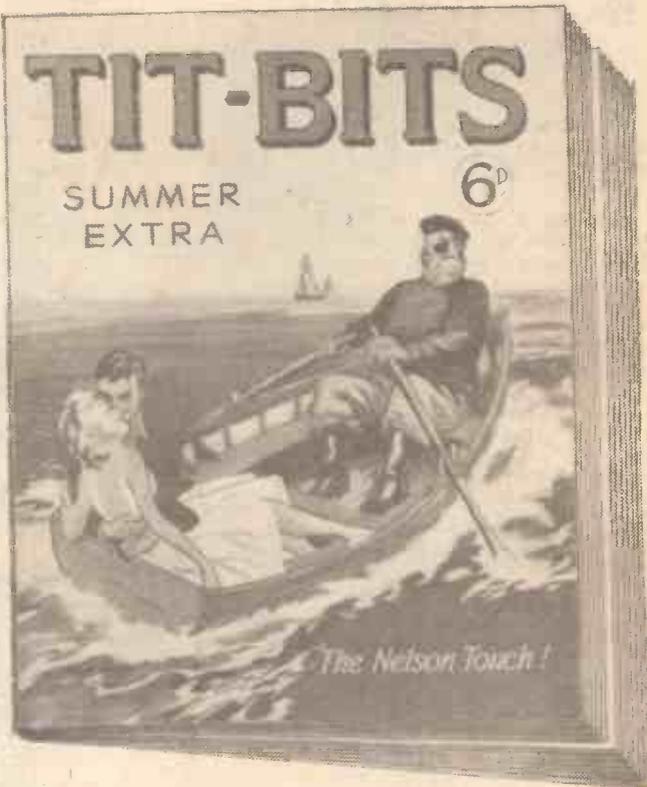
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CAR-RADIO EXPERIMENTS—See Page 374



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Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh.Sch.,
B.Sc., A.M.I.E.E., Frank Preston.

Vol. XIV. No. 354. July 1st, 1939.

ROUND *the* WORLD of WIRELESS

Electricity From Wind Power

ALTHOUGH it is proposed to enable everyone in this country to have access to mains power for lighting, heating and other purposes, there are still hundreds of places where no such facilities will be available for a long time. There are also many places in the country where the mains supply cables pass close to houses which are unable to make use of the supply, owing to the fact that the district is not provided with the necessary feed from the main supply. To listeners in those places the problem of battery charging is a serious one, as they may have to travel many miles to the nearest service station, and on this account their hours of listening are seriously curtailed. The question of using a mains receiver to obtain the greater advantages which such a receiver offers is, of course, right out of the running. But in such localities it is possible to obtain power for battery charging, or for operating a mains-type receiver, as well as lighting the house by means of a generator driven through a small windmill device, and in America and Canada such apparatus is very common in the wilder parts. Although we do not get winds in this country at such high levels as on the American continent, sufficient power may be obtained with suitable apparatus to fulfil the purposes mentioned, and we give in this issue some further details of the methods of solving this wind-power problem. Further articles will appear on the subject from time to time.

D.F. Reconstruction and Changes

THE Lorenz "blind approach landing" installation at Croydon airport is being reconstructed, and during the period for which this will be out of action (about two months) the beacon which is installed at Heston Airport will operate on the Croydon frequency—33.33 mc/s for the main beacon and 38 mc/s for the inner and outer marker beacons.

Arabic Programme Organiser

THE B.B.C. announce that Mr. A. E. H. Paxton has accepted the appointment of Arabic Programme Organiser in the Overseas Department of the Corporation. Mr. Paxton was educated at Eastbourne College and Oxford, where he obtained honours in Oriental languages and gained the James Mew Scholarship in Arabic. He was English master in

Egyptian Government Secondary Schools and afterwards Lecturer in the English Department, Faculty of Arts, at the Fuad I University (then University of Egypt).

Swiss S.W. Stations

THE short-wave station at Schwarzenburg, Switzerland, is carrying out tests on eight different wavelengths, 11.70, 13.94, 16.87, 19.60, 25.28, 31.46, 48.66, and 49.55 metres. It is believed that directional aeriels are being employed on certain of these wavelengths.

for July 12th. That night he will introduce to Regional listeners something like a dozen further "finds" that he has made in his unending search for talent. Usually he brings his discoveries to one of the studios at Broadcasting House for their programme, but on this occasion the broadcast will take place before an audience from the stage of the Palace Theatre, Plymouth.

The programme will be his first from the West Country, and it will be broadcast also on the West wavelength. It will be a surprise show, and the names of the artists will not be revealed in advance.

Collecting

A SERIES of six fortnightly talks has been planned round the fascinating subject of "Collecting." It is intended not merely to deal with the obvious subjects such as stamps or coins, although these probably will be included. There is immense scope in such a series since the collecting mania strikes people in such a variety of forms, and listeners, attacked by what is well known to be a most contagious and virulent disease, may well find themselves ardently collecting such apparently useless objects as collar-studs or star-fish. The first talk in the series will be given on July 18th.

Hay Harvest

A FARM on the slopes of the Cotswold hills has been visited by the B.B.C. Mobile Unit during hay harvest to record impressions of the scene. On July 7th, Sid Carter, of Evesham, and David Gretton will give descriptions and interview farm people in order to convey to listeners a picture of the various operations in connection with hay harvest, including stacking and thatching, and also to obtain the reminiscences of older men who can remember when practically all the work was done by hand.

Midland Composers Concert

THE last of the six concerts of works submitted and accepted under the Midland Composers' Scheme will be broadcast on July 2nd. Eric Warr will conduct the B.B.C. Midland Orchestra in compositions by A. Hawthorne Baker, of Coventry; Frederiek Bye, Birmingham 'cellist; George Radford Williams, of Coventry; and C. W. Orr, of Painswick, Gloucestershire. Mr. Radford Williams is a self-taught musician.

ON OTHER PAGES

	Page
Wind-driven Charging Plants	363
Transmitting Topics	365
Signal Strength Measurements	366
On Your Wavelength	367
Short-wave Section	369
Variable-pitch Audio Oscillator	371
Readers' Wrinkles	373
Car-radio Experiments	374
Practical Television	376
Trade Notes	379
Readers' Letters	382
Queries and Enquiries	383

Television and the Cinema

IN view of the possibility of television being a definite part of cinema installation in the future, a special series of free instructional courses for cinema projectionists is being given by Baird at a special section of their factory at Sydenham. Four lecturers will deal with the theory and practice of big-screen television, and at the end of a two-weeks course the students will undergo a test.

New "Discoveries" by Carroll Levis

THE name of Carroll Levis, inseparably associated with radio "discoveries," again appears in the B.B.C. variety schedule

ROUND the WORLD of WIRELESS (Continued)

New Stations for the Netherlands

IN addition to the Lopik transmitter now under construction, a contract has been placed by the Dutch broadcasting organisations for another high-power station. The transmitters will eventually work on 355.9 m. (843 kc/s) and 413.2 m. (726 kc/s) respectively.

"A Rose by Any Other Name"

ACCORDING to an official announcement made in Germany, the Prague (No. 2) station at Melnik (269.5 m.-1,113 kc/s), is to be known in future as *Reichssender Boehmen*, and that of Brno (325.4 m.-922 kc/s) as *Reichssender Maehren*.

INTERESTING and TOPICAL NEWS and NOTES

Also Another at Caracas

TO commemorate the centenary of the Catholic paper *La Religion*, a public subscription has been opened at Caracas (Venezuela) with a view to presenting it with a powerful broadcasting station to bear its name.

The Spanish Stations

Transmitters now regularly on the air are: Saragossa and Valencia, 352.9 m. (850 kc/s); EAJ2, Madrid, and EAJ5,

Radio-telephone Service with Ships at Sea

THE Postmaster-General announces that the radio-telephone service with ships on the Atlantic route has been extended, as from Saturday, June 17th, to the new liner *Mauretania*.

The charge for a person-to-person call will be 36s. for three minutes when the ship is within approximately 1,000 miles of Land's End, and 72s. for three minutes at other times; the charges for each additional minute will be 12s. and 24s. respectively.

July Out of Doors

THE many enthusiastic followers of William Aspden, who broadcasts in such a likable manner on out-of-doors subjects, will be glad to know that he will soon be at the microphone again. "July Out of Doors" is the subject for his talk on the Northern wavelength on Monday evening, July 3rd.

"New Brighton Night"

VICTOR SMYTHE is putting on a "New Brighton Night" on July 6th, with broadcasts from the resort's Tower Ballroom, where the Playboys Dance Band will be busy; from Frank A. Terry's show, "Pleasure on Parade," at the Floral Pavilion; and from the variety bill at the Tivoli Theatre.

Brass Band from the North-east

ONE of the best of the many good miners' brass bands in the North-east, the Ravensworth Colliery Band is to broadcast from the Newcastle-on-Tyne studios on Sunday afternoon, July 2nd. Before it was taken over by the local (Ravensworth, Co. Durham) miners' lodge in 1933 this was known as the Birtley Town Band. Through the lodge, the band is very well supported by the colliers of the Anne and Betty Pits, who pay a weekly levy to it.



Members of the Sudanese Government Departments are here seen in the Control Room at Broadcasting House recently, when they made a tour of inspection.

Argentine's Fonopost

THE Ministry of Posts and Telegraphs at Buenos Aires (Argentine Republic) has authorised the establishment of a correspondence service to be known as "Fonopost," by which electrical recordings of verbal communications can be forwarded through the post as ordinary mail. The sender registers a message up to 200 words in length through a microphone placed in special kiosks installed in various parts of the city; it is recorded on an unbreakable disc which can be reproduced on any ordinary gramophone instrument. A strong envelope is supplied with the record, the cost of postage being fixed at 1 peso for the Argentine, and slightly more for foreign destinations. If the service proves successful it is proposed to extend it by permitting the sender to secure such recordings through a telephone transmitter in his own home. By this means time would be saved, as the resulting record, duly addressed, would be despatched direct to its destination by the postal authorities.

More European Stations?

THE *Plan de Montreux* allocates the channels 219.6 m. (1,366 kc/s) to the Principality of Monaco, and 198.7 m. (1,510 kc/s) to the little State of Liechtenstein, both of which propose installing transmitters in the near future.

Seville, 410.4 m. (731 kc/s); EAJ1, Barcelona, 377.4 m. (795 kc/s); EAJ15, Barcelona, 293.5 m. (1,022 kc/s); EAJ7, Madrid, 309.9 m. (968 kc/s); EAJ8, San Sebastian, 233.2 m. (1,286 kc/s); Burgos, 238.5 m. (1,258 kc/s); Albacete, 201.7 m. (1,487 kc/s); Santiago, 201.1 m. (1,492 kc/s); Alcala and Santander, 200 m. (1,500 kc/s).

Them's Our Sentiments

SINCE the annexation by the German Reich of the Lithuanian broadcasting station at Klaipeda, the name has been altered to *Reichssender Memel*, and the call-sign is now DAM, which doubtless also expresses the feelings of the inhabitants of that city!

Lord Halifax to Broadcast

THE speech by Lord Halifax at the Annual Dinner of the Royal Institute of International Affairs, which takes place at Grosvenor House, will be broadcast in the National programme on June 29th at 9.15 p.m. Lord Astor, who will introduce Lord Halifax, will also be heard.

Variety from the North

MAF BAMBER, Laurie Howard and Les Crossley and his Harmonica Rascals will be the artists of a twenty-minute Variety programme on the North Regional wavelength on Saturday, July 1st.

SOLVE THIS!

Problem No. 354

Matthews had an A.C./D.C. receiver which gave very good results and which he used on his A.C. supply. He changed his address to a district which was supplied with D.C. and when he connected his receiver to the supply he could obtain no signals. He thought that it had been damaged in transit and returned it to the makers, but it was sent back marked O.K. He tried it again but could still obtain nothing on it. What was wrong? Three books will be awarded for the first three correct solutions opened. Entries should be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 354 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, July 3rd, 1939.

Solution to Problem 353

The wire which Jackson found in his spares box was resistance wire and thus the coil which he wound for his wave-trap was heavily damped and the tuning was accordingly very flat. This accounted for its failure to function in the recognised manner.

The following three readers successfully solved Problem No. 352 and books have accordingly been forwarded to them:

H. V. Kerrick-Walker, 59, Holywell Avenue, Monkseaton, Northumberland; J. Stewart, 72, Deane Road, Liverpool, 7; H. G. Reed, 298, Malden Road, Cheam, Surrey.

WIND-DRIVEN CHARGING PLANTS

Further Notes on the Construction of Windmills for Driving Generators for Accumulator Charging or Receiver Operation

INCREASING interest is being shown in the design of wind-operated chargers, and some very ingenious ideas have been put forward by various readers in connection with this subject. As already explained in these pages, the basic idea is to erect a mast upon which an ordinary car generator may be mounted, and this is operated through gearing from a small windmill device. There are thus three main problems—the design of the windmill, the method of driving, and the method of mounting so that the windmill may always face into the wind. The generator is a standard device but is available in many different patterns. One of the simplest ideas is to pay a visit to a car-breaker's yard, where generators may be picked up from 10s. upwards. The same yard will also be able to supply gearing suitable for connection between generator and windmill. With regard to the generator, the 12-volt type should be selected and if possible the appropriate cut-out should be obtained at the same time. In some cases readers who have tried out the device find that a 6-volt cut-out is to be preferred. From details which have been submitted by various readers the following data may be summarised.

Windmills

The best form of drive is undoubtedly a large aeroplane type propeller, but this is expensive and, unfortunately, Government surplus of this type is not now readily available. A good carpenter could make up a suitable prop. and a length of about 3ft. to 4ft. for each blade is most satisfactory. If you wish to make a really reliable propeller for yourself one of the best plans is to make it in laminated form, obtaining $\frac{3}{4}$ in. boards 6in. wide by 6ft. in length. These should be thoroughly cleaned and glued together, afterwards drilling at various intervals and pinning with short pins made from $\frac{1}{4}$ in. dowel rod. The assembly should be put under firm pressure whilst the glue hardens. The blades should then be marked out and carved, checking the pitch and cross-section at intervals, and to ensure both halves being properly matched templates should be cut for the various sections from stout sheet metal. The work is tedious but a good job can be made with the exercise of a little patience, and when approaching finality the propeller should be carefully balanced by drilling the centre and placing on a spindle locked to the workbench. Perfect balance is, of course, essential to avoid vibration and to ensure perfect starting in the lightest breeze. A simpler windmill can be made from sheet metal cut to a number of small blades, bolted to a disc of metal as indicated in the short constructional details at the end of this article, and as illustrated in Fig. 2.

Gearing

The next problem is the drive between propeller and generator. The standard timing gear may be obtained with helical gears having a ratio of 2 to 1 and these are quite useful. The only difficulty is that of providing lubrication and an

enclosed oil-bath may be difficult to arrange. This may be overcome by using bicycle gearing and chain, either the standard chain-wheel and rear sprocket, or two rear sprockets being employed, according to the gear ratio needed. When using a chain drive the tension may be easily adjusted, the best method being to mount the

proof conduit or weatherproof covered wire used, and the cut-out should be mounted on the mast or as near to the unit as possible.

The Mast

For a support either a built-up lattice mast or a metal tubular structure may be used. In either case, as the unit has to be free to rotate, a tubular support is needed and will therefore have to be mounted in the top of a lattice or similar mast. Standard 2in. electrical conduit is suitable for the purpose, and by using the 1-in. material for the main support, this may be dropped inside the larger diameter material and will give a free movement. One interesting suggestion which has been made is to cap the lower end of the large diameter tube and to place inside three large ball-bearings. These should be of such a size that they nearly touch in the centre, and then when a fourth similar ball is dropped in it will ride on the other three, and then by placing a disc over the end of the small tube and dropping this in it will turn freely on the top ball. Furthermore, it will then be possible to take one part of the electrical circuit from this, provided that the balls are a good fit.

To keep the unit into wind a tail must be employed, and again standard small bore electrical conduit or gas piping may be used to support this. Screwed joints enable it to be locked to the main part of the assembly, and it may be sawn through for part of its length with a hacksaw blade, so that the metal tail may be let into the rod and then bolted in position. Weight is not necessary in this position, but as large a wind-deflecting area as possible should be obtained. It may be cut sail-shape, or merely shaped similarly to the flight of an arrow. A length between two and three feet, with a width of about 12 or 18in. should be sufficient, and it should be about 2 to 3ft. behind the pivotal point. It is obviously impossible to deal with all of the points of construction in one general article, but it is hoped that the foregoing remarks will assist those who wish to undertake experiments in connection with this type of apparatus, and in the meantime we are preparing constructional details of a definite design which will be published in due course. In the meantime the following are the main details of one such unit which has been made up by one of our readers, and he claims that this is giving very good results.

In this case the fans are made from zinc sheeting, fastened to an old fan taken from a motor lorry. This is of the ball-bearing type, and in turn is coupled to a 12-volt car dynamo. On the rear of the fan is a large sprocket wheel with 106 teeth, and this is cut from a sheet of boiler plate, with four large holes in it to reduce weight. It is bolted to the fan, and addi-

(Continued on next page)

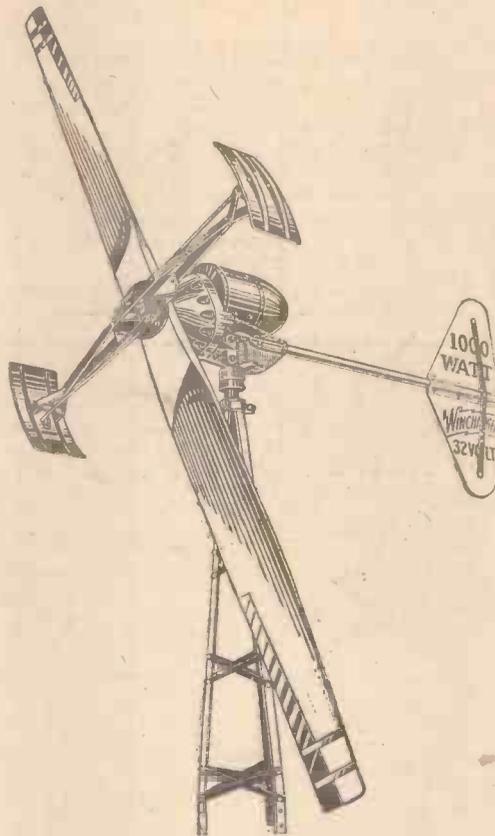


Fig. 1.—The American "Wincharger," which is obtainable from Messrs Gordon Equipments, Ltd., in this country.

generator on a sliding bracket. From some metal yards it may be possible to obtain larger gear wheels, but a useful limit may be set by the weight of the entire assembly.

Electrical Connections

The next and most important point is that of obtaining the electrical pick-up from the generator. As the head of the device must turn in the wind it is obvious that a wiping contact must be used as the head must be free to rotate continuously in every direction. A slip ring is one way of arranging for the contacts, using spring-loaded brushes for contact, but they must be totally enclosed against weather effects. Rings of copper or brass, with copper gauze or carbon brushes, are obtainable for standard electrical purposes and may be turned to account in this connection. They should preferably be mounted horizontally and well greased and enclosed in a weatherproof box. The leading-out wires should be taken through weather-

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
 Wednesday, June 28th.—Irving Berlin programme, relayed from America.
 Thursday, June 29th.—Speech by Lord Halifax.
 Friday, June 30th.—More than Murder, by Norman Edwards; The Cruising Family Robinson by Mabel and Denis Constanduros.
 Saturday, July 1st.—Music Hall.

REGIONAL (342.1 m.)
 Wednesday, June 28th.—Organ recital, from St. George's Chapel, Windsor.
 Thursday, June 29th.—Square Pegs, a domestic comedy by Lionel Brown, from Midland.
 Friday, June 30th.—Stanelli's Crazy Cruise No. 2.
 Saturday, July 1st.—Paul Jones, feature programme.

MIDLAND (296.2 m.)
 Wednesday, June 28th.—Orchestral Concert, from Reichsender, Saarbrucken: Franz Lehar conducting.
 Thursday, June 29th.—Square Pegs, a domestic comedy, by Lionel Brotn.

Friday, June 30th.—Mr. Ponsonby's Fairy, a fantastic comedy with music.
 Saturday, July 1st.—Orchestral and choral concert.

WELSH (371.1 m.)
 Wednesday, June 28th.—Welsh Chamber Music.
 Thursday, June 29th.—A Welshman's Calendar: June.
 Friday, June 30th.—Spirit of Youth: Orchestral programme.
 Saturday, July 1st.—The Urdd Olympic Games: An eye-witness account, from the Gnoll Field, Neath, Glamorgan.

WEST OF ENGLAND (285.7 m.)
 Wednesday, June 28th.—Orchestral Concert, from Reichsender, Saarbrucken: Franz Lehar conducting.
 Thursday, June 29th.—Orchestral programme, from the Winter Gardens Pavilion, Weston-super-Mare.
 Friday, June 30th.—Holidays in the West: presenting summer on the coasts of Devon and Cornwall.
 Saturday, July 1st.—Dance Cabaret, from the Polygon Hotel, Southampton.

NORTHERN (449.1 m.)
 Wednesday, June 28th.—Southport Calling! an entertainment tour.
 Thursday, June 29th.—Public Enquiry: Second of new series from public meetings.
 Friday, June 30th.—Morecambe Merriment: entertainment tour.
 Saturday, July 1st.—Saturday Concert Hall.

SCOTTISH (391.1 m.)
 Wednesday, June 28th.—Night Out in Perth: a programme from the Ancient Capital of Scotland.
 Thursday, June 29th.—Old Glasgow Favourites.
 Friday, June 30th.—Collaborate Concert with Sweden.
 Saturday, July 1st.—Another Nicht at Knowles: A Bothy Concert.

NORTHERN IRELAND (301.1 m.)
 Wednesday, June 28th.—Chamber Music.
 Thursday, June 29th.—Irish Rhythms: Orchestral concert.
 Friday, June 30th.—Granny's Birthday, a play by Mafe Houghton.
 Saturday, July 1st.—Flute and Pipe Bands.

WIND-DRIVEN CHARGING PLANTS

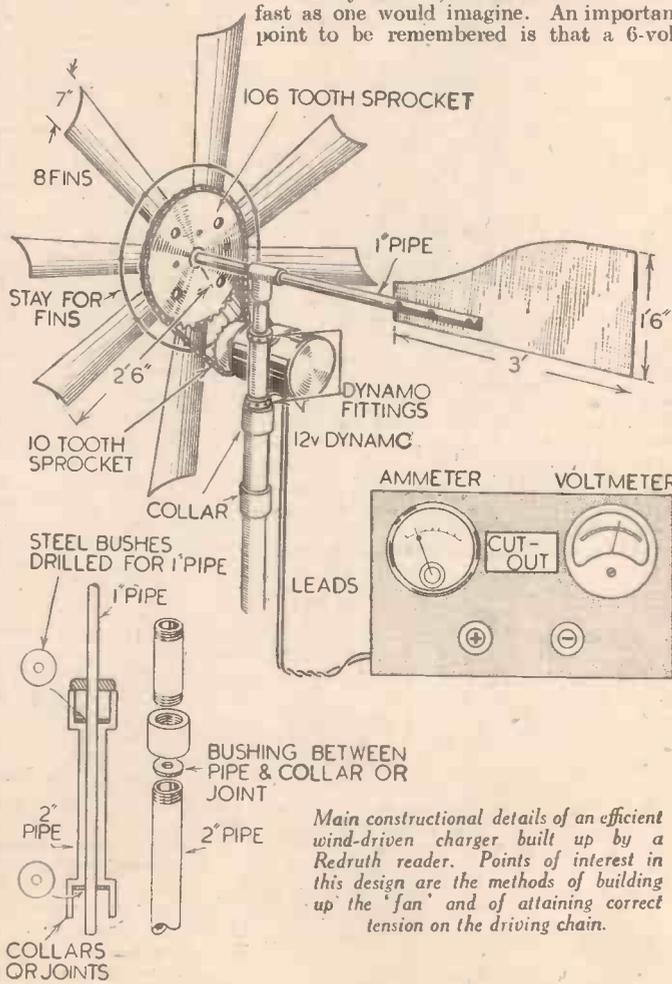
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tional strength is obtained by fastening a $\frac{1}{8}$ in. iron hoop behind the blades.

The tail piece is cut from sheet metal and is held in place by cutting down a length of tubing with a hack-saw and passing two bolts through the assembly. To mount the dynamo a gland is made and, as shown in the illustration, this is provided with clamps so that it may be attached to a length of lin. piping. It may be raised or lowered so as to obtain the necessary tension on the driving chain.

The main support is a length of 2 in. piping and locking collars and bushes are provided so that the lin. pipe may be held rigidly central in the larger pipe. I have found that the load on the dynamo has its effect on the speed of rotation of the fan, and on a 2 amp. load it rotates much faster than

it does on a 5 amp. load. Although the fan may appear rather large and with too many blades, it does not turn as fast as one would imagine. An important point to be remembered is that a 6-volt



Main constructional details of an efficient wind-driven charger built up by a Redruth reader. Points of interest in this design are the methods of building up the 'fan' and of attaining correct tension on the driving chain.

cut-out must be used, and not a 12-volt one, as is generally employed with a 12-volt dynamo.

It is important to remember that if the unit is mounted at a distance from a house, then very heavy gauge wire must be employed for connecting to the receiver or accumulator to avoid loss in the connections. For normal charging purposes, of course, a shed may be in a convenient position and will avoid this difficulty, but even so, good heavy flex should be utilised for the connections in the apparatus so that full advantage may be taken of the maximum output.

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grid swing, when compared with those used in the preceding stages, so from the point of view of voltage amplification, the ratio of the input and output voltages is naturally on the low side. If power amplification is considered, it will be appreciated that the power ratio will be high as the power input is minute while the power output is large. The ratio and output power will, of course, depend on the type of valve in use.

Forms of Amplification

So far as this article is concerned we will assume that the various forms or types of amplifying circuits suitable for the work under consideration can be divided into three distinct classes. These are Class A, Class B, and Class C. The most common of these is Class A, and a thorough understanding of the operation of a valve or valves when working under these conditions can be obtained from the curves shown in Fig. 1. The small curve G represents the input signal and by producing the vertical lines A and B it will be seen that it affects only the straight part of the characteristic curve C. To the right of this curve will be seen another curve which, if its wave form is examined it will be found to be an identical though magnified reproduction of the input signal curve G.

LAST week's article brought us to the question of modulation and P.A. stages but, before proceeding with these, it is essential to give some little consideration to the various forms or classes of amplification which can be utilised. There appears to exist a little misunderstanding regarding the operation of the different types of circuits and, although they are not so much removed from

and component characteristics are, of course, different in certain respects, as will be appreciated later.

Power or Voltage Amplifiers

When considering valves with relation to amplification, it is always advisable to bear in mind that such circuits can be divided into two sections, and these can be grouped under the headings of *voltage amplifiers* and *power amplifiers*.

For the sake of clearness let us take an imaginary receiving circuit employing, say, one stage of H.F. amplification, a triode detector, which is followed by an L.F. stage feeding into a super-power valve. All the valves in the circuit act as amplifiers, bearing in mind that with a leaky grid detector rectification takes place in the grid circuit, and amplification is provided in the anode circuit. The H.F. valve will receive a comparatively small input signal, and in that stage one is chiefly concerned with obtaining the maximum amplification of the *signal voltage* irrespective of any thought of power. The same applies to the detector and L.F. stage, therefore it is quite usual to apply the term of "voltage amplifiers" to such circuits.

When the final or output stage is reached, one is concerned with obtaining a certain power sufficient to operate a loud-speaker, so it becomes necessary to use a valve which, when fed with quite a *small* amount of power, in fact, one might say a minute amount, can deliver considerable power from its anode circuit.

Such valves usually have a very large

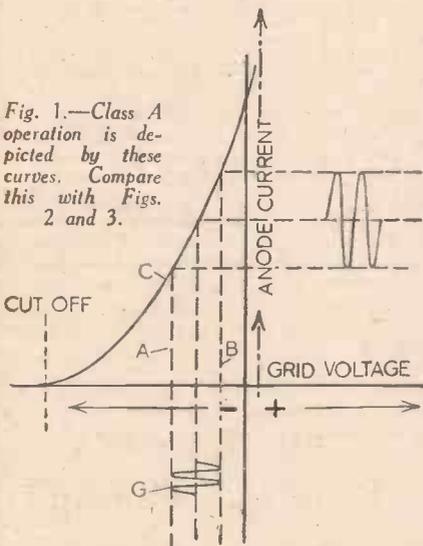


Fig. 1.—Class A operation is depicted by these curves. Compare this with Figs. 2 and 3.

ordinary L.F. circuits, a thorough understanding of the individual characteristics must be acquired.

To commence with, there is the term "power amplifier," or P.A. as it is more usually called in transmitting circuits. This must not be confused with power amplifiers of the L.F. type. Many people call a powerful L.F. amplifier, such as that used for public address work, a power amplifier and, although I do not intend to enter into a debate as to whether the term is applicable in such instances or not, it would be advisable for beginners not to confuse the two types.

For transmitting, the P.A. is called upon to amplify signals at radio or high frequencies, and not audio or low frequencies as in the case of their L.F. counterparts.

The two can be likened to each other; in fact, such procedure will, no doubt, enable a better understanding of P.A. operations to be obtained as both use the same fundamental types of amplifying circuits, although operating conditions

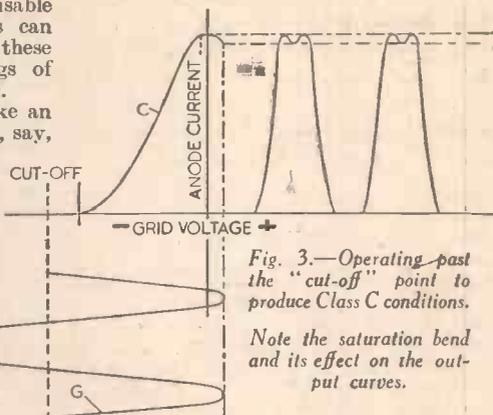


Fig. 3.—Operating past the "cut-off" point to produce Class C conditions.

Note the saturation bend and its effect on the output curves.

To obtain this faithful reproduction it is essential for definite operating conditions to exist, and as these are invariably supplied by the makers of the valve, it is not difficult to obtain satisfactory amplification under such conditions. The main requirements are correct anode and bias voltages and an appreciation of the power-handling capabilities of the valve in use.

For the purpose of enabling Class A amplification to be compared with the other types to be described, it should be noticed that the plate current is, for practical purposes, constant irrespective of whether an input signal is applied or not. Another point to observe is that the grid is never driven into a positive state or so far that it reaches the "cut-off" point of the plate current. This point is indicated on the diagram.

Class B

A striking example of the difference between Class A and Class B can be obtained by comparing Fig. 1 with Fig. 2. The latter shows that the input signal G is no longer applied to the straight portion of the characteristic curve C, but to a point quite close to the "cut-off" point.

This condition is produced by biasing the valve to such an extent that hardly any anode current flows

(Continued on page 380)

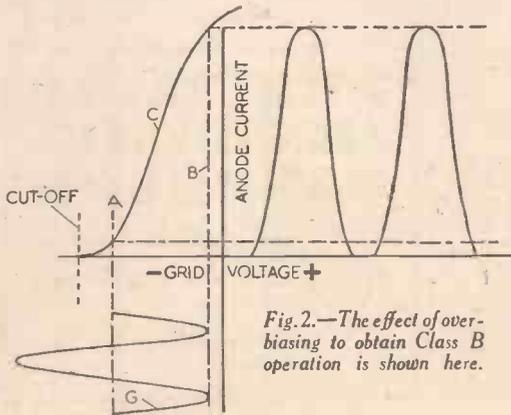


Fig. 2.—The effect of over-biasing to obtain Class B operation is shown here.

Signal Strength Measurements

How to Fit Various Forms of "R" Indicators to Standard Types of Superhet Receivers - By W. J. DELANEY

THE amateur transmitter needs for his work a standard by means of which reports may be made concerning amateur signals which he picks up. At present these reports are given in "R" values, from R1 to R9, and there is no standardisation. It is usual to give R1 as an indication that the signals are only just audible, and R9 for those signals which are heard at full loudspeaker strength, but on most receivers it is not a simple matter to differentiate between an R8 and an R9 signal, and it may often be found that one transmission is very much louder than another, but the interval between switching over from transmitting to receiving may result in a difficulty in judging any slight difference in the strength of the received signal. Unfortunately, many amateurs use only simple types of receiver, or commercial receivers which are not provided with a calibrated dial, meter, or other

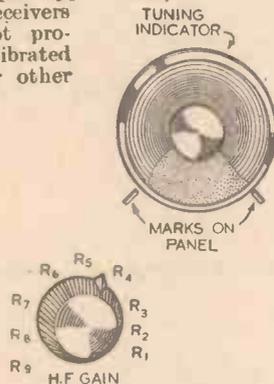


Fig. 1.—If an H.F. gain control and visual tuning indicator are fitted, the former may be calibrated to give "R" values.

indicator by means of which signal strength may be directly compared and therefore much of the value of a report during a QSO is lost. Undoubtedly there will come a time when a standard will be adopted, and this should be based upon the actual signal input to the aerial compared with the audio output—microvolts input against watts output. This will mean complicated apparatus, or a method of calibrating each receiver so that an exact measurement may be given.

Cathode-ray Indicators

Many commercial receivers are provided with cathode-ray tuning indicators, whilst others have milliammeters connected in some part of the circuit which is controlled by the A.V.C. action. In each of these cases more or less accurate signal strength measurements may be made. With a cathode-ray indicator a shadow is cast, and this varies with the signal strength. In the position of "no signal" the shadow area is greatest, and as the signals are tuned in the shadow area decreases. With a very powerful signal the lighted area may spread and overlap so that there is no shaded portion. As the carrier input affects the amount of shadow it is obvious that a control may be fitted which will regulate the input and thereby control the indications on the cathode-ray device. A good receiver will be fitted with an R.F. (or H.F.) gain

control, and this is just what is needed to control the indicator, and therefore to obtain an exact comparison between signals all that is required is to fit a dial to the control and with a pointer knob on it we may mark off settings indicating the R values from 1 to 9. For this purpose a very weak station should be tuned in, and this should be one which just causes the shaded area to close, as distinct from a station which is so weak that it does not move the indicator on your particular receiver. In this position, of course, the H.F. gain control will have to be set at maximum. A point should be indicated on the gain control dial to be afterwards marked R1. Now tune in a very powerful signal, one which you will designate R9, as distinct from an R9 plus signal. This should, preferably be one which, with the H.F. gain control at minimum, just gives the same amount of movement to the shaded area of the indicator as was obtained by the R1 signal. This point on the gain control dial must be marked R9. The intervening space between R1 and R9 may now be divided to indicate the intermediate values, and a logarithmic sub-division is to be preferred to an equal division. Small indications should be made on the panel to show the exact boundaries of the shaded area on the tuning indicator and thereafter when ascertaining a signal level all that is necessary is to adjust the H.F. gain control so that the edges of the shaded area coincide with the panel marks and the pointer of the gain control will show directly the R value. In some circuits it may be necessary to switch off the A.V.C. when making signal measurements. Although the R values as given by this arrangement will not agree with another listener's values, your own measurements will be standardised and therefore when working a station you will be able to give exact indications of changes in volume which may be effected by any changes made by the transmitter, or by variations in local conditions.

Current Meters

An anode current meter may also be calibrated for use as a signal meter, but in some circuits the meter will give a steady reading which will fall back towards zero when a station is tuned in. The meter may be in the anode or cathode circuit of a controlled valve, or of the second detector in a superhet. A low reading meter is

needed and in some circuits it may be necessary to shunt the meter with a variable resistance which may be adjusted for a "zero" setting and which may be calibrated as in the case already cited. A better arrangement is to connect the meter so that it forms part of the screen supply of the I.F. stage (the last if there are two or more). In this case a rather complicated network is called for so that a standard bridge circuit is formed, one variable element being included so that the meter may be balanced. The screen-cathode resistance of the valve forms the variable factor in the bridge and thus, by balancing it in the "no signal" condition by the variable resistance, a true indication of signal strength may be obtained on the meter.

The arrangement may be seen more

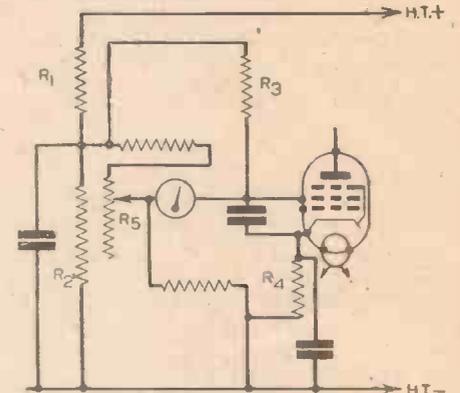


Fig. 2.—A bridge circuit for a signal strength meter: R1 and R2 are the screen voltage potential divider resistors; R3 is a screen decoupler; R4 is the bias resistor, and R5 is the meter balancing resistance.

clearly on reference to Fig. 2, which shows the essentials of the meter circuit. A potential divider is used to obtain the screen voltage, and as this may serve more than one valve a decoupling resistance must be included (R3). The bridge is formed by this network of resistances, and internal valve resistance as already mentioned, and the balancing resistance should be about 1,000 ohms.

Precautions

With all these forms of signal measurements there are two or three points to be borne in mind. Firstly, if A.V.C. is fitted it may or may not be necessary to switch this off when making measurements, and therefore before giving a report of signal strength the A.V.C. control should be operated so that reports are standardised. Similarly, if there is a B.F.O. unit this should be switched off, as it will not be used for telephony reception, and for C.W. there may be a movement of the signal indicator due to its attempting to indicate carrier level. Therefore, reports must be made with a steady carrier (without signals), or alternatively some special form of meter may have to be adopted, combining an input sensitive voltmeter with an accurate output A.C. meter.

PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM.

400 pages, 6/- or 6/6 by post

from

GEORGE NEWNES, LTD.

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ON YOUR WAVELENGTH

Is He Fey?

WE often use the expression that people talk through their hat, but have you ever considered the possibility that they may be able to listen through it? The following letter seems to suggest that someone is either talking or listening through a hat, or else the person concerned is fey—which doesn't mean that he is a fairy but gifted with some occult power. This is the letter I have received: "I am writing to you in the hope of getting your assistance and advice in a very queer yet proved phenomenon. A local medical practitioner is able to hear wireless signals from outside without the aid of any apparatus whatsoever. He has been suspected of suffering from hallucinations, but careful medical observations refute this charge. As I am the only amateur in the town, I have been approached by him to solve the mystery. I remember reading on occasions some such cases reported, and I should be much obliged if you could inform me of any literature on this subject or any tests which I can apply."

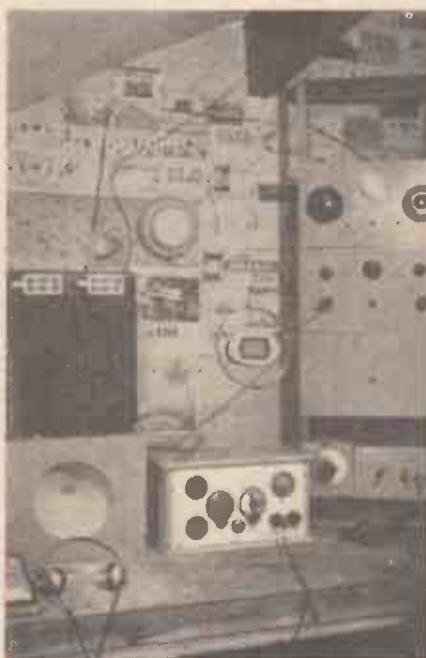
I cannot trace any literature on this subject, nor do I believe that any person can receive wireless signals without apparatus, otherwise he would be suffering noises in the head, reminiscent of the Tower of Babel, all day long and all night. I suspect a catch somewhere. An easy test would be to have the person concerned thoroughly examined to make sure that there was no apparatus secreted upon him, and then to put him in a room out of earshot of any wireless programme radiated by a wireless set, and to have another individual in another room receiving a programme from a foreign station, preferably one whose programme has not been announced. This assistant should make a note of the items, and then ask the fey one to name them. I am certain that he will not be able to answer such a test. There are still people who would believe in the impossible, and who think that in future instead of buying a wireless set we shall only have to take a dose of ether—the right type of ether, of course!—in order to be able to pick up the world's wireless programmes. I dismiss the suggestion with contumely.



By Thermion

Wireless Licences

THE Post Office issued 455,174 wireless receiving licences during May, this figure representing a net increase of 21,544 in the number of licence holders during the month, after making allowance for expired licences and renewals. The approximate total number of licences in force at the end of May, 1939, was 8,984,250, as compared with



A corner of Mr. H. Simpson's wireless den.

8,627,860 at the end of May, 1938, an increase during the year of 356,390. During the month there were 536 successful wireless prosecutions.

Radiolympia Suggestion

ONE of our keen members of the B.L.D.L.C. makes the suggestion that it would be a good idea if various members of the B.L.D.L.C.

got together a Radiolympia party and visited the Show. They could then fix up future meetings, have a Dinner at Radiolympia and invite the Editor or Thermion to be present. If any B.L.D.L.C. reader is interested in the suggestion I shall be glad to act as compere.

Wireless Dens

PROPOS my remarks recently concerning wireless dens, H. S. (Bradford) writes me as follows: "You made a remark, 'littered with wire and apparatus.' Never O.M.; the true fan takes a pride in his attic, or den."

He also encloses a photograph of his den, which I reproduce on this page.

Mr. Gerald Cock on Television Prospects

MR. GERALD COCK, B.B.C. Director of Television, who has just returned from a visit to the U.S.A. where he has been inspecting the progress of television there, addressing a gathering of the Radio Manufacturers' Association recently said: "England still leads the world in television, but American interests are watching us."

"The National Broadcasting Company, Columbia, the Film Industry, the New Deal itself, all these organisations with their vast resources are waiting to take up television at the point to which we have brought it."

"It behoves this country to move forward in the television field at such a pace that we still continue to maintain our lead."

"If only this country will go on developing television, the rest of the world will come to us for television equipment, not only for receivers, but for the transmission equipment itself."

"In every country of the world, except England, television is in the experimental stage. In this country, it is already a practical proposition."

"We know we have a three-years lead on the others. It is up to us to maintain this lead while offering the results of our experience to other nations with the object of helping them to enjoy the facilities we already possess."

Mr. O. C. Stanley, Chairman of

the Television Development Sub-Committee of the R.M.A., said that the sooner the whole of the people of Britain were given the facilities of receiving television, the more certain we should be of providing a new market for British export and a new source of employment for British labour.

The Radio Industry in this country has expended vast sums of money in bringing television to its present state of perfection. The officials of Alexandra Palace had always done their best to co-operate in this work.

It was now up to the Government and the Post Office in particular, to assist in enabling the Radio Industry to reap the reward of its labours in providing the facilities for Provincial transmission.

Ammurricanese

A HUNDRED per cent. Tough Guy Ammurrican from Chicago, replies to "Thermion's" criticism of American "English."

"TOUGH GUY"

Huh! So ya won't talk Ammurrican, hey?
Well, listen, big shot;
Jes' cum ovah here to Ammurrica,
An' we'll put ya on de spot.
Caise ya caint pull dat stuff on us, Buddy,
Fer de English we talks is "O.K."
An' Ah guess, when it comes to talkin',
De Limeys is beat any day.
Caise de hunner per cent. Ammurrican,
He sure can spill de beans;
He can talk all roun' de clock, brother,
An' say things in betweens!
Waal, maybe yer up in raddio,
"Okey-Dokey" yer second name,
Although in lil' ole England
As "Thermion" yer known ter fame.
But ya gotta get dis, ole timer,
If ya wanna come out on top,
Ya mus' learn Ammurricanese, bo,
Caise dat language ain't gonna stop.
Dead on da schnozzle it gets ye,
An' it bites like a gol-darn bug.
Don't yer B.B.C. give lessons
When de songs dey starts ta plug?
Don't dat brifig home de bacon,
An' de British public please?
Dat puts yer in big money
When ya writes in Ammurricanese.
When yer jaws on yer "gun" keeps
a-workin',
An dey sees ya's a poker face,
Dey knows yer ain't never yaller,
An der's more. . .

THEMION: Sure! But dey
ain't no space!

"TORCH."

Television Features

IT is interesting to note that television programmes are becoming more and more entertaining. For instance, Ruth Draper, the famous American diseuse, will perform selections from her repertoire before the television cameras at Alexandra Palace in the afternoon and evening programmes early in July. It is believed that Miss Draper's unique art will be specially suited to the television

Notes from the Test Bench

"Live" Spindles

THERE are still many components on the market in which the spindle is in direct contact with the moving element and thus difficulties are sometimes introduced when such a component has to be mounted on a metal panel. The difficulty is usually encountered with volume controls as it is often necessary to join the moving contact to a grid or similar point which must on no account be earthed. One simple way of overcoming the difficulty is to use insulated bushes for mounting purposes. These consist of two "dished" washers and are obtainable from such firms as Messrs. Bulgin. One is placed on each side of the panel and a larger hole than usual is called for so that the washers may be held immovable. An alternative idea, and one which possesses a further advantage, is to mount the component on a bracket on the baseboard or chassis (using, of course, an insulated bracket) and then to operate the control through an extension spindle of the insulated type.

By-pass Condensers

IT is usual in H.F. circuits to specify non-inductive condensers for by-pass purposes, but it is also important to remember that the usefulness of these condensers may be lost if they are not correctly positioned. They are used in conjunction with a resistance and this prevents the passage of H.F., whilst the condenser carries it away to earth. Therefore a length of wire between the point to be by-passed and the condenser will carry such currents and may lead to trouble due to radiation or interaction. Consequently, by-pass condensers should always be joined direct to the point being by-passed, and the other side of the condenser taken to the nearest earth point.

H.F. or L.F.?

THE design of multi-valve receivers calls in a number of problems, one of the most important being the use of H.F. or L.F. stages. In some receivers there is also the question of I.F. Tests will show that in some cases the H.F. and I.F. stages will give an increase in volume, but also an increase in the noise level. On the other hand, L.F. may provide an increase in volume without unduly raising the noise level. Two H.F.'s are regarded as the practical limit, and in most superhets it is not practicable to use more than 3 I.F.'s, one being preferable from a noise point of view. Three well-designed L.F. stages will give good volume without noise.

medium as much of the action can be performed in close-up. Accustomed as she is to holding the stage by herself, and yet taking the parts of many people in a single sketch, she will be able to concentrate on the cameras to a degree that is rarely possible in the more normal television performance in which a number of actors are engaged.

Ruth Draper will appear for a quarter of an hour in the afternoon, and half an hour in the evening. Television production will be by Eric Crozier.

"Fiat Justitia"

DESMOND DAVIS, the television producer, set a new fashion with "O Mistress Mine," a series of famous love scenes which were televised last January. On July 1st, a new motif—Justice—will be the main-spring of a programme, entitled, "Fiat Justitia," in which excerpts will be given from famous trials of literature and drama.

The first is "Like Will to Like," dating back to the sixteenth century, by one Ulpian Fulwell—"very godly and full of mirth"—and selections will be taken from Shakespeare's "Much Ado About Nothing," A. P. Herbert's "Misleading Cases," Galsworthy's "The Silver Box," and Elmer Rice's "Judgment Day."

Interspersed will be excerpts from the Trial Scene in "Alice in Wonderland." The cast includes D. A. Clarke Smith, Jessica Tandy, Barbara Nixon, Alan Wheatley, and Newton Blick.

"Me and My Girl": July 17th.

B.B.C. television cameras will pay a return visit to the Victoria Palace—the home of the "Lambeth Walk"—on the evening of July 17th, to bring viewers another performance of "Me and My Girl," and thus repeat one of the most successful experiments—judged by viewers' letters—yet carried out in televising direct from a theatre.

"Me and My Girl" was first televised from Victoria Palace on May 1st. Since then Lupino Lane has fallen into the orchestra more than eighty times. He has never missed a performance. Altogether, he has made over a thousand appearances. The cast includes George Graves, Teddie St. Denis, Doris Rogers, and Betty Frankiss.

Victoria Palace is conveniently situated for television. Just outside runs the special television cable, which encircles the West End of London, and gives direct communication, via Broadcasting House, with the transmitter at Alexandra Palace.

SHORT-WAVE SECTION

(Continued from previous page)

This advice should not be ignored, as it is most desirable, for obvious reasons, to avoid peaking due to choke resonance within the specified tuning range.

In series with the H.F. choke is the first L.F. choke, which is, of course, an iron-cored type of similar construction to the output choke, but with different characteristics. The same type is used in the first L.F. plate circuit and is of 100 henries, whilst a 32 henries output choke is used in the final stage.

It will be noted that in the theoretical circuit, Fig. 1, the cores are shown earthed to the chassis. As the original ones used by the writer were of the metal case type, earthing was carried out by means of a fixing bolt which made sound electrical and mechanical contact with clean metal and the chassis foil, respectively.

Where bakelite case L.F. chokes are used, the core is earthed via a separate terminal provided for the purpose. In addition, the individual chokes are arranged so that the fields will not produce interaction, being mounted at ninety degrees to one another.

The well-tried parallel method band-spreading is used, and has much to recommend it, and whilst the band-spread condenser is of 15 m.mfd. capacity, this may be modified according to the amount of spread desired by the individual. A spread of 80 degrees on the 40-metre band is advised, and in any case should be less than the full dial scale in order to include the commercial marker stations at each end of the band.

Layout of Components

Passing to Fig. 2, we have the general layout of the component parts. If sufficient ceramic low-loss type valveholders are to hand, these should be used. If not, the detector valveholder and coil base should be of the low-loss type.

The layout, as shown, is a very satisfactory one, and the original receiver is built on a foil-lined wooden chassis, and totally enclosed in a steel cabinet complete with steel panel.

The bandsread, reaction control, and on-off switch are mounted on the front panel, whilst the band-setter is mounted on the left-hand side of the cabinet.

In certain instances the writer has used this arrangement for a number of years, and provided that the band-setter is fitted with a slow-motion dial, as in the case of bandsread and reaction condensers, the receiver will prove very easy to operate.

The Eddystone bandsread kit could be used to advantage in a receiver of this type, although not used by the writer. In any case, once the use of the controls have been mastered and the various band-

settings have been noted, operation will not raise any difficulty, and the general scheme will be found to reduce wiring to the minimum.

It is general practice where a metal panel is used to omit the lead coupling the moving vanes of the band-setter and spreading condenser, and depend on the direct contact with the metal panel.

As modern receivers are capable of working down to 10 metres without modification, as in this instance, the writer does not recommend this practice, and strongly advises that the two condensers be wired in parallel, as would be the case if a metal panel were not used. Eddy current effects which might be experienced will thus be avoided.

There is another point which concerns the wiring of the filament circuit in that

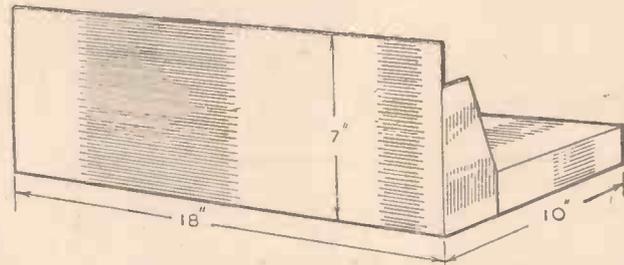


Fig. 3.—Details of panel and chassis.

sometimes constructors take the earth-potential side of the filament circuit directly to earth from each valveholder, via the chassis. It is better to wire through and earth to the chassis from the final stage valveholder.

Output-choke Arrangements

Whilst it is possible to build a stable short-wave receiver and omit output-choke arrangements, much trouble would be avoided relative to instability and feedback if such arrangements were incorporated as standard. In this instance they should not be omitted, especially if it is desired to use the receiver in conjunction with an A.C. H.T. eliminator. Apart from the factor of efficiency, the safety factor shouldn't be forgotten, as headphones are to be used.

Whilst the physical dimensions of the L.F. chokes cause the layout to be less compact than would otherwise be the case, the constructor can, if care is exercised, obtain a balanced layout and reduce wiring to the minimum by using wire-end type .0005 mfd. condensers and Erie wire-end resistances, both of which can be supported by the wiring of the receiver.

Fig. 3 shows the dimensions of a suitable wooden chassis complete with metal panel. The chassis should be of robust construction, with wooden brackets trenched into the chassis ends, thus avoiding panel whip, which eventually leads to loose connections,

and cutting out crackling effects, etc. Copper or tin foil may be used to line the underside of the chassis, and direct earth returns made to it by means of small bolts with twin washers and lock nuts.

Performance

A few remarks concerning the performance of the original receiver will give some idea as to the results to be expected, other things being equal.

The fact that choke-capacity coupling went out of favour with the early constructors of broadcast receivers was because the L.F. choke in itself does not provide any voltage amplification as in the case of the L.F. transformer. Consequently, we depend for amplification on the valves themselves.

In the writer's opinion choke-capacity

coupling thus offers the short-wave headphones-type receiver enthusiast an advantage which is a useful aid to DX listening, in that whilst the stage gain is comparatively low, a useful measure of amplification is obtainable without undue increase in noise level or background.

Thus we are enabled to make full use of the sensitivity available, and the result is a clear signal of good quality.

One of the most noisy bands is the 160-metre band, and it is on this and the trawler bands that many of the multi-stage mains operated receivers fail, due to the fact that the sensitivity available is not fully usable, and, consequently, in conjunction with the H.F., I.F. and L.F. amplification, brings up the noise level beyond permissible level, and signals are lost or partially swamped by QRM.

Tests with this receiver fully justified this point of view, as clear signals at reasonably good volume were receivable, using the A2 aerial-input coupling, whilst the noise level was extremely low.

The same remarks apply to the complete band coverage, and 'phone reception on the 40-metre band was a revelation, taking into consideration the congestion experienced on this band.

In addition to 'phone reception, a receiver of this type is well worth the consideration of the C.W. enthusiast, due to its extremely low noise level.

A Call from Formosa

JFO, Taihoku, the 3-kilowatt station J logged on 31.15 m. (9.63 mc/s) announces itself as the short-wave station on the beautiful island of Taiwan (Formosa). The distance from London is roughly 6,000 miles. The studio possesses a woman announcer, opens and closes its transmissions with strokes on a gong, and may be heard on the air daily from B.S.T. 14.00.

Add to Your List

THE *Emissora Nacional de Radiodifusao*, the Portuguese State Broadcasting organisation, has inaugurated another short-wave transmission on 41.32 m.

Leaves from a Short-wave Log

(7.26 mc/s). The call letters are CSW8. Broadcasts are only made on Saturdays, Tuesdays and Thursdays from B.S.T. 22.00-23.00.

Japan Assumes a Title

IN the broadcasts destined to overseas listeners the Tokio (Japan) transmitter gives out that "This is the Tokio,

the Metropolis of Japan and capital of the Land of the Rising Sun."

From the Land of Coffee Trees

TI4NRH, Heredia (Costa Rica), on 30.95 m. (9.69 mc/s), usually opens its broadcasts with a bugle call, followed by the announcement in Spanish and English to the effect that the transmission emanates from *La Voz del Comercio* (The Voice of Commerce), installed at Heredia, the city of flowers "in the Land of Coffee Trees" (Costa Rica). Its signals are well heard between B.S.T. 02.00-03.00, when, as a rule, a special concert is given for North American listeners. The programme closes down with the playing of the "March of the Toy Soldiers."

VARIABLE-PITCH AUDIO OSCILLATOR

(Continued from previous page)

For preference, the majority of the wiring should be carried out with tinned copper wire, covered with sleeving as the soldering is carried out; this provides a clean and durable job.

As the above chassis view of the wiring gives a slightly complicated aspect, it will possibly help beginners here if this is detailed as follows.

The choke wiring should be attempted first of all, the position of this component will have been checked when mounting so that the red and black leads are to the right, as shown on this page.

The coloured leads should be carefully chosen and soldered to their respective points on the pitch-control switch, this giving an increase in inductance from left to right, looking at the front of the oscillator.

'Phone Jack and Volume Control

With the potentiometer contacts at the top, as shown, the left-hand side contact and the centre contact only are used, these being wired directly to the two jack contacts immediately underneath the potentiometer. A wire should then be taken from the centre contact of the potentiometer to the wiper-arm contact of the five-position switch.

One side only of the key jack J2 is wired, and this is taken through hole No. 6, using flex, out through the grummet hole in the rear-chassis runner (Fig. 5), terminating in a wander plug for H.T. negative. The H.T. positive flex passes through hole No. 5 and is connected to the jack contact which is common to the potentiometer centre contact and switch wiper; the other wire from the jack (sleeve) passing through this hole goes to the screen-grid socket of the valve-holder (S.G.).

The on/off toggle switch is connected to one filament socket of the valve and passed through the other grummet hole to the L.T. positive wander plug, the leads from this switch passing through No. 4 hole in the chassis.

Also from this filament socket is taken a lead through hole No. 3 to one side of the 2v. 60mA pilot bulbholder, the other side being commoned to chassis by soldering a bare copper wire to the panel-fixing bush nut. The rest of the wiring is clearly illustrated, and if care is taken in the soldering, a lasting job will result.

There is one other point concerning the wiring, and this is with regard to the red

and black leads from the choke, which pass through holes 1 and 2. To prevent these frail leads wearing against the edges of the holes, a short length of sleeving should be worked over these wires also.

A little experimenting will soon accustom the operator to the use of the instrument, and the many test purposes which can be fulfilled by this simple audio oscillator will make its construction well worth while.

For example, it may be found particularly useful as a capacity-fed oscillator adapter for measurement purposes in connection with the design or servicing of audio amplifiers, or again by the easy expedient of fitting a couple of test prods in place of the morse key, a useful continuity tester will be provided, due regard being, of course, given to the question of H.T. voltage used in this instance.

With regard to the ultimate finish of the job so far as a suitable cabinet or box is concerned, fixing holes are not included in the diagram, as this is an optional feature, but this should be determined beforehand so that the panel or chassis can be drilled appropriately before the components are mounted.

The Bulgín I.P.7 dial plate is recommended for the volume control, but as there is not available an undesignated five-position dial plate suitable for the pitch-control, it is suggested that (and as adopted by the writer) a white card disc be cut and marked off in increments of 30° for the switch location.

Finally, there is one further consideration with regard to the on/off toggle switch. If desired, the L.T. switching can be carried out through a combined potentiometer and switch movement, but as it is often desirable to leave the volume control set for test purposes, this is only possible by utilising a separate on/off switch as adopted here.

Mains or Battery

Many readers will, no doubt, feel that a mains version of this particular unit would be of use, but we must point out that there are many difficulties in the way of designing such a unit. One of the most important of these is the question of hum, and although hum itself can be an annoyance, the fact that the hum is caused by

a ripple in the H.T. supply will give rise to several difficulties—due to the ripple setting up beats with the oscillator. Furthermore, the battery unit will be found to offer certain advantages in the average "den." We must also point out that, with this as with all designs published in these pages, we are unable to enter into correspondence regarding the use of existing or substitute parts in place of those which are specified. It is quite possible that alternatives would work, but in many cases before a definite decision can be given tests have to be carried out, and, therefore, to ensure that all results obtained are identical we must insist upon the use of the parts which have been originally used by us.

WIRING DIAGRAM

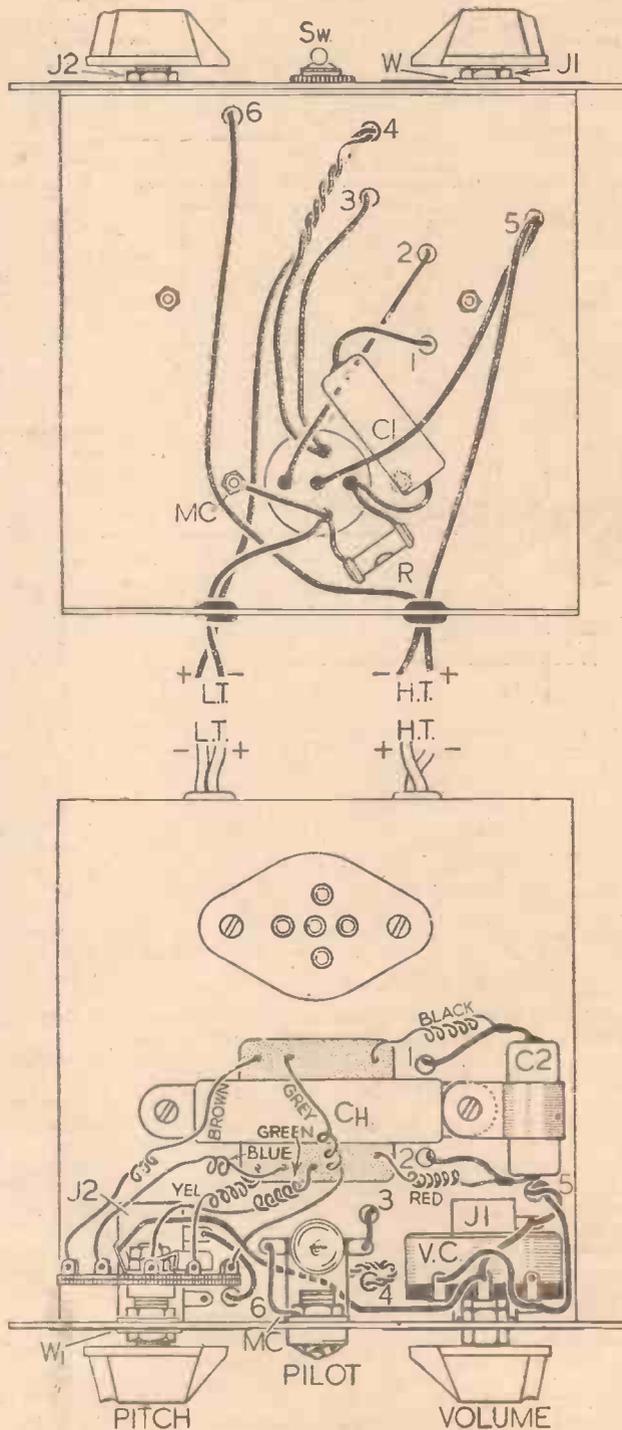


Fig. 5.—Above and below chassis wiring diagrams.

- LIST OF COMPONENTS FOR A VARIABLE-PITCH AUDIO OSCILLATOR
- Condensers (fixed): Two type 4601 S .01 mfd. (Polar N.S.F.).
 - Resistors (fixed): One 100,000 ohm 1/2 W. (Erie).
 - Potentiometer: One type Ex. Rabidus (V.4) (Polar N.S.F.).
 - Tone-Control Choke: One type L.F. 43 (Bulgín).
 - Jacks: Two type J.2 (Bulgín).
 - Jack Plugs: Two type P.38 (Bulgín).
 - Pilot Light: One miniature signal-fitting (red), type D.19 (Bulgín).
 - Pilot Light Bulb: One type B.206 (Bulgín).
 - Rotary Stud Switch: One type S.119, with two fibre-embossed washers, type 1058 (Bulgín).
 - On/off Switch: One type S.80T toggle (Bulgín).
 - Wander Plugs and Spades: Two No. 14 spade terminals—red, black (Clix). Two No. 5 master plugs eng'd H.T.—, H.T. + (Clix).
 - Instrument Knobs: Two No. K.92 (Bulgín).
 - Dials: One type I.P.7 (Bulgín).
 - Valveholder: One type V.117 (soldering) (Clix).
 - Valve: One type P.P.2 (L.F. pentode) (Tungsram).
 - Chassis: Peto-Scott.
 - Miscellaneous: 6BA.Rd.Hd. 1/2-in. brass bolts and full nuts (Bulgín). Shakeproof washers (Bulgín). 18 S.W.G. T.C. wire (Bulgín). Sleeving. Flex.

A PAGE OF PRACTICAL HINTS

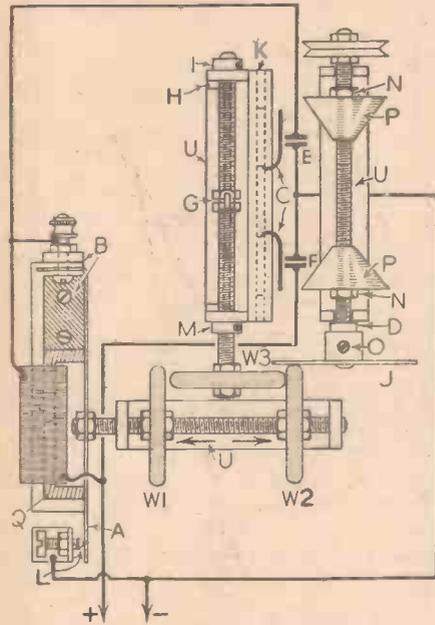
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Motor-driven Coil-winder

BECOMING tired of the slow hand winding of solenoid coils, etc., I devised an automatic winder, driven by a small electric motor, as shown in the accompanying illustration. Most of the parts were discovered in my "oddmens" box. The supports are of 7-gauge brass,



General arrangement of a small motor-driven coil-winder: A, Armature—soft springy iron. B, Magnet mounting bracket—stout brass. C, Adjustable contacts—thin brass. D, Collar—soldered to shaft. E and F, Open contacts—theoretical. G, Wire guide—screwed on shaft. H, Wire guide runner—slotted slackly in groove in guide. I and M, Collars soldered to shaft. J, Pliable disc—attached to collar—held on shaft by O. K, Contact slides—brass or copper—soldered to support. L, Keeper contact. N, Cone-nuts. O, Grub screw—in collar. P, Hardwood cones. Q, Laminated magnet core.

bent "U" shaped. The former-holder support is mounted on a plywood baseboard, together with the driving motor, the base being fixed to the baseboard proper by means of slotted holes, enabling the disc J to be moved along W2 so altering the speed of guide G to suit various gauges of wire and diameters of formers. It will be observed that in the former-holder the metal above the shaft holes is cut away so that the shaft can be lifted direct from the support. The disc J is made to press firmly on to W2 and locked there by the grub screw O; to mount a former the disc, cone-nut and cone are removed, after, of course, lifting the shaft from its support. The former is then placed over the shaft and the cone, cone-nut and disc replaced, tightening the former by means of the cone-nut. The wire-guide G consists of a piece of large gauge wire, twisted to form an eye,

THAT DODGE OF YOURS!

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.

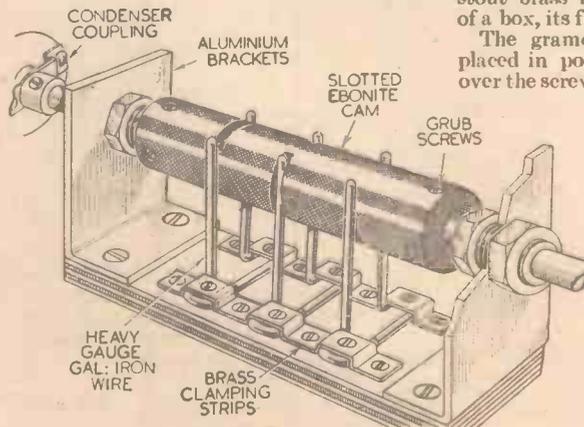
SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page iii of cover.

soldered to a large nut. To prevent G turning with its shaft a groove is filed in the nut to take runner H (shown in dotted lines). The guide shaft support extends above the shaft holes to allow the fixing of the contacts slide, which is made up of two copper channels soldered to the support. Two pieces of ebonite are cut to slide between the channels, at a tight fit. A piece of thin springy brass is mounted on each piece of ebonite, cut and bent so that the springy brass does not touch the channels except when the wire being wound is brought against it by the movement of G. The movement of G is controlled by the electro-magnet engaging and disengaging W1 and W2, the magnet is operated by the closing of E and F.—FRANCIS MURPHY (Darlington).

Station-locating Movement

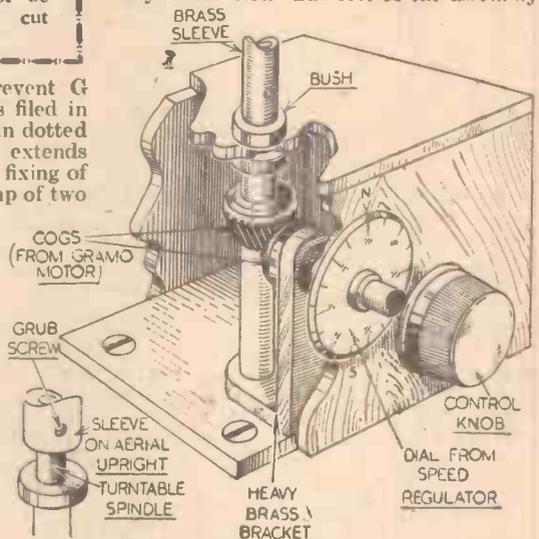
WITH a long ebonite former, or rod, obtained from an obsolete wave-change switch, and some heavy gauge galvanised iron wire I have constructed a novel station-locating movement, as shown in the accompanying illustration. The existing holes in the ends of the ebonite "cam" were first of all increased in



A simple station-locating movement.

diameter and depth, to take two short lengths of 1/4 in. shafting for the condenser and drive coupling, and end bearings.

Three positions of the tuning condenser were required, so after bending and clamping down three wire spring assemblies, with a common strip of reasonably heavy gauge brass, as shown, the exact positions of the stations received were scribed on the ebonite, indicating the correct centres for the cam slotting. After making the slots and re-assembling, each slot was taken in turn, and with a pair of strong pliers, the locating wires, or springs, were "tensioned" by adjusting near the clamping strip with the wire in each case resting fully in the slot. The rest of the assembly



A pictorial view (part broken away) of a novel aerial direction indicator.

details will be clearly seen in the illustration.—N. G. SOUTHALL (Ilkeston).

An Aerial Direction Indicator

THE calibrated direction indicator illustrated is constructed mainly from disused gramophone parts, a bracket of stout brass being attached to the bottom of a box, its front surface flush with the side.

The gramophone spindle with a cog is placed in position, and a tubular support over the screw fixing the right-angle bracket, holds the whole upright section firmly. Another cog and spindle is placed at right angles, the two cogs being enmeshed, and the spindle passed through the side of the box with the speed regulator dial attached. A control knob turns the whole, and by the addition of the points of the compass a record can be kept. The aerial is attached by slipping a brass sleeve fixed to the upright over the turntable spindle and tightening a grub screw.—H. GRAHAM (Rugby).

CAR-RADIO EXPERIMENTS

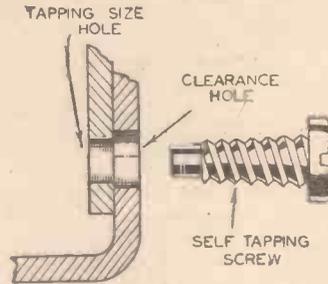
Some Hints on the Construction of an Experimental Car-radio Receiver, as Well as Different Types of Car Aerial

By Frank Preston

ALTHOUGH last week some of the difficulties of making a car-radio receiver at home were explained, the article did not cause readers to lose interest and hope. In fact, it probably had the reverse effect—of “whetting the appetite” of many of those who are determined to give car-radio a trial. Consequently, I propose this week to be rather more constructive and to show how you can at least approach the subject; at the same time the difficulties mentioned cannot easily be overcome.

It is evident that many readers are not particularly anxious to have a “pukka” outfit, as long as they can take radio with them in the car. When that is the requirement, most of the difficulties are obviated. If you are prepared to build a small four-valve superhet with A.V.C. you can obtain satisfactory results while the car is stationary or when travelling along quiet, open roads. It is probably most satisfactory to employ four-volt A.C. valves—since the set will also be used in the home—and to use a battery for H.T. and G.B. supply. Low-tension can be obtained from the car battery by taking a tapping, unless the battery is of the latest type in which the inter-cell bus-bars are covered with pitch. When the set is used in the home, H.T. and L.T. can be ob-

When workshop facilities are available, it is best to build the receiver on a metal chassis and to house it in an aluminium case which will act as a complete screen. Care should be taken that the joints are



A form of self-tapping screw which is convenient when making a metal containing case.

a close fit and that they are bolted together at a number of points. For this purpose manufacturers frequently make use of self-tapping screws; to fit these it is necessary only to drill a clearance hole in one member

and a tapping-size hole in the other and then to force in the screws with a big screw-driver. The screws then cut their own thread and make a sound job. Sheet aluminium of about 20-gauge is probably the most convenient, and is not very expensive when a polished surface is not required.

Remember to provide holes or louvres in the containing case to permit of ample air circulation round the valves. If holes are made, screening will be more complete if they are covered with copper gauze.

In mounting the receiver chassis it is best to use rubber bushes, to allow the chassis to “float,” whilst the interior of the container should be lined with rough felt. This can be fixed with ordinary glue. It is also desirable to fit rubber washers between the speaker and the case to reduce resonance effects. The outside of the box can be finished with cellulose to look fairly respectable when used in the home, but the more expert worker might prefer to give a crackle finish, or to have the box finished in this style after finding that the receiver operates satisfactorily.

Position of the Set

It is generally desirable to have the receiver near to the bulkhead of the car, since that is most convenient for the aerial lead-in and battery connections, but if it is found that it restricts foot-room to too great an extent the set can be mounted in the rear compartment. It is very important that the metal container should be

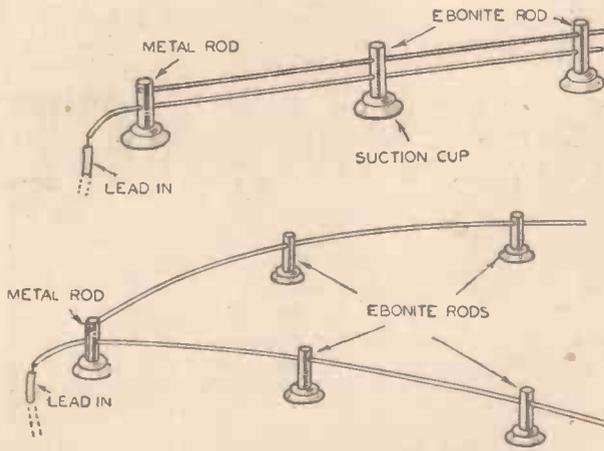
well earthed by means of heavy cable or copper braid. The earth lead should be as short as possible—seldom need it be more than a few inches—and it should make perfect contact with the container and with the earth line of the receiver. When the receiver is in front, earthing can be to the steering column or to a bolt through the bulkhead. Alternatively, it might be possible to make a good connection to a chassis bolt if the cable is passed through the floorboards; this also applies when the receiver is in the back of the car. In this case, it will often be found that there is a convenient bolt underneath the rear seat cushion.

Earthing

The earth-return will, of course, also act as one side of the L.T. supply. Take great care, therefore, to find whether the positive or negative side of the battery is earthed. The second L.T. lead may consist of the “black glossy” cable used for the car-wiring circuits, but it is often better to use screened wire, earthing the screening braid every foot or so of the run. This connecting wire should have a low resistance, so if its length exceeds about four feet it will be better to use two twin wires in parallel. Do not omit to include a fuse in this lead, mounting it accessibly—a value of about 10 amp. will generally be as convenient as any. Most manufacturers use a fused connector for this lead, and that is the best arrangement.

Type of Aerial

Consideration must next be given to the aerial, bearing in mind that, at best, it can be only of comparative low efficiency. Consequently, a make-shift arrangement is not likely to prove very satisfactory. As a general rule, a roof or fishing-rod type is most satisfactory, although under-car and running-board aerials are often surprisingly effective if accurately proportioned.

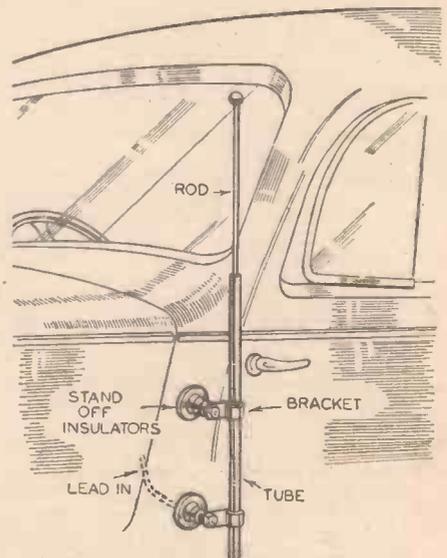


Two types of roof aerial which can be bought ready-made or can be built by the practical man.

tained in the usual manner from a mains unit. Two-volt battery valves can be used, but they are rather less robust mechanically, and do not give as high a degree of magnification. Nevertheless, if the house is not wired with A.C. the large amount of current required from an L.T. accumulator is prohibitive.

Receiver Details

It would not be possible to give full constructional details of the receiver itself in the space of this article, but the more advanced constructor will not find great difficulty in adapting one of the many circuits which have previously been given in these pages. For the benefit of those few who still fight shy of the superhet it can be mentioned that a good four-valve “straight” circuit with two H.F. stages, A.V.C. and pentode output will behave fairly well in good conditions.



The fishing-rod type of aerial shown here is becoming increasingly popular.

CAR-RADIO EXPERIMENTS

(Continued from previous page)

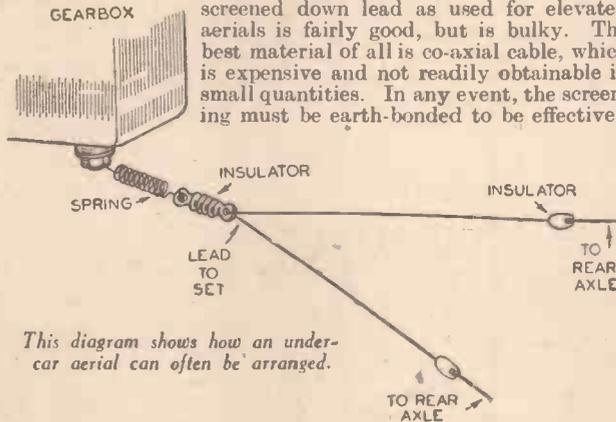
The aerial can be bought ready-made, and many of the roof-type now available are provided with rubber suction cups which can be securely attached to the roof by using liquid glue and pressing the cups tightly against the metal roof. Details of two common patterns are given in an accompanying illustration, and from this readers can probably devise a form of construction which is within their capabilities.

Bear in mind that some of these aerials are covered by various patents, and that anyone making similar ones for sale would be liable to prosecution for infringement! It is not likely that any trouble of this kind will be experienced if you make an aerial for your private experimental use.

Plated copper rod or a white-metal alloy is most suitable since it will not discolour, but bare copper wire or small-diameter tube can be used experimentally. It will be seen that both types of aerial shown are virtually of doublet type, although in one case the two arms are so close together that they probably act as a single lead of large area. Large suction cups are required, and the rods or tubes are carried in insulators except at the front, where they are both connected together.

The Lead-in

The lead-in can be passed through a small hole bored through the front edge of the roof above the screen or, when there is a sliding roof, it can be wedged between the forward edge of the sliding portion and the fixed part. In many cases it is found that ordinary flex can be used for the down lead—although this is likely to pick up interference from the ignition system—but screened material is better. The capacity of ordinary screened wire, however, is too great. A length of special screened down lead as used for elevated aerials is fairly good, but is bulky. The best material of all is co-axial cable, which is expensive and not readily obtainable in small quantities. In any event, the screening must be earth-bonded to be effective.



This diagram shows how an under-car aerial can often be arranged.

Rod Aerials

The fishing-rod type of aerial is becoming increasingly popular and proves very effective. Essentially, it consists of a small-diameter tube in which a length of thin rod fits fairly tightly. The rod can be extended or closed according to the required sensitiveness of the aerial. In

some instances there are two concentric tubes in addition to the extensible rod, and metal workers will not find very much difficulty in devising a suitable device. The rod is carried in a couple of insulators with suction cups or bolts and attached to the rear side of the scuttle, between the rear edge of the bonnet and the front of the door. A small hole must be bored to take the lead-in. There is on the market at least one fishing-rod type aerial which can be fitted to the door hinge, where this is at the forward edge of the door, and it is not difficult to devise simple brackets to fit the hinge pins (or new, longer pins) and to support the insulators which carry the aerial rod. When the car is not new there might not be any objection to drilling the bodywork to take a couple of ordinary stand-off insulators, which will give excellent support to the aerial.

Whether using a roof or rod aerial it will probably be necessary to remove the interior trimming to thread the lead-in through the body panel. In the case of a roof aerial it will generally be found that the roof cloth can be loosened by prising off the cloth beading which runs round the edge; the lead can then be taken from the centre to the side of the roof underneath the cloth. When using a rod aerial the fibre board on the inside of the scuttle can be moved sufficiently by prising under one edge, where it is fixed with small tacks.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CANN.

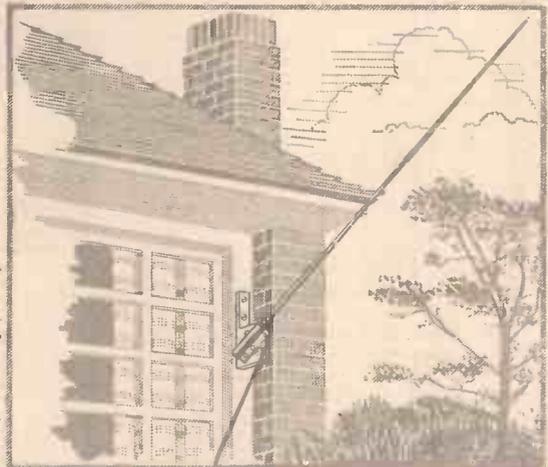
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Practical Television

July 1st, 1939. Vol. 4. No. 158.

Who Has the Lead?

THERE has been a certain amount of newspaper comment lately on the question of who is entitled to claim the lead in television. One reason for reopening the discussion was the fact that the French Minister of Posts and Telegraphs stated that the new television transmitter operating in conjunction with the ultra-short-wave aerials of the Eiffel Tower was the most powerful in the world. This was included in his reply to criticisms in the French Senate when he was pressed to make improvements in both the number and power of French radio stations, and also in the quality of their programmes. Admitting that the British radio budget was higher than the French; M. J. Julien insisted that France was not behind Britain in television. With America now definitely "on the air"; Germany anticipating a real start to synchronise with its radio exhibition which opens in a few weeks' time; Japan conducting transmissions in spite of war activities; Russia radiating signals and so on, it is as well to review what constitutes a lead in television. Surely this is dependent on two important factors, namely, the quality of the programmes, coupled with the duration of the public service. In these two important categories no one can take from this country a two-and-a-half-years' lead. When consideration is given to the standard of picture definition, the rated power of the ultra-short-wave transmitters, and the number of stations radiating programmes, then Britain is behind. While the slight differences in the line standards do not affect the issue to any great extent, there is no doubt that the B.B.C. must be given powers to erect provincial stations, and also add to the power of the transmitter. This is the only way in which this country can maintain her television pre-eminence and build for herself an export market for receiving sets and so avoid repeating what happened in the early days of aural radio's development. In every important provincial centre the campaigns for urging on the P.M.G. the necessity for extending the television service are being pursued with undiminished vigour, and the only way to remove the embarrassing position in which he has placed himself is for Major Tryon to adopt a bold policy, and start building not one provincial station, but two or three.

Good Big Screen Results

THE recent televising of the Trooping of the Colour, with its rediffusion to cinemas, proved to be a very high quality transmission. From the programme angle it lacked the excitement of an event where an unknown result was to be portrayed to viewers, but none of the glorious pageantry of the occasion was lost on those privileged to see the pictures. The technical quality of the images was very high, far in advance of the Derby, for example, but this may have been due to better camera positioning

and the use of a line feed instead of a radio link to transmit the signals from their point of origin to Alexandra Palace. There was an unexpected visitor at the New Victoria Cinema in the person of Gerald Cook, the Director of Television. He was there, no doubt, to secure first hand knowledge of the quality of big screen rediffusion,



Village children from 5 to 14 in one of the quietest parts of the Weald of Kent are given lessons by television. This is the Hurst House School, Staplehurst, and the pupils are almost all farmers' children. Citizenship and general knowledge are taught them through the study of news reels and the presentation of historic events, such as the departure of the King and Queen for Canada. Our illustration shows a lesson by television in progress at the school.

and he could not have chosen a better event for picture quality. Each item was portrayed with clarity, even to the un-rehearsed fainting of the unfortunate drummer boy overcome by the heat, and his subsequent removal from the parade ground on a stretcher by first-aid men. There was a welcome absence of tilt and bend, a feature which can so easily ruin a transmission if not watched carefully and suitable steps taken to correct it.

More Big Screen Systems

FOR a very long time the Baird and Scophony companies were the only ones who had developed big screen equipment for use in cinemas and theatres and

had installed their apparatus for actual public demonstrations. On the occasion of the Derby the E.M.I. Company showed their equipment at Hayes. According to those who witnessed the results the picture gave about 3-foot candles in the high lights, and used front projection cathode-ray tubes in which the picture passed right through the fluorescent screen to be projected on to the silver screen by means of a Taylor Hobson 14in. f-1.8 lens. The tube and lens are fixed to a pivoted housing so that they can be tilted to suit the rake of the screen. Three racks (in duplicate) are associated with the apparatus, the first containing the radio receiver, the second the picture and sound amplifiers, and the third a monitor tube and amplifiers with, of course, a remote E.H.T. unit providing the 50,000 volts necessary to feed the C.R. tube's high potential anode. It has now been established that there are at least three other radio companies who

are experimenting with big screen television systems, all of which employ the projection C.R. tube principle. Cossors are working on equipment which they state, however, will not reach a commercial stage for some months. B.T.H. are carrying out experiments at their research laboratories in Rugby, while Philips are also making progress on similar lines. How soon results will be demonstrated is a moot point, but what is established is the fact that the film industry must face up to the knowledge that they would be adopting a wrong policy to oppose big screen development, now that so many other interests are involved.

A Projectionist's Course

AS more and more of London's cinemas have big screen receivers installed it is obvious that the men who will be called

upon to operate the equipment for each rediffused programme will be the cinema projectionists themselves. It is for this reason that the Baird Company have started a school for projectionists at their factory at Lower Sydenham. Each "student" will be given a two-weeks' intensive training, as mentioned on page 361.

PATENTS AND TRADE MARKS

Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents, of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this paper.

Radio Clubs and Societies

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

EDGWARE SHORT-WAVE SOCIETY

Headquarters: Constitutional Club, Edgware.
Secretary: F. Bell, 118, Colin Crescent, Hendon, N.W.9.

ARRANGEMENTS are now well in hand for the society's first 5-metre field day, to be held on July 2nd. Ten entries are now competing, and G2QYP will be in charge of the transmitter, which will radiate each hour for five minutes. This station is also working on July 9th in the R.S.G.B. 5-metre field day. The R.S.G.B. field day was a great success, and nearly 60 people visited the camp, including a reporter from the *Daily Mail* and all continents excepting VK were contacted.

Future meetings include a lecture by Voigt Speakers, Ltd., with discussion on Practice and Theory, and 5-metre field day apparatus. Three new members joined during June.

INTERNATIONAL SHORT-WAVE CLUB (LONDON)

Headquarters: R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8.
European and Colonial Representative: Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

At the meeting of the London Chapter of this organisation held on Friday evening, June 10th, a lecture on Radio Components was given by Mr. H. T. Stott, A.M.I.R.E. (2COT). Mr. Stott dealt with the type of components generally used by radio amateurs and dwelt at length with the subject of meters. Members followed the illustrations on the blackboard with much interest. Mr. Stott also gave some interesting information on vibrators, and described the construction of power packs for use with portable equipment on field days, etc.

The International Short-wave Club extends a special invitation to all readers of PRACTICAL AND AMATEUR WIRELESS to attend a special demonstration and lecture on "Hi-Frequencies" to be given on Friday evening, June 30th, at 8.30 in the R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8 (nr. Vauxhall Station).

ROMFORD AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters: Red Triangle Club, North Street, Romford, Essex.
Hon. Sec.: Rowland C. E. Beardow (G3FT), 3, Geneva Gardens, Chadwell Heath.
Meetings: Every Tuesday evening at 8.30.

THE last month has seen great activity at Romford in direction-finding. The first joint field day was organised by the Southend Society, the results being Southend 1st, Ilford 2nd, and Brentwood 3rd. The second, organised by Romford, was attended by 39 members in 12 cars. The start was from Shenfield, and the transmitter was located near Aveley; only one car found the TX, namely, 2CWF, of Romford: he received a prize, as also did the driver. The club has been issued a licence for a Society's transmitter, the call being G4KF, for portable operation. Peto-Scott's representative (G2HK) kindly brought a Trophy receiver along for demonstration at a recent meeting. The accompanying illustration shows the Romford team who entered for the May 14th event.

EASTBOURNE AND DISTRICT RADIO SOCIETY

Hon. Sec.: T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

MR. A. ACHURCH (G2PA) gave a lecture entitled "Television Transmission and Reception" at the last meeting.

He started by saying that when selenium was discovered to give out a current when affected by light many people thought of ideas to transmit a picture by wires from one site to another. He then told of different scanning systems which were used: Nipkow's scanning disc, which was used in Baird's early experiments, oscillating mirrors, Jenkin's specially ground mirror plates, the mirror drum, and finally the cathode-ray tube which is used to-day. Campbell Swindon thought of the idea of using a cathode-ray tube as a scanning device as far back as 1903.

He briefly spoke on film transmission, the band width necessary for television transmission, and aerial systems. Lastly he dealt with interlaced scanning, D.C. modulation, and time base circuits.

CLAYESMORE RADIO CLUB

Hon. Sec.: I. H. Gordon, Clayesmore School, Iwerne - Minster, Dorset.

At the beginning of this term the club-rooms were completely redecorated inside and out. The listening-room was refurbished with a carpet and attractive wall lights. Decorating having finished, preparation then went ahead for the school Speech Day on June 10th. First a mobile truck was built for the carriage of the equipment. The main amplifiers for the P.A. work consisted of two 6L6's in push-pull fed by a 6C5, the output being fed into a Stentorian speaker with a plywood flare. Also on the truck was an electrical recording unit consisting of a powerful battery amplifier, to avoid mains hum; an electric synchronous recording motor, tracking and cutting gear. The blanks were "Shuplat" glass base 10 and



A group of members of the Romford and District Amateur Radio Society who entered for the direction-finding contest on May 14th.

12in., cut by a sapphire stylus. The mikes were Siemens ex G.P.O.

Here is a report of the proceedings of June 10th. 11 o'clock to 1: sports announcements. During the guests' lunch, at 1.15 to 2.30, the truck was moved 1/2 mile to the main school building and placed in position overlooking the lawn where the speeches were to take place. The speeches were heard through the large speakers and they were recorded. At about 3 o'clock Earl de la Warr, President of the Board of Education, arrived. The recordings were very successful. We should like to thank Mr. Swain, of Western Union Telegraphs, who is presenting the club with a microphone for its success with the recording; and also we thank the school for the equipment which made it possible.

Should other clubs be trying recording, we should like to get in contact with them.

BIRSTALL SHORT-WAVE RADIO CLUB

Secretary: Miss B. Jevon, 29, Went Road, Birstall, nr. Leicester.

THE above club has just been formed for transmitting and receiving in Birstall (Leics) and district. No special knowledge of radio is required, and new members will be very welcome. Will those interested please communicate with the secretary, who will be very glad to impart further information.

SALE AND DISTRICT RADIO SOCIETY

Secretary: S. G. O. Allen (2FCQ), 31, Emmerdale Drive, Sale, nr. Manchester.
Meetings: Weekly, on Thursday evenings, at St. Mary's Schools, Barkers Lane, Sale.

MR. ROBINSON (G5UP) lectured at the last meeting and dealt with various types of aerial systems suitable for amateur transmission on 1.7 mc/s, 7 mc/s and 14 mc/s, including a special indoor transmitting aerial on which he had carried out a number of experiments. At the close of his lecture Mr. Robinson answered a number of questions.

New members will be welcomed at any of the society meetings. Subscriptions, sixpence per week, with an entrance fee of 1s.

BARGAINS!

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ALL KITS—VALVES FREE—
"WAVE" Kits are supplied less coils to accommodate those who already possess famous B.T.S. self-locating Inductors. Matched and tested valves given FREE.
ALL-WAVE WORLD S.G.3. Wave-range 9-2,000 metres, slow-motion tuning. Station-name scale. Kit includes all parts with drilled metal chassis, transformer, etc., and FREE S.G. Det. and Pentode valves. List value £4/15/0. BARGAIN 29/6 or 2/6 down and 12 monthly payments of 2/10.
ALL-WAVE WORLD S.G.4. Employs one more S.G. audio stage than the 3-valve model and all extra components. Station-name scale. 4 valves given FREE. Astonishing BARGAIN at 42/- cash or C.O.D., or 2/6 down and 12 monthly payments of 3/9.
COILS. Complete set of 10 coils, 9-2,000 metres. List 27/6. N.T.S. BARGAIN 17/6, or add 1/6 to World Kit deposit and to each monthly payment.

ALL WAVE CHASSIS—Speaker FREE!
BATTERY MODEL. 14-2,000 metres. Amazingly sensitive SG3 Pentode output circuit. Station names. Screened coils. Steel chassis. Low H.T. consumption. A really modern replacement chassis. Complete with all valves. Matched speaker FREE! List value £5/19/6. BARGAIN 77/- or 5/- down and 16 monthly payments of 5/6.
A.C. MODEL. Unbeatable N.T.S. offer. All-world reception on 18-2,000 metres. 4 valve SG. bandpass circuit, providing 3 watts output. Station-name scale. Pick-up sockets. Fully tested. Complete with 4 valves and FREE matched enameled-type speaker. List value £6/16/6. BARGAIN 89/6 or 5/- down and 15 monthly payments of 6/9.
A.C. SUPERBET OFFER. Brand new chassis, 18-2,000 metres. Powerful 4-valve model, giving 3 watts output. Modern station scale. Fully tested, complete with all valves and FREE matched speaker. List value 7 gns. BARGAIN £4/12/6 or 5/- down and 16 monthly payments of 7/-.

BARGAIN PARCEL

Don't miss this opportunity. 1 each 2 and 3 gang variable condensers, 1 screened coil, 1 audio transformer, 3 valve holders, 6 fixed resistances, 6 fixed condensers, 1 doz. control knobs and 1 brand-new ready-drilled steel chassis. List value, 45/- BARGAIN 5/9, plus 9d. for special packing and postage. ORDER EARLY.

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Tel. City 5516.



When a neighbour be-
moaned to old White,
"My set crackles all
day and all night,"
Whitey murmured,
"Oh, yes,
That's your set's
SO S,
Just to tell you it's
needing
FLUXITE!"

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Ask to see the FLUXITE SMALL-SPACE SOLDERING SET—compact but substantial—complete with full instructions, 7/6. Write for Free Book on the art of "soft" soldering and ask for Leaflet on CASE-HARDENING STEEL and TEMPERING TOOLS with FLUXITE.

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Special Summer Sale !!!

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SECOND LIST OF BARGAIN PRICES.

For first list, see last week's issue.

Switches for Switching Anything. Snap 250 v. 5 amp., indicating, 1/2; 10 amps., 1/6; 20 amps., 1/10. Light duty switches for wave change. Semi-rotary, 6d. Yaxley and Rex Wavechange D.P. 3-way roll contact, 1/-. Bulgin 3-point wave change, 9d. Tune well S.P. or off, 8d.

Stud Switches 7-way. Box panel by R.I. for meter ranges, etc., 3/6. Larger type G.P.O., 4 sets of 10-way studs, 2 arms and rings on panel, 5/6.

R.A.I. Switchboxes. 3-way rocker type, 1/-. 6-way rocker toggle, 2/8-way ditto, 3/6.

7-Stud Panel Switch. 2 1/2 ins. sq., 3/6. 4-plus sockets, 1/9. 10-way D.P. ebony mount, 8 amps., 5/6. 12-way D.P. 5 amps., 4/-.
20-Stud Panel Switches, contact arm and rings for 10 amps., 6/6. Ditto, on iron box fitted 300 ohm. 1 amp., 20 tap resist., 10/6. 5-Stud 50 amp. slate panels, new, 25/-.
Remote Switches. Delay Switches, 250 v., 15 amps. mercury tube operated 12-volt coil, 30 secs. delay, 35/-. Mercury Switches for remote control, 6 or 12 volts coil for 5 amps., 2/0 volts, 16/-. Double-pole, 22/-. S.P., 15 amps., 20/-. D.P., 15 amps., 25/-. Mercury Tubes, S.P., 5 amps., 4/-. 10 amps., 5/-.
Transmitting Key Relays. Creed polarised, platinum 2-way contacts. Cost 37. Few only at 30/- each. Ship magnetic key relay for 10 amps., 15/-.
Trans. Valves. 30 watt triodes AT40, 4/6. T250 £2 10 0. AT40 10 watts, 4/6.
100 A.R.P. Crystal Sets with plug-in coils, 2 tuning condensers, semi-perm detector, 7/6.
Headphones. Sullivan 120 ohms, 2/9. Ericsson, Lissen and others, 2,000 and 4,000 ohms, 4/6. Single high res. ear-pieces, 2/6. Portable phones in box with bell and handcord, 27/6.
50 X-Ray Vacuum Discharge Tubes, 10. New Government Hospital Surplus, 7th. dia. bulb. Big solid Tungsten electrodes. Emission guaranteed. COST 25. SALE 10/-. Packing, 2/6 extra. With 12-volt spark coil, £3.
200 Spark Coils. Fine add, Trembler, 10 g. Medical Shock Coils, 2/-. Short-wave Spark Transmitters with tuner for distant control of robots or models by radio, 18/6.
300 Spark Ignition Coils 6 or 12 volts, 3/6. With vibrator, 4/6.
250 Neon Lamps, Miniature, 2/6. Special Bargain. Standard size better Neon bulbs with holder, 200/240 v., 1/6.
2,000 Fixed Condenser Bargains, 1 mfd. condensers 250 volts, 3 for 1/-; 2 mfd. 2 for 1/-; 4,000 volts 1 mfd. 10/-. All tested O.K.
Coils. S.W. coils plug-in, 1/6. Ribbed formers, 9d. Long-wave and B.C. 2-pin, 1/-. 3- and 4-pin coils, 1/-.
Reaction tuners, 9d. H.F. twin chokes, mains, 9d. Rugby coils 4,000 turns Long-Wave, 3/6. All wave-lengths in 2-pin, 1/3. M.I.C. 2-pin coils, set of 4, 2/9; aerial, react., long, short and multiple, 1/6. S/W Formers ribbed and slotted, 4d.
Panels. Polished aluminium, 18 and 16 gauge bright or enamelled, 12in. x 12in., 3/-. 18in. x 18in., 5/6. Ebony tin panels 24in. x 24in., for 8/6. Carr. paid.
Oak Cabinets for A.R.P. Battery Receivers, 2 or 3 valve, ovalised Jacobean, 13 1/2 in. x 7 1/2 in. x 6 1/2 in. deep, oval, black aluminium panel fitted geared, 0.005 mfd. condenser, with sunk dial 3-way range switch and a single plate condenser. Sliding back 10 terminal Strip, new. Model F, brand new, 12/6.
The Superseder makes B.T. from your L.T. 2-volt battery, rectified and smoothed. Three tappings. List £3 15s. New, sale price, 35/-.
Motors. Motors. Motors. Motors. Tiny, Small and Medium. A large stock of really fractional horse-power motors have been released at bargain prices. 300 at 218 for immediate delivery.
HOME SOUND RECORDING at low cost.
The FEIGH RECORDER fits any Radiogram, positive drive, worm gear and rack. Complete ready for use, only 37/6. Super Feigh Fidelity Set, 42/6. Tracking Gear only 21/6. Either 4-dozen metal blanks can be used or the glass-coated Simplets, 10in., 3/- each. Pre-amplifiers for Recording Mikes, 1-valve Battery Model in cabinet, 25/-. A.C. Mains pre-amplifiers, with valve rectifier, steel-cased model, 60/-.
Microphone Parts. Our Famous PARTS for making your own mike. Carbon Granules in glass capsule: Grade No. 2, 1/-; No. 3, fine, 1/6; No. 4, extra fine, 2/-; Carbon back Blocks, 4d.; Diaphragms, thin carbon, 6d.; Button in 1 1/2 in. hard wood case with 2-in. mica diaph., 2/6. Ditto, mounted on pedestal, 3/6; Single Button Mikes 1/-. 30-1 Transformers, chassis type (Philips), 1/9. 100:1 ratio, 2/-.
Fixed Condensers for odd smoothing jobs, 5,000 Mansbridge 1 mfd. Condensers to clear at 2/- doz., 20/- gross.
Parcels of experimental odd coils, magnets, wire, chokes, switches, terminals, etc., post free; 10 lbs., 7/-; 7 lbs., 5/-.
Over 1,000 other Bargains in our enlarged Illustrated 1939 List "N"
Have you got our NEW SALE LIST? FREE for stamped addressed envelope.

ELECTRADIX RADIOS

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Impressions on the Wax

A REVIEW OF THE LATEST GRAMOPHONE RECORDS

A FEATURE of the Parlophone releases for this month is a new and remarkable record by the sensational pianist, Claudio Arrau. He has recorded "Ballade in A Flat Major" on both sides of *Parlophone R 20443*. Owing to numerous requests, Richard Tauber sings, this month, "Heidenröslein" and "Die Lorelei," both of which are sung in German on *Parlophone RO 20442*.

In the 12in. Classic Series we have another pianoforte solo, this time by Eileen Joyce, who plays four short pieces, "Solitary Traveller," "Brooklet," "Butterfly" and "Melodie," on *Parlophone E 11411*. Also in this series are the Berlin State Opera Orchestra with a recording of "Eugén Onegin" polonaise and waltz on *Parlophone E 11414* and "Il Re" and Marcella played by the E.I.A.R. Symphony Orchestra, Turin, on *Parlophone E 11413*. The orchestra is conducted by the composer.

George Gershwin's famous "Rhapsody in Blue" (two parts) appears in the 10in. Classic Series, played by Orchestra Georges Tzipine, accompanied by the Grand Organ of the Gaumont Palace, Paris, on *Parlophone R 2666*. Ivor Novello's last play, "The Dancing Years," is also featured in this section with a two-part selection played by the Theatre Orchestra on *Parlophone R 2667*.

Variety

THAT "low, highbrow humorist," Ronald Frankau, deals out some more sophisticated humour with recordings of "In the Bush and on the Prairie and the Veldt" and "That's How I'd Write a Love Song"—*Parlophone 2667*. He is accompanied by Monte Crick at the piano.

Harry Roy and his Orchestra have made four up-to-the-minute numbers with "Beer Barrel Polka" and "Goosey Goosey"—*Parlophone F 1452*—and "Begin the Beguine" coupled with "Little Sir Echo" on *Parlophone F 1451*. Harry Roy also makes a vocal recording of "Small Town" and "Apple Blossom Time," on *Parlophone F 1453*.

Another popular band, Nat Gonella and his Georgians, have recorded four popular numbers—"Chopsticks" and "Patty Cake, Patty Cake" on *Parlophone F 1435*, and "Always" coupled with "One O'Clock Jump" on *Parlophone F 1436*.

Leslie A. Hutchinson ("Hutch") chooses songs from films for one of his latest records—"A Mist is Over the Moon" from the film "The Lady Objects," and "This Night," from the film "Honolulu"—*Parlophone F 1444*. For his other record, *Parlophone F 1443*, he sings two popular songs of the moment, "I Paid for the Lie I Told You" and "Begin the Beguine."

Patricia Rossborough's piano medley which she calls "My Favourites" introduces "Blue Room," "Smoke Gets in

Your Eyes," "These Foolish Things," "Just One More Chance," "There's a Small Hotel," and "Thanks for the Memory"—*Parlophone F 1448*.

Victor Sylvester and his Ballroom Orchestra caters for dance enthusiasts with strict dance tempo recordings of "Apple Blossom Time" (quick-step) and "A Mist is Over the Moon" (slow foxtrot) on *Parlophone F 1437* and "Angels Never Leave Heaven" (quick-step) and "Waltz of my Heart" (waltz) on *Parlophone F 1438*.

Decca and Brunswick

DECCA present, this month, the first recording of the Piano Quartet of William Walton, written by the composer in 1918-9, when he was 16 years of age. It features the Reginald Paul Piano Quartet, and the composer was present at the recording session—*Decca X 239-41*.

Of the foreign records now issued, three more of the Liszt Hungarian Rhapsodies, played by Borowsky, are published—*Decca LY 6152, LY 6153, and PO 5136*.

No month would be complete for record fans without a new disc from Bing Crosby, so he obliges this month with three. First comes "Sweethearts," coupled with "Ah! Sweet Mystery of Life," by the ever popular Victor Herbert, on *Brunswick 02761*. "Deep Purple," another of to-day's loveliest songs, is coupled with George Gershwin's "Summertime," which comes from the opera "Porgy and Bess" and is regarded as the most beautiful—and the most difficult—song that Gershwin ever wrote—*Brunswick 02746*. Finally, there is a tune which promises to be the hit song of the month, "Little Sir Echo." This is coupled with the favourite "That Lonesome Road"—*Brunswick 02753*.

A negro who makes a hit this month is Tela Sowande, who was musical director of the "Blackbirds" shows and now holds a similar position for the floor show, "Dark Sophistication," at a London night club. Starring in the same show is Adelaide Hall, another famous Blackbird.

Sowande's first recording engagement is as the accompanist on Adelaide Hall's record of "I Have Eyes" and "I Promise You," on *Decca F 7049*. Playing on the first cinema organ ever to be installed in a British recording studio, he shows complete mastery of the instrument both as a straight and swing player. He also accompanies Constance Impey on her record of "Sweethearts" and "One Day When We Were Young"—*Decca F 7064*. But his most striking contribution to the June record list is as the leader of The Sowande Trio. Here for the first time we have real swing on a large organ. Accompanied by piano and drums he provides the jazz fiends with a real kick in "St. Louis Blues" and "Hold Tight," on *Decca F 7061*.

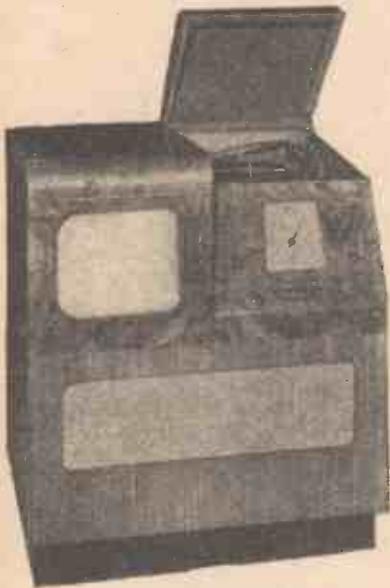
NOTES FROM THE TRADE

Tungram Change of Address

BRITISH TUNGSRAM RADIO WORKS have recently acquired extensive new premises immediately adjacent to the existing Tunggram valve factory, and accordingly all departments of the organisation have been centralised at that address. All inquiries and communications should, therefore, now be made to British Tunggram Radio Works, Ltd., West Road, Tottenham, N.17 (phone: Tottenham 4884, 4885 and 4886) and not to Theobalds Road.

New G.E.C. Television Model

THE General Electric Company announce a new luxury addition to the television market in an all-wave auto-radiogram for A.C. operation. The model, BT.0124, is presented in a superb hand-finished



G.E.C. television-auto-radiogram, model BT.0124.

walnut cabinet of modern design and is operated almost entirely by automatic press-button control. The picture size is 10ins. by 8ins., and occupies half of the upper section of the cabinet front, as shown by the accompanying illustration. The control panel is sloped and the gramophone desk occupies the minimum of space above the controls. There are eight buttons for station selection and seven additional buttons for control purposes. The first brings complete television entertainment; the second television sound only for special high-fidelity sound broadcasts; the third brings into action the gramophone equipment, and the fourth, fifth and sixth cover the short, medium and long sound broadcast wavebands. No matter which of these buttons is pressed first, it will automatically switch on the set, leaving the seventh and last button to switch it off.

The radio chassis is a 5-valve super-heterodyne, embodying A.V.C. and tone compensation, and the gramophone section will play batches of eight 10in. or 12in. records consecutively. The television chassis is an 18-valve combination. The price is 72 guineas.

Servicing Handbook

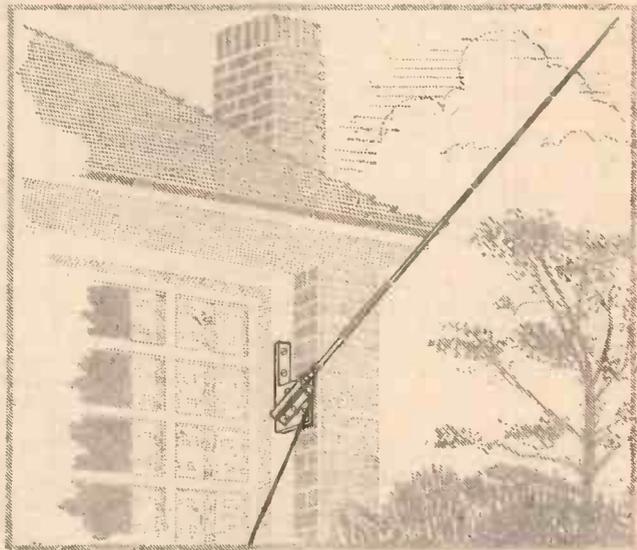
A VALUABLE booklet entitled "True Dynamic and Functional Servicing," explaining in detail how the Rider Chanalyst may be used for servicing modern apparatus, may be obtained from Messrs. Holiday and Hemmerding, Ltd., of 74-78, Hardman Street, Deansgate, Manchester, 3, for 1s. 6d. Profusely illustrated, this shows in detail the circuit embodied in the Chanalyst, and the appropriate sections of modern receivers to which it may be applied and, therefore, even if you do not intend to use one of these testers the principles of testing and fault-finding are clearly illustrated.

Morse Practice Records

MR. C. E. MASTERS, supplier of the Morse records which were recently reviewed in these columns, has changed his address, and the discs may now be obtained from Orchard House, Finchampstead Road, Wokingham. The price is 2s. 6d. each, or a series of three records for 7s., including postage. Details of a correspondence course, used in conjunction with the records, may be obtained from Mr. Masters, and the fee for this course is 3½ guineas, the fee including operating key, buzzer and 10 gramophone records.

Sky-pilot Aerial

PILOT RADIO, LTD., are supplying a neat aerial which will be found of the greatest value to flat-dwellers and others with restricted garden space, as well as to those who wish to obtain improved short-wave reception. The aerial may be attached to a chimney stack or other suitable position, or even fitted to the side of a window, as shown in the accompanying illustration. The aerial is sent out neatly boxed, and consists of a stout drilled sector mounting plate, stout screws and Rawl-plugs, and galvanised bolts, spring washers and nuts. The aerial proper is in four tapering sections, fitted together in the same manner as a fishing rod, the lower section being ¾in. in diameter and the top section approximately ¼in. in diameter. A neat cap is provided to make it weatherproof. Sufficient lead-in wire is also supplied (40ft.) to enable the aerial to be connected to the receiver under almost any normal conditions, and to facilitate installation of the aerial a booklet of instructions is supplied showing several different mounting systems. The fact that the aerial may be placed outside a window gives to the flat-dweller many advantages over the normal type of indoor aerial, and furthermore by mounting it as nearly vertical as possible, directional troubles are overcome and improved signal strength may be obtained in certain circumstances. The price of the aerial kit is 21s.



The sky-pilot "fishing-rod" aerial shown in one form of mounting. This aerial is supplied in kit form at 21s.

Addition to Pertrix "All-Dry" Battery Range

MESSRS. HOLSUN BATTERIES, LTD., announce a further Pertrix battery for use in the new all-dry battery portable radio sets. This is a 90-volt H.T. battery consisting of two 45-volt units in one block, measuring 4½ins. by 3½ins. by 5ins., and is fitted with a socket for 3-pin plug. The type number is 1485 and the list price is 9s.

Hanrad Wholesale List

HAMRAD RADIO, whose slogan is "Hams for Hams," have prepared a list of the many amateur components and accessories which they handle, and copies may be obtained on application to 32, St. Lawrence Terrace, London, W.10. The list includes practically everything required by the transmitter, including sundries such as black-crackle paint at 2s., 3s. 6d., and 4s. 6d. per tin; crystals; valves; panels; relays; cabinets; racks, etc. Full details are also given of the Super Communications Receiver which was reviewed in our recent article on this type of receiver. It will be remembered that this is a 12-valve receiver selling at £27 10s., and incorporating all those features which are desirable in a receiver of this type. We hope shortly to publish a complete test report of the model.

New McMichael Models

MESSRS. McMICHAEL announce two new models in their 1939-40 range, both all-wave superhets. One is for A.C. mains and is priced at £9 7s. 6d., and the other is a battery model at £8 15s. Both models are identical in appearance and

similar in electrical characteristics and performance. Both employ three wave-band superhet circuits covering from 18.5 metres upwards with high peak constant performance aerial couplings. The battery-operated model is fitted with an extra L.F. stage before the pentode output, giving an overall amplification quite comparable to that of the A.C. model. On both models the illuminated tuning scale is an entirely new design, sub-divided into separate sections for each waveband, fitted with an extra pointer, ganged to the wave-change switch, thus indicating the actual scale division which is in use.

RADIO BIOGRAPHY

PHIL CARDEW

INSTEAD of being a famous orchestrator and band-leader, as he is to-day, Phil Cardew, athletic fellow of thirty-five, might well have been doomed to wear a leg-brace, his promising career wrecked.

Indeed, had it not been for his own initiative, his leg, which had since his school days given him trouble, would probably have withered, giving him cause to regret ever having listened to the advice of innumerable doctors.

He was born early in the twentieth century, at Wimbledon (Surrey), son of a classical-musician father, who, as soon as Phil could hold and play a fiddle, put him in the Cardew Family Quartet, a small string orchestra well known in the district. To further his progress, Phil secretly made off to the opera after school, then had to sit up in bed when he got home, spending the early hours of the morning coping with his neglected studies!

He rightly considered opera to be an essential part of his training, but he could only afford the gallery at the Old Vic.

Still, it did him a whole heap of good, for at 20 he was playing in an amateur symphony orchestra, and naturally feeling very proud of himself. It was fifteen years later before he entered these sacred ranks again, when he became for a time a clarinetist in the Ernest Read Symphony Orchestra.

At the architectural college which he attended after his schooling, he heard one of the most successful student dance-bands of the day, and persuaded the leader to allow him to sit-in with the saxophone section, this being his introduction to jazz, which did anything but please his father!

Still, what could his Dad say when, urged by his new interest, Phil matriculated at the Royal Academy of Music, getting his coveted L.R.A.M., which comprised Theatrical Conducting and involved a certain rudimentary knowledge of scoring and harmony.

Let it be said here and now, though, that this clever orchestrator has never had an orchestrating lesson, for his ability to arrange so vividly is purely the result of his own swotting at the subject.

It seems that his inauguration to dance music proved the turning-point in his career, for he bought a saxophone ("what a horrible instrument it was!") with which to "inflict himself upon some innocent band leader or another."

He never really mastered it, and has always regretted the day he failed to take "sax" lessons, which he feels certain would have provided a short-cut to the achievements which have instead taken many years of his life to attain.

In 1924-6 he was greatly enjoying life playing at country dances, hunt-balls and the like, at a remuneration musicians can only dream about nowadays.

His first professional job worth talking about was with Jack Hylton's famous "Piccadilly Revels," at the Piccadilly Hotel, secured on the recommendation of Jack's tenor saxophonist and comedian, Johnny Raltz.

When, after a pleasant run, the Revels broke-up, Phil had to resort to odd engagements for a time, but soon had the good fortune to gain a place in Fred Elizalde's Orchestra, at the Savoy Hotel, thanks to the spade-work of Fred's guitar-player, Len Fillis, who is now in Australia and watches Phil's career with considerable affection.

Famous American orchestrators whom Phil met while with Fred Elizalde, imbued him with the ambition to retire from saxophone playing, and devote his entire energy to the use of a manuscript pen.

Phil's association with Fred came unexpectedly to an end when Fred's always superb band

crumbled after two theatre tours following its departure from the Savoy Hotel.

It was about this time that his leg gave him cause for concern. As a child he had met with a bicycle accident which set up the growth



A recent portrait of Phil Cardew.

of a mysterious disease. The limb was encased in a plaster cast, and it recovered.

But suddenly in 1926—at the height of his

career—the old trouble recurred, developing alarming symptoms. A whole army of doctors examined him and each pronounced that it looked like a case of tuberculosis and would require prolonged treatment in Switzerland to prevent the leg withering away.

But Phil just wouldn't believe it. Something prompted him to throw off the plaster cast to test whether the disease grew any worse. Instead, it miraculously recuperated and he has never experienced any further bother with it!

To revert to his unwilling break with Elizalde, Phil was not workless for long. Jack Hylton engaged him. Then came yet another triumph when Jack Payne, starting his long run at the B.B.C., made Phil his arranger-in-chief.

When Jack went on the halls, Henry Hall succeeded him and retained the services of his orchestrator. Another few years of very enjoyable work ensued, until Henry also gave up radio for variety.

Phil, however, found plenty of opportunities for his arranging and had, in fact, practically forgotten that he could do anything else when John Watt approached him to form a band for a new radio feature, entitled "Band Waggon," which could be expected to run for about six weeks.

Six weeks, indeed! The pretty-well immortal "Band Waggon" exceeded forty performances in all . . . and, writing of this intimate show, Phil explains that his "Band Waggoners," which outfit he personally conducted throughout, varied quite a bit in size and personnel during the series, only two musicians being on absolutely every session; George Hurley (violin), and Alan Ferguson (guitar). Not that this marvellous orchestra ever sounded any different, thanks to the man in front.

At the moment, Phil is awaiting a new series of broadcasts which are due to start in July, and be on the air every fortnight thereafter.

TRANSMITTING TOPICS

(Continued from page 365)

when the grid is not excited by an input signal.

If, however, a signal is applied, anode current starts to flow at each positive half-cycle of G. This will be appreciated as soon as it is observed that the negative half-cycle will only drive the operating point more negative and, likewise, cuts off the anode current completely.

The resultant effect is shown in the output curves depicted on the right of the diagram, and as these take the form of pulsations they would not be suited to L.F. work in that form. For P.A. circuits, however, the effect is quite permissible, as will be explained later.

The outstanding characteristics of Class B amplification can be summed up in the following details. Practically no anode current flows when the valve is idling. High current peaks are only produced when large signal inputs are applied to the grid, or, in other words, the power output of a valve operating under Class B conditions is proportional to the square of the input signal voltage.

Owing to the fact that the anode current is usually driven past the saturation point on the anode current curve, the grid invariably becomes positive with respect to the filament and, consequently, grid-current will flow. This introduces losses in the grid circuit and these have to be made good by the stage feeding the Class B valve, therefore, it is often necessary to use a small power valve in the preceding stage if maximum results are required.

Class C

The operation of a valve under Class C conditions is shown in Fig. 3. In this method, the valve is biased with a negative

grid voltage of such a value that it takes the operating point well past the anode current "cut-off" point. An average value for a grid-bias is twice that required to reach the "cut-off" position. This over-biasing produces such conditions that anode current only flows during a very small period of the positive half-cycle of the input signal and this, combined with other operating conditions, results in a somewhat distorted output wave-form, as shown by the curves on the right of the diagram.

The anode current is driven further into the saturation region than with Class B operation, and this necessitates the input signal being of sufficient amplitude or strength to make good the high grid losses. The trough in the output wave-forms is due to the fact that the grid becomes so positive, through the above requirements, that an appreciable portion of the electrons which would normally reach the anode are attracted to the grid, thus reducing the anode current value during a fractional part of the input signal cycle.

To sum up Class C, it can be said that the output power is proportional to the square of the anode voltage; that this form of amplification has little application to low-frequency work, and that large driving-power is required for efficient operation.

Next week the writer will deal with these three forms of amplification as applied to P.A. stages and modulation.

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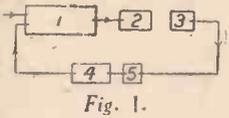
LATEST PATENT NEWS

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume or in bound volumes price 2s. each.

Abstracts Published.

REPRODUCING MUSIC.—Baird Television, Ltd., and Johnstone, D. M. No. 500217.

A method of improving the reproduction of electrical signals comprises applying the signals to the input of an amplifier 1 (Fig. 1) which feeds a converting device 2, such as a loudspeaker, arranging an appropriate detecting device 3, such as a microphone, so that it is influenced by the energy emitted by the converting device, and feeding the electrical energy produced by the detecting device



back to the input of the amplifier so that the signals fed back are in opposite phase to the initial signals, the feed back being made through a network 4 the frequency characteristic of which is such that the overall characteristic of the reproduction is improved by the feed back. As shown, an amplifier 5 is interposed between the detecting device and the network 4.

SWITCH CONTACTS ; SPARK PREVENTING.—Schaub Apparatebauges, G.—No. 500321.

A high frequency switch for radio circuits has one or both of its contacts made of a

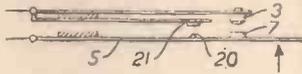


Fig. 2.

material such as carbon, the resistance of which decreases on an increase of pressure, so that the actual make or break occurs at a low current value, thus reducing undesirable noise in a radio receiver. As shown in Fig. 2, the contact 3 is made of carbon and is engaged by a metal contact 7 on a spring 5, the contact resistance being greatly reduced when full pressure is applied, the circuit being finally completed through a pair of metal contacts 20, 21, to cut out the residual resistance of contact 3. Fig. 3 shows a method of mounting a carbon



Fig. 3.

contact 12. The non-contacting surfaces are coated with copper and an annular groove in the contact is snapped into a hole in the spring blade 15 which is slotted at 16 to allow for yielding engagement.

ADJUSTING WIRELESS APPARATUS.

—Plessey Co., Ltd., Packman, P. J., and Morrison, P. H. No. 501273.

In a push-button motor-control system for adjusting a tuning condenser, provision is made for manual tuning by a knob 97 (Fig. 4) mounted on the shaft of the motor 94 which is geared to the condenser through wheels 98, 99, and a friction drive comprising a wheel 101 which engages between two spring discs 102.

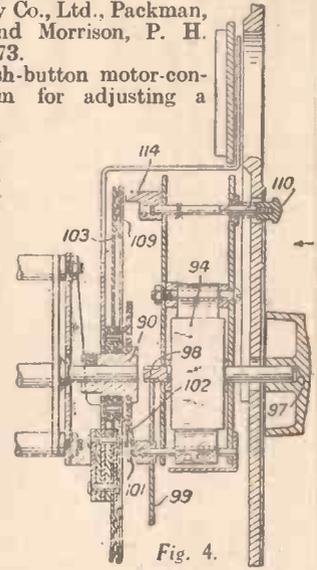


Fig. 4.

NEW PATENTS

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Latest Patent Applications

- 16557.—Baird Television, Ltd., and Baird, J. L.—Methods of scanning kinematographic film in a television etc. system. June 6.
- 16556.—Baird Television, Ltd., Graham, G. E. G.—Electron multipliers. June 6.
- 16749.—British Thomson-Houston Co., Ltd.—Radio receivers. June 7.
- 16372.—Bullers, Ltd., and Nickless, J. E.—Wireless aerials. June 3.
- 16239.—Farnsworth Television and Radio Corporation.—Shielded anode electron multiplier. June 2.
- 16549.—Grenfell, A. R.—Deflecting circuits for cathode-ray tubes. June 6.
- 16204.—Philips Lamps, Ltd.—Mechanical transmission system. June 1.

- 16482.—Philips Lamps, Ltd.—Radio-receiving sets. June 5.
- 16603.—Standard Telephones and Cables; Ltd., and Smyth, C. N.—Focusing, etc., means for cathode-ray tubes. June 6.

Specifications Published

- 506502.—Johnson, G. W. (Phileo Radio and Television Corporation).—Tuning arrangements for superheterodyne radio receivers.
- 506639.—Telephone Manufacturing Co., Ltd., Paddle, L. H., and Whitehead, C. C.—Ultra-short-wave thermionic systems.
- 506732.—British Thomson-Houston Co., Ltd., and Kinman, T. H.—Suppression of radio interference from portable domestic appliances. (Cognate Application, 35707.)
- 506542.—Marconi's Wireless Telegraph Co., Ltd.—Thermionic amplifiers.
- 506543.—Marconi's Wireless Telegraph Co., Ltd.—Indicators particularly for radio receivers.

- 506658.—Marconi's Wireless Telegraph Co., Ltd., and Wassell, H. J. H.—Keying circuit arrangements for radio and like transmitters.
- 506798.—Marconi's Wireless Telegraph Co., Ltd., and Myers, L. M.—Cathode-ray tubes and method of manufacturing the same.
- 506659.—Marconi's Wireless Telegraph Co., Ltd., and Oliver, A. L.—Remote-control systems for volume or gain control of electron-discharge device amplifiers.
- 506691.—Radioakt.-Ges. D. S. Loewe.—Television scanning disc.
- 506454.—Farnsworth Television, Inc.—Cathode-ray tubes.
- 506621.—Telefunken Ges. Fur Drahtlose Telegraphie.—Circuit arrangements for phase comparison and bearing-finding radio receivers incorporating the same.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

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LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

Station K6PLZ

SIR,—Last week I received a card from Norman Thompson (K6PLZ), and on it he asks me to inform B.L.D.L.C. members that in future he will QSL only reports accompanied by an International Reply Coupon, or 3c. U.S. postage stamps.—E. CROUCH (Burton-on-Trent).

A Prizewinner's Thanks

SIR,—I should like to take this opportunity of thanking you for the book, "Sixty Tested Wireless Circuits," sent to me in connection with Problem No. 351, and also to tender my congratulation for the high standard of the articles appearing in PRACTICAL AND AMATEUR WIRELESS.

I am very much inclined to agree with "Radio Engineer," in the S.W. section, and realise now that the major cause of my failure some nine months ago when I first started on short-wave work was due to incorrect choice of components and the use of ancient triodes in every stage!

I have recently purchased an Eddystone All World Two, and am exceptionally pleased with its performance. On a recent Sunday night (23.00 G.M.T.) 7 PY's, 4 CO's, 15 W's, and 6 VE's were logged.

My next achievement will, I hope, be the logging of a VK, but I never seem to get up early enough.—G. D. BRITAIN (Hendon).

Correspondent Wanted

SIR,—I have been a regular reader of your popular journal for the past two years. Being a short-wave enthusiast, I should like to get in touch with a reader residing in either district of Alum Rock or Bordesley Green, Birmingham.—KEN TWIST (77, Caldwell Road, Alum Rock, Birmingham, 9).

A Suggestion for Radiolympia

SIR,—The forthcoming Radiolympia Exhibition will probably prove to be the most successful ever held, and it is to be hoped that this will be the ultimate result.

Television will undoubtedly command a bigger share of attention than hitherto, especially now the public has experienced viewing in several cinemas. In this connection, I sincerely trust that amateurs will not suffer, and would like to point out that a welcome innovation at the exhibition would be an amateurs' advice bureau where experimenters could seek guidance on the kindred problems with which they find themselves confronted. A bureau on the lines indicated could be run in co-operation with the exhibiting manufacturers, and would do much to further the friendly rivalry which has always been a pronounced feature at each year's Radiolympia.

I am not trying to hint that television should take a back seat; it is a modern instrument, and must go from strength to

strength, but on the other hand, sound reception is still in the majority, and as such must be treated with the respect which its position thus demands.—ERIC L. ADLEM (Notting Hill, W.11).

Tokio S.W. Transmissions

SIR,—In a recent issue of PRACTICAL AND AMATEUR WIRELESS it was stated that Tokio broadcasts at 06.30-07.30 and at 13.00-15.30 on JZK.

I would point out that I have been receiving these programmes every night for the last five weeks, and the times of transmission are 19.30-21.00 G.M.T. on JZK, and JZJ 25 metres. Anyone reporting these stations receives a large form from Japan, which they are asked to fill in every night and then send back to Tokio. Have any other readers had this experience?—THOS. H. PLATER (Leicester).

Cape Town Broadcasts

SIR,—I am sure that many readers of your fine paper would be interested in our Cape Town transmissions. The Cape Town station broadcasts on 49.2 m., 31.23 m., 341 m., and 500 m., and is experimenting on 110 metres.

Each Wednesday an English programme

CUT THIS OUT EACH WEEK

Do you know

—THAT a metal mast used with a transmitting aerial may affect radiation and reduce efficiency.

—THAT oil-dielectric or similar condensers should be used in L.F. coupling circuits.

—THAT the reason for the above is to prevent H.T. from being applied to the grid.

—THAT the capacity of the bias by-pass resistor in an L.F. stage affects the bass response.

—THAT interaction between stages can be effected by coil fields which cut through a metal chassis.

—THAT high-resistance between switch contacts is a common cause of trouble, and particular care is therefore necessary when choosing switches for H.F. circuits.

—THAT ordinary pocket-lamp bulbs are not suitable for dial lights in battery-operated receivers unless switched off when a station has been tuned-in.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Neaves, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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is arranged for overseas listeners. One item especially is very enjoyable; it is called "Snook-town Calling," and is classed as one of the finest comical transmissions in the world. Reports on these transmissions, I understand, would be gladly received, and such reports should be sent to: S.A.B.C., Cape Town Station, Riebeeck Street, Cape Town, U. of S.A.—JACK LEVIN (Cape Town, S.A.).

A 14 mc/s Log From Workshop, Notts

SIR,—May I forward my log for 14 mc/s, this time it covers as from June 8th to June 17th. Before doing so I would like to express my appreciation to you for an excellent weekly. The article I like best is "Leaves From a Short-wave Log," and the author of that deserves my thanks for the interesting "snips" he has given in that column.

Recently you published an article on "Mastering the Morse Code"; the log below will, I hope, prove that code is far better than 'phone! In my opinion all genuine S.W.L.s should have a working knowledge of the code.

I have just finished checking up my log and I find I have considerably increased it since it was last published. The total up to date—June 18th—is 7,053 and covers the 28 mc/s, 14 mc/s, 7 mc/s, 3.5 mc/s, and 1.7 mc/s bands. On 14 mc/s alone I have logged 3,699 amateurs.

In my log you will notice a W7FDV—this station is (or was) a portable operating in its own district. The complete call was "W7FDV/7." XU9UX is situated at Ishang on the Yangtse-Kaing river.

Here is my log:

14 mc/s 'phone: W4BAH, W5BEK, W6AHP, BEY, EOU, GRL, PDB, SE; W7BVO, DC, FAQ; W8ANC, W9MM, K6OQE, DA4AW, HP1A, YV1AP, ZS2AV, ZE1AJZ. C.W.: W1,2,3,4, W5ADO, EGY; W6ANN, AZO, DEC, DL, FKG, FMY, KAN, KEV, KVJ, LHN, LUR, MAK, MCB, MRB, PFI; W7ADA, AWD, AYO, DSZ, ENW, FDV, FHW, FMK, FZP (of Wyoming), GMV, WWQ; W8AEK, MEL, MJF; W9AZT, QWZ, VDX, ZVT; PAOKW, VK2ADE, AES, AJU, VA; VK3CX, GZ, NF, RC, VZ; VK5KO, VK6KW, VK7GJ, K4ESH, K6BAZ, PHD; ZL2QY, ZL4GS, GY; VE5AAD, ACN, AET, KC; XU9UX, and CT3AN.

The above log shows what it is possible to receive when you have a "working" knowledge of the code! On Thursday, June 8th, all W districts (apart from W3), were logged on 'phone, and on Saturday, June 10th, all W districts on CW; also VK2,3,5,6,7. Not bad going for a 1-v-1.

Incidentally, I would be pleased to hear from anyone whether abroad or at home.—R. W. IBALL, 1, Riddell Avenue, Langolds, Workshop, Notts).

Correspondents in U.S.A.

SIR,—I have noticed often in PRACTICAL AND AMATEUR WIRELESS that some of your readers want to correspond with other short-wave listeners in foreign countries. I have several correspondents in U.S.A., and some of these want other S.W.L.s to write to them.

King Fountain, 905, 14th Street, Orange, Texas, will send an attractive S.W.L. card to any reader who sends him one; he will also correspond.

Arthur Woods, 401, Yankee Street, Wellsburg, W. Virginia, will exchange cards, etc.

Billy Epps, Mineola, Texas, runs a S.W.L. card club; it is free to anyone who sends his card.—S. G. BURRAGE (Forest Gate).



QUERIES and ENQUIRIES

seem all right in the 'phones. What is the most likely cause of the trouble, and how can I locate it?"—V. Y. McD. (Belfast).

Screen Voltage

"In constructing an A.C. receiver with an S.G. or H.F. pentode valve, I propose to use a potential-dividing circuit for the H.T. to the screen. How can you work out the exact voltage on the screen so that the two arms of the divider are of the correct value?"—S. L. (Doncaster).

THERE are several methods of arriving at the value, although the exact voltage is not always critical and some variation in voltage is permissible. For maximum performance, it is preferable to use a variable arm on the potentiometer, and this enables the screen voltage to be varied and the maximum output thereby obtained. The divider will consist primarily of two resistances in series, and there will therefore be a current flowing through this dependent upon its value and the H.T. across the ends. In addition, however, there is the screen current which flows through the upper part of the divider, and this must be added to the potentiometer current. The best plan is to work on a rule of thumb basis, making the value of the divider such, that at the voltage in use, the current is 1 mA. The proportions can then more easily be worked out, but much calculation is saved if you use a variable element as previously mentioned.

Screened Leads

"I am making up a communications type receiver, something on the lines of your Air Hawk. I find, however, that leads from the H.F. stage must pass some way across the chassis to enable the bias and screen to be fed, and this means that the associated leads must pass either through or near other stages. Will screening these leads be satisfactory to prevent interference or instability, or is it necessary to re-design the receiver and modify the layout?"—O. W. N. (Stoke).

NORMALLY no trouble should arise from the two leads mentioned by you. These points should be adequately bypassed, the condensers being joined direct between earth and the screen and cathode on the valveholder. However, in a receiver of the type mentioned, it is desirable to avoid all risks of interaction and, therefore, where a lead from one stage passes through a section belonging to another stage (assuming that each stage is properly screened), the lead should be properly screened with the screening covering earthed. It is, of course, desirable in this type of receiver to endeavour to keep each section entirely self-contained, using metal partitions and screens to keep everything in its proper place.

Output Stage Defects

"I have an A.C. receiver in which a peculiar fault has arisen, and I wonder if you could help me to trace it. The quality is very poor indeed, and there is a prominent hum. Previously the set has worked quite well. I have a 'phone plug in the L.F. stage which cuts out the output stage and things

IN an A.C. receiver the usual cause of such a trouble will be defective biasing. This would cause increased anode current giving rise to hum, but will not generally affect earlier stages. The bias is generally obtained by a resistor and condenser in the cathode lead, and either a short-circuited condenser or an open-circuited resistor should be looked for. A milliammeter in the anode circuit is the most certain way of finding the trouble, and if the above is confirmed, then replacements of the components will soon decide which is at fault.

D.C. Receiver from A.C. Mains

"I have a D.C. receiver and the mains are shortly to be changed over to A.C. I understand that I can operate the set from a small unit joined to the mains plug, but

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

have no details as to what apparatus is required. Could you give me any details as to what I should need?"—K. L. (N.W.5).

WE assume that the receiver is a standard model designed for an input between 200 and 250 volts, and having a load of 100 mA or so. In that case the simplest conversion is effected with a mains transformer and two H.T.17 type metal rectifiers, plus one 8 mfd. smoothing condenser. The transformer should have a secondary winding delivering 310 volts at 350 mA, and the two rectifiers should be connected in bridge formation. The 8 mfd. condenser should be joined across the output. A circuit will be found on page 135 of our issue dated April 22nd last.

Connecting Sets Together

"I have a short-wave set and get very good results, but should like louder signals. Can I connect the set to our commercial radiogram so that I can get louder signals, on the speaker for preference?"—G. R. (Coventry).

IT is possible to make use of the broadcast receiver, but some care is necessary when joining them together. If you use

pick-up sockets on the set you will have to employ a transformer to couple the sets together. It may be possible to convert the short-wave set into a converter or adapter, but probably the use of the L.F. stages alone, by means of the pick-up sockets, is most satisfactory. See the article in our issue dated May 20th last on this subject.

Mains Smoothing

"I have modified my set which is an A.C. model. There is a rather small choke in the H.T. lead which was previously suitable, but I have modified the output stage with much greater current. The rectifier will supply the extra, but the problem will be smoothing. I do not want to alter the dropping resistances in previous stages and wonder what is the best plan for me in this case."—W. F. S. (Portsmouth).

THE best plan would no doubt be to obtain a new choke and use this for smoothing only the output stage. In this way you would not need a very substantial component (compared with substituting your present choke for all stages) and, furthermore, additional smoothing will be provided for the stage owing to the smaller current which will flow through it. Thus there will be two chokes in your circuit, the smaller feeding the early stages, and the other taking only the output stage. A 4 mfd. condenser should, of course, be joined across the receiver side of the choke in the usual manner.

REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

G. G. S. (Belfast). At the moment we cannot give any address as the set is of American origin.

J. E. (West Melton). Could you give us some working voltages, current, or other details so that we could help you to obtain satisfaction? There is no other receiver in which you could use these particular parts.

E. R. (c/o G.P.O.). We cannot supply blueprints of the sets mentioned as they were described in a periodical no longer on the market.

E. W. (Stockton-on-Tees). You can use a transformer in place of the unit, or a similar unit may be obtained from Messrs. Bulgin, type LF.10. Morse may be recorded by any standard home-recording method.

K. P. B. (Edgware). The disc visor is not suitable for modern television reception and therefore we are unable to recommend any receiver for the purpose mentioned.

E. S. (Doncaster). Messrs. Peto-Scott can supply the coil and any other parts. The transformer may have any ratio from 3 to 5 to 1.

H. P. (York). The G.B. battery should be replaced or tested when you renew the H.T. battery.

L. P. (Margate). A dipole would undoubtedly be desirable and a reflector will be of great use in reducing the noise level.

C. F. R. (S.E.5). A standard 1 stage L.F. amplifier should be quite satisfactory. A transformer of 5 to 1 is suitable.

F. W. (Mythe). Three I.F. stages could be used, but preferably a crystal gate should be included. The crystal should be 465 kc/s.

A. B. (Datchet). Push-pull would be desirable and the H.T. is adequate for the two valves. Use the special push-pull input transformer. Your output transformer is suitable, but use the correct tapplings for the load required by the valves.

B. R. (Penge). The emission is definitely low. Modern valves will be desirable as replacements and one of the HL types is recommended.

L. A. (Southall). An aperiodic H.F. stage would be useful and a good all-wave choke should be used in place of the coil. This will remove all of the difficulties mentioned by you.

M. D. H. (N.W.4). The type of apparatus will depend upon the charger circuit. Write to Messrs. Belling Lee for details of suitable suppressors.

The coupon on page iii of cover must be attached to every query.

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The "Junior" Crystal Set	27.8.39	PW94	F. J. Camm's 2-valve Superhet	13.7.35 PW52
			F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37 PW75
			Mains Sets : Blueprints, 1s. each.	
One-valve : Blueprints, 1s. each.			A.C. £5 Superhet (Three-valve)	— PW43
All-Wave Unipen (Pentode)	—	PW31A	D.C. £5 Superhet (Three-valve)	1.12.34 PW42
Beginners' One-Valver	19.2.39	PW85	Universal £5 Superhet (Three-valve)	— PW44
The "Pyramid" One-valver (HF Pen)	27.8.39	PW93	F. J. Camm's A.C. £4 Superhet 4	31.7.37 PW50
Two-valve : Blueprints, 1s. each.			F. J. Camm's Universal £4 Superhet 4	— PW60
Four-range Super Mag Two (D, Pen)	—	PW36B	"Qualitone" Universal Four	16.1.37 PW73
The Signet Two (D & LF)	24.9.38	PW78	Four-valve : Double-sided Blueprint, 1s. 6d.	
Three-valve : Blueprints, 1s. each.			Push-Button 4, Battery Model	22.10.38 PW95
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2	Push-Button 4, A.C. Mains Model	—
Selectone Battery Three (D, 2 LF (Trans))	—	PW10	SHORT-WAVE SETS.	
Sixty Shilling Three (D 2 LF (RC & Trans))	—	PW34A	One-valve : Blueprint, 1s.	
Leader Three (SG, D, Pow)	22.5.37	PW35	Simple S.W. One-valver	0.4.38 PW88
Summit Three (HF Pen, D, Pen)	—	PW37	Two-valve : Blueprints, 1s. each.	
All Pentode Three (HF Pen, D (Pen), Pen)	20.5.37	PW39	Midget Short-wave Two (D, Pen)	— PW38A
Hall-mark Three (SG, D, Pow)	12.6.37	PW41	The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.38 PW91
Hall-mark Cadet (D, LF, Pen (RC))	16.3.35	PW48	Three-valve : Blueprints, 1s. each.	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW19	Experimenter's Short-wave Three (SG, D, Pow)	30.7.38 PW30A
Genet Midget (D, 2 LF (Trans))	June '35	PM1	The Prefect 3 (D, 2 LF (RC and Trans))	7.8.37 PW63
Cameo Midget Three (D, 2 LF (Trans))	8.0.35	PW51	The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.38 PW68
1935 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	—	PW53	PORTABLES.	
Battery All-Wave Three (D, 2 LF (RC))	—	PW55	Three-valve : Blueprints, 1s. each.	
The Monitor (HF Pen, D, Pen)	—	PW61	F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	— PW65
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62	Parvo, Flyweight Midget Portable (SG, D, Pen)	3.6.39 PW77
The Centaur Three (SG, D, P)	14.8.37	PW64	Four-valve : Blueprint, 1s.	
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.33	PW69	"Imp" Portable 4 (D, LF, LF (Pen))	10.3.38 PW86
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	18.2.39	PW72	MISCELLANEOUS.	
The "Rapid" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW82	S.W. Converter-Adapter (1 valve)	— PW48A
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	28.8.37	PW73	AMATEUR WIRELESS AND WIRELESS MAGAZINE	
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.33	PW61	CRYSTAL SETS.	
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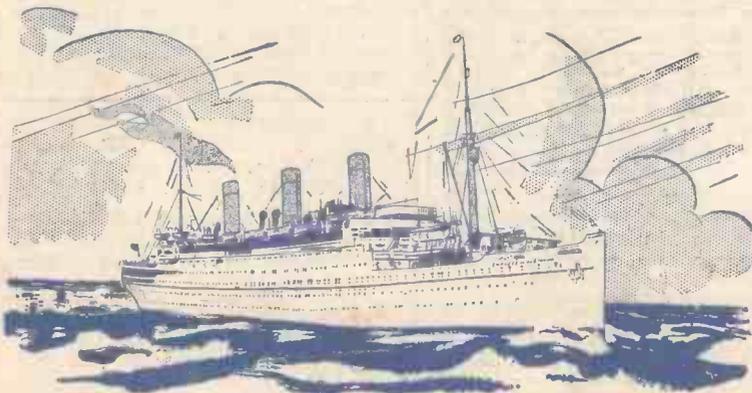
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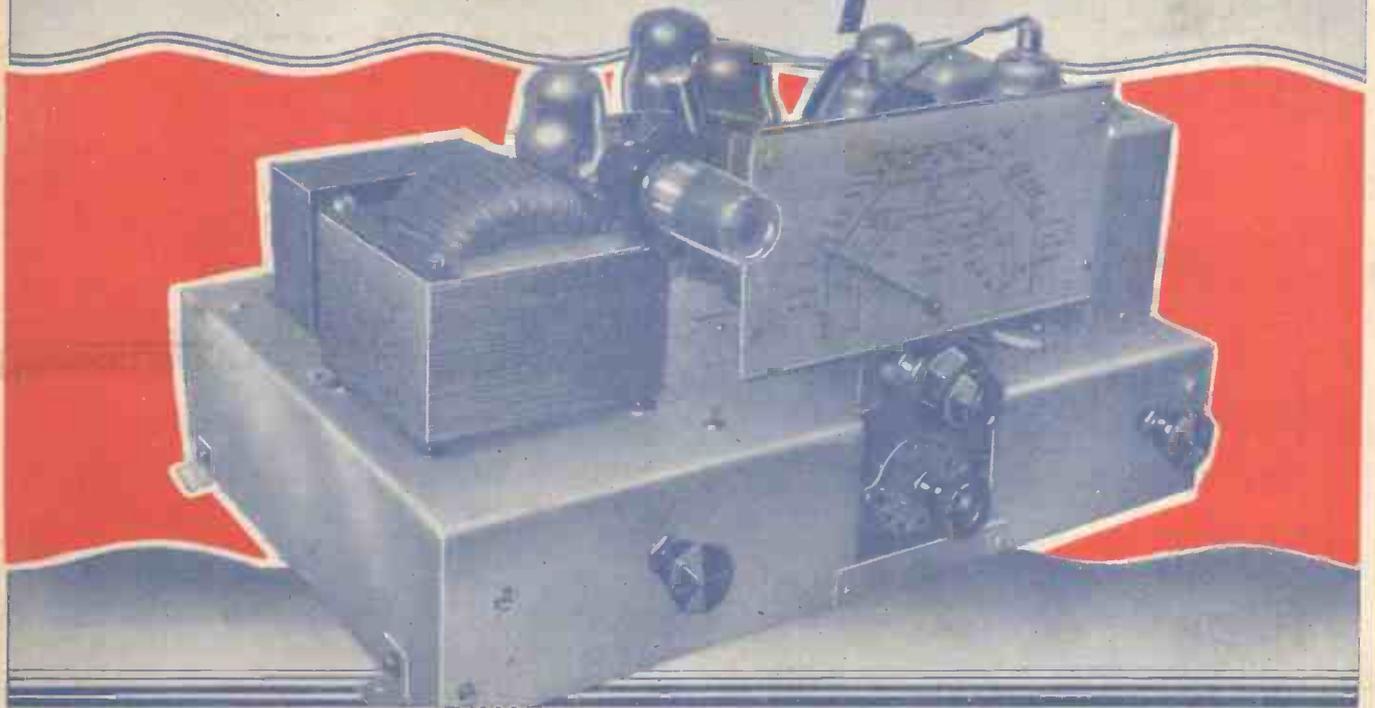
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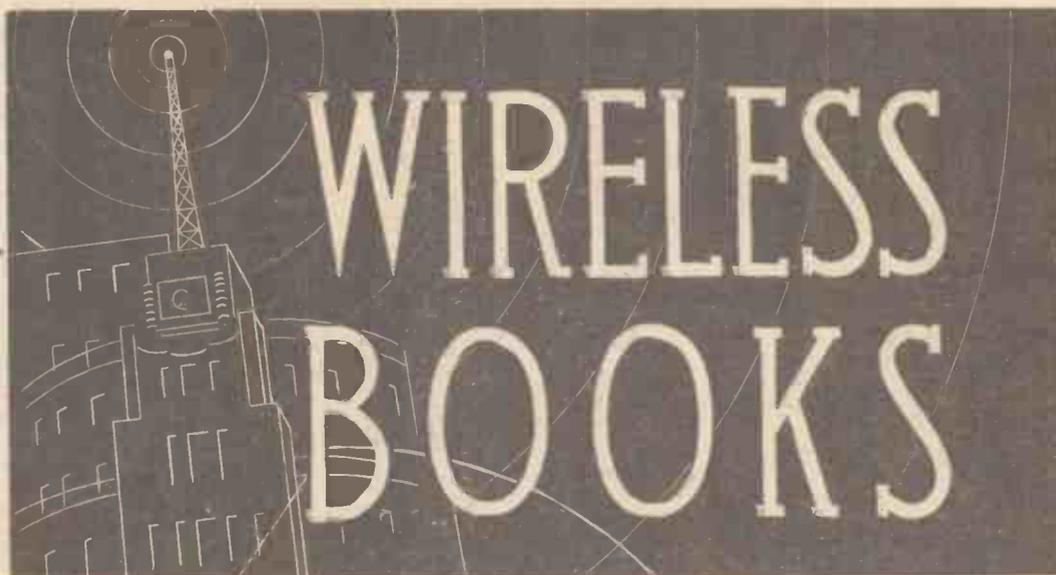
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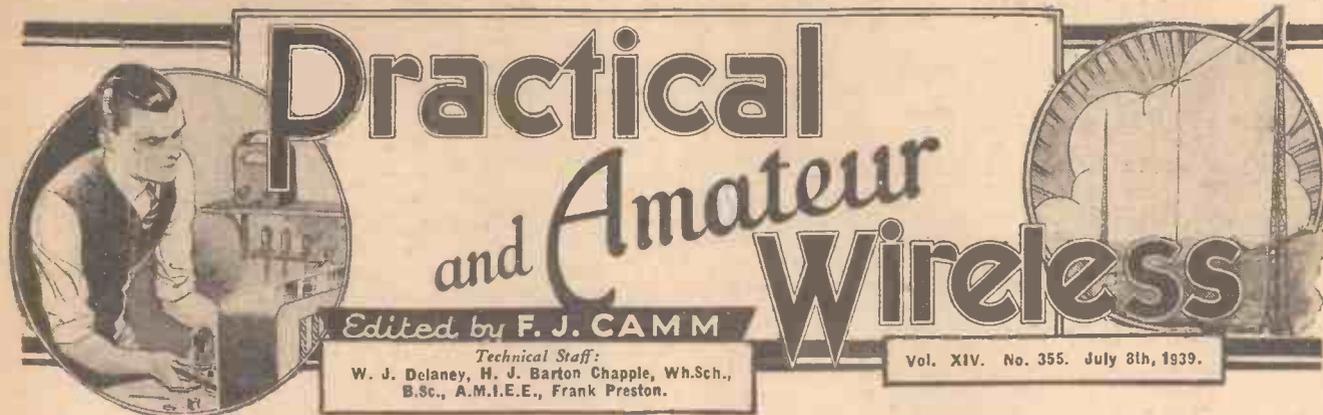
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TRANSMITTING TOPICS — See Page 400



Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
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Vol. XIV. No. 355. July 8th, 1939.

ROUND *the* WORLD of WIRELESS

The 1939 Superhet

IT is doubtful if any type of receiver has received the popularity which has been gained by the superhet, and in spite of its many short-comings, it still holds the position of the ideal home-broadcast receiver. It is, of course, possible to make a superhet with only two valves, whilst at the other extreme as many as fifteen valves may be usefully employed in a superhet circuit. With the superhet go such refinements as variable selectivity; automatic-volume control in many forms; visual tuning indication, and similar arrangements. Many of these have been introduced of necessity due to the characteristics of the superhet arrangement, but others are advantages which are best seen in a receiver in which this feature is employed. In this issue we describe the construction of a seven-valve superhet (including rectifier) in which certain of these features may be seen, and a push-pull stage is incorporated so that really good quality at high power may be obtained. The receiver is economical to construct and maintain, and is not difficult to build. Many of the difficulties of construction in a superhet are found on the H.F. side, where a number of coils and switches have to be wired, but in the 1939 Superhet this has been avoided by using a commercial tuning pack. This incorporates the coils, switches and condensers, and thus the wiring operations are reduced, and higher efficiency may be expected. Full constructional details will be found on pages 396-398.

New Air Station

THE Air Ministry have brought into operation a new station at Belfast Harbour, with the call sign GVE. This station operates on 857 metres (350 kc/s), and acts as the area station in place of Newtownards—which, in future, will be a collaborating station.

German Radio Exhibition

THE Berlin Radio Show, which opens on July 28th, will again feature television apparatus, although apparatus previously exhibited has not yet been put into regular service. Worldwide propaganda for the show is in hand, and among the features will be a "Children's Broadcasting Corner," and sports in the garden.

Aerial Service Area

THE design of the transmitting aerial controls the useful service area, and wide claims are made for a new type of aerial which has been tried out at the Stolp relay station in Germany. It is claimed that a useful increase of 20 per cent. has been obtained during the hours of darkness by the new aerial which is supported on a circle of six masts at a height of 150ft.

Radio Tunis

THE reconstructed station at Radio Tunis is practically ready for tests and it is anticipated that the station will be put into operation by the end of September. The power of the new station will be 120 kW.

R.M.A. Television Service Area Map

A MAP showing the area in which reliable reception can be obtained from the Alexandra Palace television station has just been compiled by the R.M.A. from exhaustive information supplied by television receiver manufacturers' members.

The map, which measures approximately 31in. by 28in. is in three colours, shows all the important towns inside the service area, and includes county boundaries and the names of the counties.

It proves that, if it is desired to quote a round figure for the effective radius of the station, a figure of 40 miles can safely be used.

It is, of course, impossible to lay down a hard and fast line between the area where reception is satisfactory and that where it is unsatisfactory, so the outer boundary has been indicated by a broad shading covering an area roughly five miles wide.

Copies are available to anyone who is interested from the Radio Manufacturers' Association, 59, Russell Square, London, W.C.1, at 2s. 6d. each.

ON OTHER PAGES	
A Simple Remote Control	Page 387
Car-radio Experiments—2..	389
On Your Wavelength ..	391
Short-wave Section ..	393
Readers' Wrinkles ..	395
The 1939 All-wave Superhet	396
Practical Television ..	399
Transmitting Topics ..	400
Relays and 'Phone Broadcasting ..	402
Readers' Letters ..	404
Queries and Enquiries ..	407

No Relay For Grimsby

AS a result of a deputation from the Grimsby Chamber of Trade and other local associations, the town's Highways Committee have decided not to consider an application for a relay service in Grimsby.

New B.B.C. Service

ON July 3rd a new early morning service was inaugurated by the B.B.C. for Latin-American listeners. The programme is scheduled for 12.25 to 2.15 a.m.

Licence Figures

THE total number of receiving licences in force at the end of May in Great Britain was approximately 8,984,250. This represents a rise which was not in evidence at the same period of last year.

"Where's That Tiger?"

THE village of Ballymakillop was sinking into oblivion until Sarah McWhittrick saw a tiger in her hen-pen, and then its name splashed into the headlines of civilisation. Wires buzzed, telephones rang, 'planes zoomed across the Channel, and questions were fired off in the Commons. And while Ballymakillopians gasped "Where's that Tiger?" Sergeant Fogarty swore: "O'm a policeman, O'iam—not a big game hunter!" The Police Force and the Army caught it in the end—and then the world laughed! But, anyway, sleepy Ballymakillop lived its "short fierce hour and sweet." Those who listen to this half-hour frolic, the work of a Belfast journalist, to be broadcast on July 8th, will hear what happened when they caught the tiger.

ROUND the WORLD of WIRELESS (Continued)

The Revival of the Roman Era

THE privately owned transmitter, Radio Tunis, on 215 m. (1,395 kc/s), has now been re-named Radio Carthage. This 1-kilowatt station broadcasts daily from B.S.T. 12.00-14.00 and from 20.15-23.00.

British Esperanto Listener Guest of Italian Authorities

MR. P. A. RODGERS, a young Esperantist of Darlington, returned to England on June 11th from a free holiday in Italy, which he gained as a prize through taking part in a wireless competition in Esperanto from the Rome stations. The award consisted of free second-class rail facilities and hotel accommodation for visits to Rome, Turin, Capri, Pompeii and Ostia. Throughout he received the utmost cordiality and friendship from Italian Esperantists and the authorities.

Radio Bizerta

IN addition to the broadcasting station at Tunis, the French authorities also possess a small 100-watt transmitter at Bizerta. This station, which operates on 209 m. (1,435 kc/s), is on the ether every day between B.S.T. 12.30-15.30, and from 21.30-23.30.

"Review of Revues"

FROM Midland shows which he has produced in the past, Martyn C. Webster has picked some of the gayest tunes for a broadcast under the title "Review of Revues," to be heard on July 7th. Reginald Burston will conduct the Midland Revue Orchestra, and the vocalists will include Marjery Wyn. Mr. Webster will return to Birmingham at the end of June after spending three months at Manchester as producer of light entertainment programmes in the North Region.

Dance Cabaret from Torquay

DANCE Cabaret will be broadcast from the Grand Hotel, Torquay, on July 6th in the National programme.

"My Week-end"

SHORT accounts by various people telling how they will spend the week-end out of doors and where they are going to spend it, will be broadcast fortnightly under the title, "My Week-end." The first of these broadcasts will be given in the Western programme on July 7th.

Scarborough on the Air

SCARBOROUGH will be on the air twice during the evening of July 7th, when Northern listeners will hear Reg. Williams and his Futurists playing the Spa ballroom at the Yorkshire resort, sharing this pro-

INTERESTING and TOPICAL NEWS and NOTES

gramme period with Larry Hall and his band, who will be playing in the Manchester studios. Later in the evening, for Regional as well as Northern listeners, Murray Ashford's "The Bouquets," a well-known Northern concert-party, which has often broadcast in the past, will be heard, also from the Spa at Scarborough.



The Cambridge University Officers Training Corps recently had their voluntary camp at Cambridge. When the War Office cancelled all official O.T.C. camps last year, Cambridge decided to hold its activities on its own Rifle Range at Cambridge. Our illustration shows a tank in radio communication with headquarters at the camp.

Dance Band from Liverpool

ADMIRERS of Jack McCormick and his Ambassadors, the band which plays at the Rialto Ballroom, Liverpool, will be interested to know that this combination is to have a half-hour broadcast on the Northern wavelength on Thursday evening, July 13th, direct from the ballroom.

"New Brighton Night"

VICTOR SMYTHE is producing a "New Brighton Night" feature on July 6th, with broadcasts from the resort's Tower Ballroom, where the Playboys Dance Band will be heard: Frank A. Terry's show, "Pleasure on Parade," at the Floral Pavilion; and the variety bill at the Tivoli Theatre.

The Royal Welch Fusiliers

THE Royal Welch Fusiliers is one of the oldest Regiments in the British Army. This year it celebrates the two

hundred and fiftieth anniversary of its foundation. This will be done in fitting style at Caernarvon Castle on August 5th, and in preparation for this event the microphone will visit the depot at Wrexham on July 7th for a sound picture of the Regiment's life in barracks.

"Cabarette"

ON July 6th the artists in "Cabarette," presented by Leslie Bridgmont, will be Doreen Pullen (impressions), Compton Evans and Ray Monelle (in original songs at the piano), and Ruby Taylor and Frances Keyte (four hands and two pianos).

Opera from Glyndebourne

THE whole of Verdi's "Macbeth" will be broadcast from Glyndebourne on July 7th, with the following soloists: Francesco Valentino, Margherita Grandi, David Franklin, David Lloyd and Eric Starling. Listeners will hear Acts I, III and IV in the National programme and Act II in the Regional.

A Civil Air Guard on Gliding

TERENCE HORSLEY, a journalist who has broadcast several times from the North-East and has helped to arrange one or two programmes that have come from this part of the world, has joined the Civil Air Guard, and on the evening of July 10th he will present a short programme on flying, but on gliding in particular. He will bring to the microphone others concerned with this increasingly-popular sport, a thorough grounding in which provides a valuable basis for the training of potential aeroplane pilots. Horsley, who studied gliding closely before he returned as a newspaper man to Newcastle-on-Tyne, has broadcast on the subject before, describing Great Hucklow "meets" from the Manchester studios.

SOLVE THIS!

Problem No. 355

JACKSON was building an A.C. receiver in which was an H.F. pentode. The maker's instructions said that the screen should be supplied from a potentiometer consuming a greater current than the screen and therefore Jackson selected two suitable resistors, which he joined between H.T. positive and negative, with the screen taken to the junction. When tested the resistors got very hot, and he decided that the current was excessive. As results were good he decided that the H.T. on the screen was in order and to avoid altering this, but to reduce the current, he decided to add a resistance in series with that on the earth side of the screen. He did this, and although the resistances did not heat up, results were not so good. Why was this? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 355 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, July 10th, 1939.

Solution to Problem No. 354

When Matthews connected his receiver to the D.C. supply he overlooked the fact that one pole is positive and that therefore the mains plug has to be inserted in correct relation to the supply. Each time he inserted his plug he had it reversed and the receiver accordingly failed to work.

The following three readers successfully solved Problem No. 353, and books have accordingly been forwarded to them: J. Robertson, Aukengill, Wick, Caithness; J. B. James, Bank House, 46, Stafford Road, Wallington; G. Butler, 41, Station Road, Handsworth, Birmingham, 21.

A Simple Remote Control

How to Provide Full Control of a Receiver by a Push-button Unit Situated at a Distance from the Receiver

RECENT developments in radio receiver design have been responsible for the introduction of many forms of automatic-tuning systems, by means of which a radio receiver may be tuned in to one or other of a number of predetermined stations simply by pressing a selected one of a number of press buttons representing the desired stations. In one system the tuning condenser of the receiver is coupled to an electric motor, and the press buttons control switches in a control network for the motor, so arranged that actuation of any one press button will cause the motor to move the tuning condenser to a predetermined station-selecting position. In another system the press buttons actuate switches, each one of which connects a selected one of a number of pre-tuned circuits into the circuit of the receiver, and in other systems the press buttons actuate switches which introduce pre-tuned coils or condensers of different values into the circuit of the receiver.

The use of press buttons is not, of course, limited to the selection of predetermined stations or frequencies; they may also be used for waveband selection and for other functions, such as volume control and frequency control.

Usually the press buttons are mounted on the receiver, but it is often desirable to be able to control the receiver automatically from one or more remote points. When a motor-operated tuning system is employed, this may be accomplished by arranging the press-button switches in a separate box or case and coupling them to the circuits of the motor by means of leads, such as a multi-core flexible cable. In other cases a duplicate set of press-button switches may be provided at the remote point and each switch is connected by leads in parallel with its corresponding press-button switch at the receiver, whereby the motor may be operated by actuation of either a local press button or a press button situated at the remote point, to tune the receiver to a desired predetermined station.

In either case it is necessary to provide at least one more lead than there are press buttons, and the cost of the multi-core cable becomes heavy if the number of press buttons is large and/or the run for the cable is long.

The provision of remote control when the switches controlled by the press buttons are included in the circuits of the amplifier of the receiver, such as in the pre-tuned circuit and like kinds of tuning systems, presents difficulties. The difficulties may be overcome by providing remote-control apparatus which will in effect actuate a set of local press buttons at the receiver, and in this article is described a remote-control system in which a radio receiver is provided with local press buttons which may be actuated to control the receiver, and with a remote control unit comprising a duplicate set of press buttons and means for actuating the local press buttons under the control of the duplicate or remote set of press buttons.

The remote-control unit may comprise a single member which can be moved under control of the remote press buttons into engagement with any desired local press

button, and then moved to actuate the selected press button, or a separate actuating member may be associated with each local press button. An important feature of this remote control unit resides in the control by means of relays of the member or members which actuate the local press button. This results in a considerable reduction in the number of leads required for a given number of press buttons, and the system may thus often be used with advantage in preference to other systems for motor-tuned receivers.

Magnetic Operation

Preferably, the push buttons at the receiver are actuated by electro-magnets which are selectively energised by the push buttons at the remote control device. Selective energisation of the electro-magnets may be effected through the medium of relays which themselves are energised by operation of the push buttons of the remote control device, the latter buttons serving to apply current in one of two directions, say, in a positive or negative direction to the relays.

The relays employed may be of the self-centring type, wherein when no potential is applied to the coil of the relay, the contacts of the relay are in their central position; when a positive potential is applied to the coil of the relay the contacts may be caused to move in one of two directions, say, in a left horizontal direction, while when a negative potential is applied to the coil of the relay the contacts may be caused to move in a direction opposite to the aforesaid direction. Each of these positions for each relay may be combined with each of the positions of the other relays employed. Thus, when two relays requiring only two leads are employed and each has three possible positions, the two relays provide nine possible combinations. One of these combinations, however, corresponds to the condition when no potential is applied to the coils of both relays, and, neglecting this combination, it is seen that two such relays provide eight effective combinations. In a similar manner, three such relays, requiring only three leads and each having three possible positions of their contacts, provide 26 effective combinations.

Reference should be made to the accompanying drawings which represent an embodiment of the idea by way of example and in which Fig. 1 illustrates on the left-hand side the connections made at the

push-button control remote from the radio receiver, and illustrates on the right-hand side coils situated at the receiver which serve to actuate relays. Fig. 2 illustrates the circuit connections at the receiver.

In Fig. 1 the push buttons situated remote from the receiver are indicated as being utilised for operating the receiver to "on" or "off," and the volume to "up" or "down," and with ten other push buttons numbered 1-10 for operating the receiver to tune it to the various transmitting stations or any other functions that may be desired. Each push-button is connected to one or both of the rectifiers X and Y, X and Y being rectifiers situated at the remote control which rectify in opposite directions, and to one or more of the terminals A, B and C.

Relay Working

When one of the push buttons is pressed it serves to complete circuits between the rectifiers X and Y and the terminals A, B and C. It will be observed from Fig. 1 that some of the push buttons are connected with a single pair of contacts which are closed when the push button is pressed, whilst other buttons are connected with two pairs of contacts both of which are closed when the

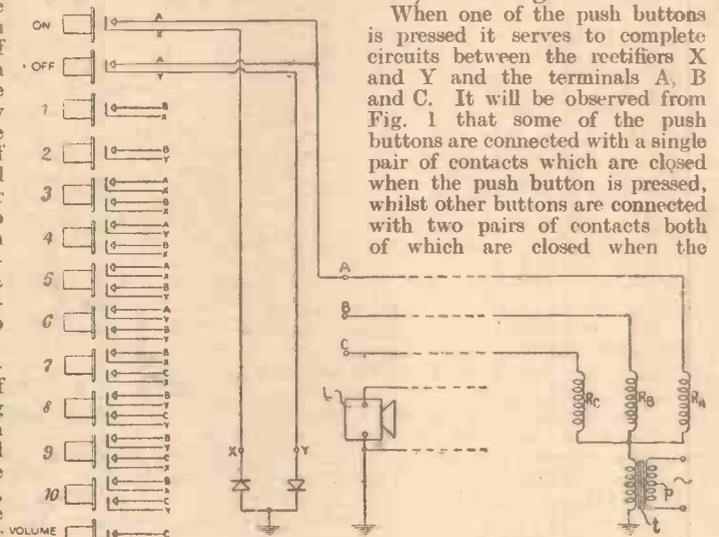


Fig. 1.—Practical arrangement of the Remote Control mechanism.

associated push button is depressed. The various contacts are lettered with combinations of the letters A, B, C, X and Y to indicate how the contacts are connected to the terminals A, B, C and to the rectifiers X and Y. Thus the button numbered 1 serves to complete a circuit between the rectifier X and the terminal B, while the button numbered 5 serves to connect terminal A with the rectifier X and terminal B with the rectifier Y. Leads run from the terminals A, B and C to the coils of the relays R₁, R₂ and R₃ at the receiver, so that when one of the press buttons is operated, current flowing through either or both of the rectifiers X and Y is supplied to one or more of the relay coils R₁, R₂ and R₃. The rectifiers X and Y complete the circuits for the supply of potential to the coils R₁, R₂ and R₃ of the relays when the push buttons shown to the left of Fig. 1 are depressed.

The source of the supply of potential for the coils R₁, R₂ and R₃ is a transformer "t" shown to the right of Fig. 1 below the coils R₁, R₂ and R₃, and the primary of this transformer "p" is always connected

(Continued on next page)

A SIMPLE REMOTE CONTROL

(Continued from previous page)

in circuit from, if necessary, a separate source of supply from that utilised for the radio receiver. This transformer "t" is connected in circuit during stand-by time and may be so constructed as to take an almost negligible amount of power, and it is so connected that on pressing the "on" button for the receiver the contacts of relay A are moved so as to complete the circuit for the primary of the transformer "t" which supplies the power for setting the radio receiver as is hereinafter explained.

The relay coils R_a, R_b and R_c of Fig. 1 serve to actuate the movable contacts of the relays A, B and C of Fig. 2 respectively. Referring now to Fig. 2, current flowing through the rectifier X causes the contacts of the relays A, B and C to move to the left while current through the rectifier Y causes the contacts of these relays to move to the right.

The coils numbered 11 to 20 are energised from the source of alternating current potential indicated conventionally at 21, which is applied to the primary winding P of a transformer, T, the secondary winding 22 of which is connected to the coils numbered 11 to 20 through a rectifier 23. Whichever coil of the coils numbered 11 to 20 is energised depends upon the positions of the movable contacts of the relays A, B and C, and this in turn depends upon the potentials which are applied to the coils R_a, R_b and R_c of the relays. For any of the electro-magnet coils numbered 11 to 20 to be energised it is necessary to complete the circuit through the electro-magnet coil from the rectifier 23 to earth. With the connections shown in Fig. 2, the coil 15 is energised when the contacts of the relay A are moved to the left and those of relay B are moved to the right, the circuits being completed through contacts A₃ and B₁. To complete the circuits to the coil 15 the button 5 shown to the left of Fig. 1 is depressed and this causes the circuits to be completed to the coils R_a and R_b, these coils being supplied with current through the rectifiers X and Y respectively. The relay coil R_c is not energised thereby, so that the contacts C₁ and C₃ remain in the central position, shown in Fig. 2. As another example, for electro-magnet coil numbered 17 to be energised the button 7, shown to the left of Fig. 1, is depressed so that the coil R_c of relay C has applied thereto a current through the rectifier X, the circuit being made through contact C₂ and the coil of relay B has applied thereto a current through the rectifier X, the circuit being completed through contact B₁. Thus, when any of the coils numbered 11 to 20 of the electro-magnets is energised by the remotely situated push buttons the corresponding push button located at the radio receiver is operated so that, in effect, the push buttons of the receiver are operated from a position remote from the receiver. In the means shown in connection with Figs. 1 and 2 this is effected by utilising only three leads from the remote press buttons to the relay coils situated at the receiver. A connection for earthing one side of each of the rectifiers X and Y is required and this earthing connection may be made at the remote point or a lead may be run from the rectifiers to the earth connection situated at the receiver. It is preferred to make the earth connection for the remote loudspeaker shown at L, Fig. 1, to the earth connection situated at the receiver.

Switching "Off"

In order to switch on the radio receiver the button marked "on," shown to the left of Fig. 1, is pressed. This causes current through the rectifier X to flow through the relay coil R_a and thereby the contact A₁ of relay A is moved to the left and completes a circuit through the primary coil of the transformer T shown in Fig. 2, from the source of supply 21 to earth. The current flowing through the primary coil P of transformer T energises the coil 24 of the rectifier 25 and the current through the coil 24 actuates a holding relay coil 26. This coil 26 serves to close contact 27, completing the circuit for the primary coil P of the transformer T independently of control A₁. Movement of contact 27 makes it unnecessary for contact A₁ to remain in the left-hand position for energisation of the primary coil P and this contact A₁ is hereby left free for further actuation by the source of potential X and Y. Further depression of any of the press buttons to the left of Fig. 1 supplying current through the rectifiers X or Y to the relay A causes contact A₁ to move, the circuit from the primary coil of the transformer T still being completed through the contact 27.

It will be noted that only the "off" button shown to the left of Fig. 1 serves to short-circuit the holding relay coil 26 in Fig. 2. Depression of any other push button shown to the left of Fig. 1 serves to move the contacts of relay B either to the left or the right-hand position and thereby breaks the circuit for short-circuiting the holding coil 26 through contact B₂ and contact A₁ to earth.

In place of the electro-magnet coils of Fig. 2 which are utilised to operate the push button at the radio receiver a single electro-magnet may be used, this electro-magnet being brought opposite the required push button by the use of a selector drum. This selector drum may be in the form of a cylinder, having the single electro-magnet mounted on the periphery thereof and the amount of rotation of the cylinder may be made to depend upon the movement of the movable relay contacts which, in turn, depends upon the remote push button which is operated. The various amounts of rotation imparted to the cylinder may cause the electro-magnet to come opposite different press buttons situated at the receiver, the relay being arranged so that the electro-magnet is energised when the appropriate push button is opposite the

electro-magnet and the electro-magnet is de-energised when the required tuning function has been performed.

Tuning Operations

The push buttons at the receiver may serve to effect tuning in any suitable manner. For example, they may switch into operation pre-tuned circuits or they may operate a motor for adjusting the tuning device of the receiver.

The lowermost push buttons to the left of Fig. 1 which are indicated as operating the receiver to cause the volume to increase and decrease respectively, cause currents through either the rectifier X or the rectifier Y to be applied to the coil of relay C. When current flowing through the rectifier X is applied to the relay coil R_c the movable contact C₁ of relay C, Fig. 2, is moved to the left and the circuit

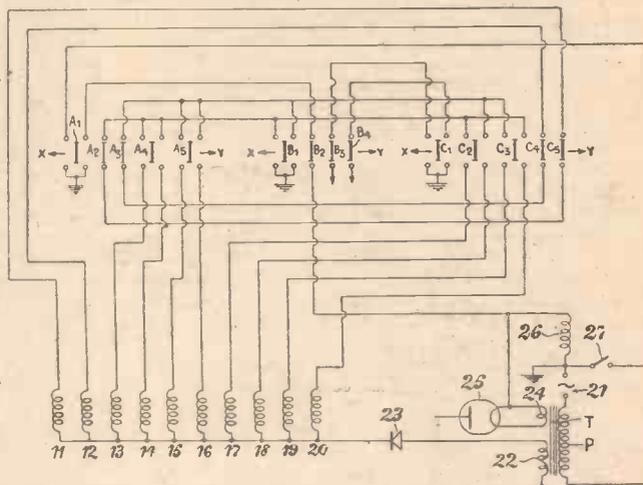


Fig. 2.—Theoretical circuit of the control mechanism.

is completed through contact B₃, while when current flowing through the rectifier Y is applied to the relay C the movable contact C₁ is moved to the right and the circuit is completed to contacts B₄. From each of these contacts B₃ and B₄ a circuit is completed to actuate the volume control of the receiver; the circuit through contacts B₃ serving to increase the volume output of the radio receiver and the circuit through contacts B₄ serving to decrease the volume output of the radio receiver. The circuits from the contacts B₃ and B₄ may serve to operate a magnetic clutch of the motor so that the volume control spindle of the radio receiver is driven by the shaft of the motor, a circuit of which motor is completed from either of the contacts B₃ or B₄ to cause the volume control spindle to be driven in the required direction.

In one preferred arrangement, loudspeakers, which are employed at a position remote from the radio receiver and of which one is indicated at L in Fig. 1, are provided with volume controls which are situated adjacent to the loudspeakers. In order that such an arrangement may function properly an efficient system of automatic volume control is required to be embodied in the receiver, and a volume control is required across the loudspeaker at the receiver as well as at the remote positions. The difficulty of efficient automatic volume control and the expense thereby entailed may be practically overcome by causing the push button to operate a volume limiting device which is pre-set at the receiver according to the station which it is required to receive.

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Car-radio Experiments—II

Continued from Last Week, this Article by FRANK PRESTON explains the Need for Suppressor Devices when Using an Improvised Car-radio Receiver

LAST week I dealt fairly briefly with some suitable forms of experimental car aeri-als. In addition to the roof and fishing-rod types, an illustration was given of an under-car V-type aerial, but shortage of space did not permit of a description of this aerial being given. The following brief particulars refer to the aerial shown on page 375 last week.

It is a V, with equal-length arms, the lead-in being taken from the apex. Ordinary aerial wire can be used, and it should be fitted with insulators, which can be attached to the ends of the axle case by binding with wire just outside the shock-absorber

relation to the design of the receiver, so the constructor cannot normally fit them with success.

Extent of Suppression

Experiments soon show that the number and arrangement of suppressors are by no means standardised; sometimes only slight suppression is needed to remove interference entirely, whilst in other instances a considerable amount of care is taken. The design and layout of the ignition and electrical circuits of the car have a marked effect, but the effectiveness of the receiver screening is a factor which cannot be overlooked.

With most commercially-made receivers of modern design it is necessary only to include a suppressor resistor in the main high-tension lead to the centre of the ignition distributor and a condenser between terminal SW on the coil and earth. Special resistors are sold for the purpose, these having a bakelite shroud with shrouded push-in type connectors. For purely experimental purposes you can try an ordinary metallised or composition resistor of about 25,000 ohms, but it will be necessary to bind the ends with insulating tape. And since the proper

component is not expensive it is by far the best to buy one. In most cases it can be fitted simply by cutting the H.T. wire about 1in. above the distributor, when the two ends of the cut can be pressed into the ends of the resistor; sometimes there is a screw inside the end of the component, and then the wire ends should be screwed in position. Remember that the suppressor should be as close to the distributor as possible if it is to be fully effective.

An ordinary tubular condenser can be used for the coil, but this is not fully effective due to it being unscreened. A suitable value is about .25 mfd. A proper suppressor condenser in metal case is in every way to be preferred, and the bracket of this can be attached to any convenient engine, chassis or bulkhead screw near to the coil. The two essential suppressors are shown in Fig. 1, along with the method of fitting.

Individual Plug Suppressors

When magneto ignition is employed it is clearly impossible to fit the main H.T. suppressor, and in that case it is nearly always essential to include a resistor in each plug lead when using other than a carefully-designed special car-radio receiver. These resistors may have a value between 25,000 and 50,000 ohms, but here again, it is wise to use the special components which are supplied with terminal ends for directly fitting to the sparking plugs and to the plug leads. These suppressors should be close to the plugs so that they are as near as possible to the actual spark gap— from which the interference is radiated.

There is a good deal of prejudice about the fitting of these resistors, but in few instances is it well founded. They do, of course, "slow-down" the spark to a slight degree, and it is by so doing that they prove effective. Except on a fairly highly-tuned engine, however, they seldom have any marked effect on either performance or fuel consumption. If it is believed that the behaviour of the engine is less satisfactory after the suppressors have been fitted, the effect of slightly reducing the sparking-plug gaps can be tried, except in those cases where special so-called wide-gap ignition is used.

It will sometimes be found that individual plug suppressors must be used in addition to the main H.T. component with coil ignition when there is no provision for suppression inside the set. The same remarks apply as when magneto ignition is fitted.

Screened Ignition Leads

When wide-gap ignition is used (plug gaps set to between .25 and .45 thou.), or if it is feared that engine performance might suffer from the installation of individual plug resistors, it is frequently possible to obtain very satisfactory results by screening either the main H.T. lead or all leads carrying H.T. This can be done by using screened wire, taking care to keep the leads as short as possible and to earth the screening at not less than two points, or by passing all the leads through a metal tube with side holes through which the ends of the leads can be fed to the plugs. The tube can be attached to the cylinder-head studs by means of short brackets. See that the tube is sufficiently far above the cylinder head for the leads not to become unduly hot. With an o.h.v. engine the tube can generally be fitted to convenient

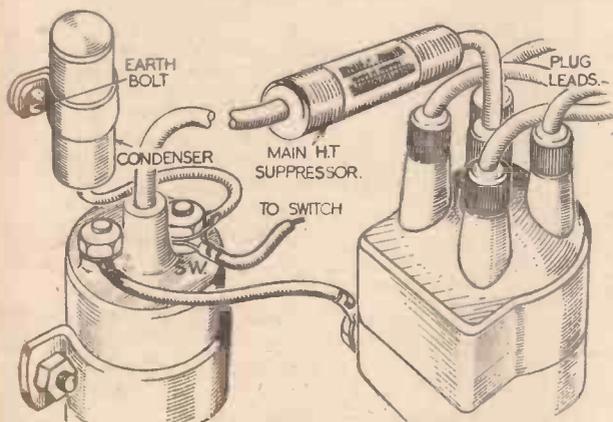


Fig. 1.—Connection for a main H.T. suppressor resistor and an ignition-suppressor condenser.

brackets. An insulator is also required at the forward end, and this should be fitted to the gearbox through a small spring which is in light tension; this allows for the movement of the rear axle.

If there is not a convenient gearbox bolt, a thin iron plate with large hole can sometimes be fitted under the flange of the drain plug. Take care, however, that the fibre washer is replaced on the plug and that the plate is flat and not more than 1-16in. thick. When the aerial would foul the chassis if attached directly to the gearbox it is not usually difficult to use a small iron bracket, which can be held under a chassis bolt, to lower the aerial slightly. As the lead to the set from this kind of aerial is generally so short it can be of unscreened wire.

With an open car it has often been found that a fairly effective makeshift aerial can be made simply by running a length of flex from the top of the windscreen to the tail, whilst another idea is to sew a length of flex to the inside of the hood cover, running it zig-zag from front to back.

Interference Suppression

Even after attaching to the car the best possible aerial and taking care in earth-bonding the receiver, reception will generally be impossible while the engine is running unless suppressors are fitted to the ignition system. With commercially-made car-radio receivers ignition suppression is an extremely simple matter, but that is because suppressor inductances are included in the set, as mentioned last week. These call for special consideration in

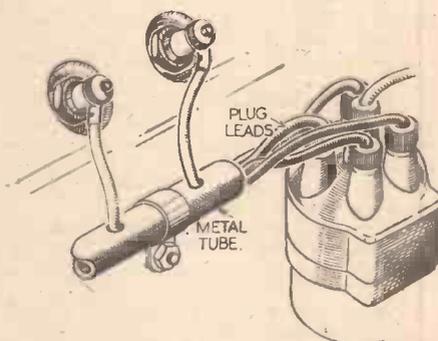


Fig. 2.—A method of screening the sparking-plug leads.

bolts or studs alongside the cylinder block or head (see Fig. 2). When the leads have to run for more than about 3in. from the distributor to the screening tube it might be necessary to pass them through a second short length of tubing, or to cover them with screening gauze which must be earthed to the engine, chassis or body.

It is scarcely necessary to emphasise the importance of ensuring adequate insulation between the earthed screening and the H.T. wires. At the same time

(Continued on next page.)

CAR-RADIO EXPERIMENTS—II

(Continued from previous page)

it should be pointed out that if there is any sign of perished rubber insulation of the leads, it is wise to fit new cables. There is a type of material on the market which has a silvered or glossy surface; this is very suitable since the insulation is very tough and impervious to oil.

Earth-Bonding

In the majority of cases it will be found that ignition interference is entirely eliminated by carrying out some or all of the work outlined. But if this is not the case re-examine the earth-bonding of the receiver and of the screening used for external leads before proceeding further. It should be possible, after having tuned in a station, to start the engine without any continuous noise being heard from the speaker; there will probably be a few crackles as the starter motor is switched on, but that is of little moment.

With the suppression system arranged as described it should even be possible to operate a fairly good portable receiver in the car while the engine is running, although it is better to have an external aerial connected to it. This type of set is seldom very satisfactory while the car

is in motion, because the A.V.C. circuit, if provided, will seldom be able to cope with the rapid and marked fluctuations in signal pick-up.

When ignition interference remains despite the steps outlined having been taken, it might occasionally be found that it is due to the proximity of the receiver and the coil. In that case a small can may be suitably drilled for the connecting wires and placed over the end of the coil to act as a shroud. For preference it should be a tight fit on the coil case and should be properly earthed.

Other Sources of Interference

Although the ignition circuit is mainly responsible for what might be termed dynamic (as opposed to static) interference, it is often found that some interference is radiated by the dynamo, direction indicators, windscreen-wiper motor, and lamp switches. Condensers—preferably metal-cased—can be used to “kill” the interference, by wiring them between the earth line and the “live” terminal, but before doing this it is wise to check and if necessary clean the contacts, commutator, bulb-holders and the like. The object of this is to prevent the occurrence

of the trouble rather than to cure it after it has been caused. Loose connections in any part of the electrical system can also be responsible for interference, and by arcing between H.T. leads and earth. It is evident, therefore, that it is far better to make a thorough check of the system than to fit numerous suppressors.

Static interference is far more difficult to trace, and an examination must be made for loose and rubbing metal parts, a loose exhaust pipe, loose body-holding-down bolts and things like these. This just brings to mind the difficulty experienced by a friend who fitted a running-board type of aerial of good commercial make. Interference was very bad, and in the end he decided to scrap the aerial and fit one of the roof type. When this was done reception was completely satisfactory, so he made a point of “advising” his acquaintances that running-board aerials were hopeless.

It so happened that he had fitted the aerial on the same side as the exhaust pipe, which was within a couple of inches of the aerial, and that the ignition coil was not very far from the front end. Had he transferred the aerial to the other running board it is more than likely that the interference would have been prevented.

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)

Wednesday, July 5th.—Ronald Frankau revue, *Beyond Compère*.

Thursday, July 6th.—*Life Begins at Sixty*, light entertainment.

Friday, July 7th.—*Macbeth*, Acts 1, 3 and 4, from Glyndebourne.

Saturday, July 8th.—*Summer Serenade: Up with the Curtain*, a variety entertainment.

REGIONAL (342.1 m.)

Wednesday, July 5th.—Burford, a programme from the Cotswolds.

Thursday, July 6th.—*The Classic Soil: Manchester to-day and a hundred years ago*, an interesting feature programme from North.

Friday, July 7th.—Concert Party programme.

Saturday, July 8th.—*Ithuriel's Hour*, adapted for broadcasting from the novel by Joanna Canaan. This is to be relayed from Wales.

MIDLAND (296.2 m.)

Wednesday, July 5th.—Burford, a programme from the Cotswolds.

Thursday, July 6th.—Birmingham City Police Band.

Friday, July 7th.—Review of Revues: Orchestral concert.

Saturday, July 8th.—*The Birmingham Air Port*. A recorded impression of the opening of the airport by the Duchess of Kent.

WEST OF ENGLAND (285.7 m.)

Wednesday, July 5th.—Johann and Gertha, a mime-ballet.

Thursday, July 6th.—*A Sonata Recital*.

Friday, July 7th.—Light orchestral concert from the Continental Restaurant, Bournemouth.

Saturday, July 8th.—*Ithuriel's Hour*, adapted for broadcasting from the novel by Joanna Canaan.

WELSH (373.1 m.)

Wednesday, July 5th.—Radnor Forest: A programme compiled by Austin Jones and A. Watkin-Jones.

Thursday, July 6th.—A Concert from Bethania Congregational Chapel, Dol-lais.

Friday, July 7th.—*The Royal Welch Fusiliers*, a sound picture of the regiment's life, relayed from the Barracks, Wrexham.

Saturday, July 8th.—*The Resurrection*, a story by Sam Jones, told by Clydach Thomas.

NORTHERN (449.1 m.)

Wednesday, July 5th.—*The North Country-woman—7*, a personal miscellany.

Thursday, July 6th.—*The Classic Soil: Manchester to-day and a hundred years ago*.

Friday, July 7th.—Concert Party programme from the Spa Theatre, Scarborough.

Saturday, July 8th.—*Pit Ponies at the Royal Show*, Windsor.

SCOTTISH (391.1 m.)

Wednesday, July 5th.—*The Scottish National Players in 8 for Sugar Candy*, a comedy by Donald MacLaren.

Thursday, July 6th.—*Scots Songs: Orchestral concert*.

Friday, July 7th.—*Students' Songs*.

Saturday, July 8th.—*Glints o' Sunshine*, a summer miscellany.

NORTHERN IRELAND (301.1 m.)

Wednesday, July 5th.—*Ballad Concert*.

Thursday, July 6th.—*Band Concert*.

Friday, July 7th.—*Gardening discussion*.

Saturday, July 8th.—*Where's that Tiger?* a farcical comedy by Ruddick Millar.

(See note on page 385.)

NEW PLAY ABOUT GRACE DARLING

THE story of Britain's first national heroine will be told in a new play, “The Fame of Grace Darling,” which is to be televised in the evening programme on July 9th, with Wendy Hiller in the name part. Incidentally, this will be Wendy Hiller's television début and her first public appearance since her success in the Bernard Shaw film, “Pygmalion.”

The play has been written by Yvette Pienne, the well-known actress, who has been able to study television at first hand by taking part in several plays herself.

This original play gives the sequel to the story of Grace Darling's famous rescue off the coast of Northumberland. It will show that the heroine's reward was the perpetual turmoil which is the lot of anyone who becomes “news.” Besieged by trippers, pestered by souvenir hunters for locks of hair, and entreated by rival theatre managers to appear on the stage, the humble lighthouse keeper's daughter was quite overwhelmed until, under the strain, her health gave way and she died at the age of twenty-eight.

The Design Department at Alexandra Palace is now engaged in the difficult task of making scenery which shall give the impression of a lighthouse interior while allowing space for the actors. The “set” is being designed from a contemporary engraving of the Longstone Lighthouse, where Grace and her father lived.

It will be repeated in the afternoon programme on July 14th.

ON YOUR WAVELENGTH



The Television Push

I AM delighted at the efforts which have been made to ensure that television spreads its beneficent influence over the country. I am quite sure that television will transmogrify the whole science and industry of radio. It should not be held back. The British have earned an undeserved reputation for being slow to make up their minds, but quick to act once they have made it. Let us undo this reputation, for there is no reason to delay the television service. The financial side cannot be the reason, for the manufacturers have agreed to meet any loss on the first year's working of a new station. If it is necessary to increase the licence fee, I do not think that this would be a serious barrier, although the obvious solution is to issue a separate television licence so that the money needed is raised only from those who will benefit; that is to say, from those who own television receivers. I have kept you acquainted with the moves which have been made in order to ensure the development of television on a national scale. In order that the dossier on this matter shall be complete, it is necessary for you to know that the Postmaster-General recently received a deputation urging the speedy extension of the television service to the provinces. The deputation, which was organised by the Radio and Television Traders' Federation, comprised representatives of the Wireless Retailers' Association, the National Association of Radio Retailers, Ltd., the Scottish Radio Retailers' Association, the Wales and Monmouthshire Radio Retailers' Association, and the Coventry Musical and Radio Retailers' Association. The case was presented by Mr. Upton.

The deputation stressed the necessity for extending television to the provinces and Scotland, and emphasised the fact that radio and television were two distinct forms of entertainment. They said the public were asserting a demand for the new entertainment, and that the delegates were voicing that demand. The British television industry could only continue to lead the world if the service were extended. If the difficulty in the way of such an extension

By *Thermion*

was a financial one, the deputation proposed that the existing 10s. od. wireless licence fee should remain, and that a new licence should be introduced for the radio and television services at a combined fee of £1 per annum. The deputation considered that the public would be prepared to pay for this additional form of entertainment. They urged the provision of one provincial television station this year, two further stations by the end of 1940, and an 85 per cent. coverage by 1942.

The Postmaster-General stated in reply that the Television Advisory Committee had been investigating the problem in all its aspects and he understood that they were about to submit a report to him on the subject. He promised that in considering the report he would give full weight to the representations made to him by the deputation.

Telephone Radio Relay Service

YOU must all have read the recent pronouncement by the Postmaster-General in the House of Commons on the projected radio relay service to telephone subscribers. The manufacturers, in response to my inquiry regarding their attitude, commented that they could only reiterate the view expressed some time ago that relay and wired

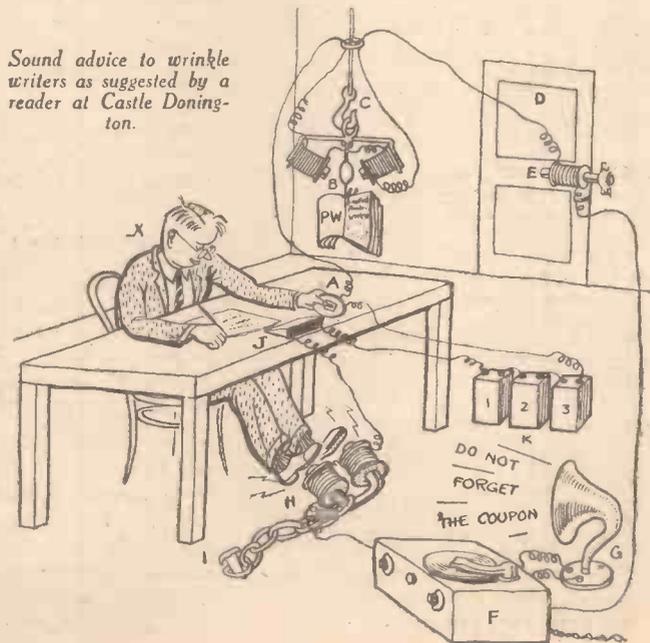
wireless systems are in no way a substitute for the radio receiving set, which gives listeners a wide choice of programmes from all over the world.

In emphasising the case for wired communication in case of emergency, the Postmaster-General seems to have overlooked the lessons of the last war. It was shown repeatedly that in bombed and shelled areas wired communication was subject to continued interruption and if, as has been frequently stated, large areas are vulnerable from the air, then wired communication may be subject to interruption, and the radio link is vital to the maintenance of communication.

The Postmaster-General appears to have overlooked or ignored the importance of radio services as a means of maintaining communication in case of emergency.

Wanted—A Correspondent

I HAVE received a letter from a German short-wave fan who wishes to get into touch with a girl correspondent of his own age (19 years), and who takes an interest in radio or short-wave affairs. He is anxious to improve his knowledge of the English language and feels that a mutual interest in radio would help towards that end. The correspondent



Sound advice to wrinkle writers as suggested by a reader at Castle Donington.

concerned is a member of a German short-wave club. If any lady readers are interested in short-wave matters (can there be lady short-wave readers of this journal?), I shall be glad to forward their letters, which should be addressed to me and marked G. K. in the top left-hand corner.

From an Old Wrinkler

AN old wrinkler residing at Castle Donington has conceived an idea to make the wrinkling public remember the coupon. The illustration (p. 391) shows his plan. Perhaps it is just as well that I should explain that "Wrinkle Writer" X in the diagram completes letter to the Editor re wrinkle, then proceeds to wet stamp on stamp lubricator (A), under which is concealed a press switch. This switch makes contact and completes circuit which causes patent vibrating pendulum (B) hanging on hook (C) to shake copy of PRACTICAL AND AMATEUR WIRELESS before the wrinkle-writer's eyes. The current from batteries K 1, 2 and 3 at the same time causes electromagnetic bolt (E) on door (D) to lock and sets into motion radiogram (F), which plays special record repeating "Do not forget the coupon" via loudspeaker (G) with 15 watts undistorted output. Meanwhile, electromagnet (H) is attached to the nails in wrinkle-writer's boots. This effectively prevents writer from going to the post. As magnet (H) is chained to stake (I) on the desk, trap door (J) flies up and on its surface is printed a copy of regulations concerning wrinkles "of the radio variety," which is read by the astonished writer of wrinkles, and he finds with horror that he must enclose a coupon with his wrinkle. This causes him to stop wetting the stamp, which releases the switch (to see the effect of releasing the switch the reader must read this instruction sheet backwards) and cuts the coupon from the PRACTICAL AND AMATEUR WIRELESS copy in front of his eyes. Thus another tragedy is prevented.

Wrinkle people who try this invention (given freely to the trade) are advised to tie two knots in their handkerchiefs, one to remind them about the coupon and the other to remind them why they built the machine herein described.

The "Practical Wireless Service Manual"

ON page 320 of this journal, dated June 17th, 1939, a printer's error occurred. The *Practical Wireless Service Manual* was announced as costing 3s. 6d. The correct price is, of course, 5s., or 5s. 6d. by post.

Notes from the Test Bench

Station Searching

USERS of superhets of the standard type may have noted that some difficulty is experienced when searching for very weak stations due to the fact that the noise level rises with the A.V.C. action. A further point with this type of receiver is that C.W. signals cannot be obtained unless a regenerative stage is included. Both of these defects may, of course, be overcome if a beat frequency oscillator is fitted, as this enables the H.F. currents in the 2nd detector stage to set up a beat with the oscillations fed to it from the B.F.O. stage. If such a device is not fitted to the receiver it may, of course, be constructed as a separate unit and placed outside the receiver, but it must then be perfectly screened and a screened lead taken from it to the input to the 2nd detector stage. When adjusted, the reception of a station may be detected by a squeal in the same manner as when using an oscillating detector stage, and the oscillations must then be slackened off to render the speech or music intelligible.

Multi Connections

IN some modern mains receivers and also in some battery sets it is often necessary to connect several wire-end components to one point. The difficulty which usually arises is that one or two parts are first placed in position and when additional parts are added the first connections come adrift. By using a number of soldering tags this difficulty may be overcome, but an alternative idea is to solder a length of bare wire to the point in question and then attach the various components round this lead at intervals, the result being that each may be made to point in the required direction, and they may be added as wiring proceeds without risk of previous connections coming adrift.

Microphone Feed-back

THE main trouble when trying microphone circuits is that of feed-back which gives rise to a high-pitched howl as soon as the volume is turned up. Generally, this is due to the sound waves from the speaker impinging on the microphone and therefore the cure is so to place the two that they are "back to back" or as nearly so as possible. Instability can, however, give rise to a similar trouble and the input leads may have to be screened. The distance between mike and speaker is also a vital factor when instability of the type mentioned is experienced.

This valuable handbook is worth ten times the price charged.

P.U.—Separate or Combined?

F.L., who resides in the salubrious district of Las Palmas, contributes his dicta, quota, opinion, pronouncement, moiety, or last word on the subject raised in a recent issue. This is what he says:

"I noticed in your article in No. 349 of PRACTICAL AND AMATEUR WIRELESS that you would like comments on the relative merits of plugging a P.U. into any old receiver, or building a complete radiogram.

"I have tried each and they both have their advantages and disadvantages.

"First of all why not use the transmitter's idea of the rack system? This was O.K., but hardly decorative, considering the whole was to be deposited in the living room.

"From this was evolved a unit with each section an independent unit—with multiple plugs for connections.

"Doors opening either sideways or downwards, according to which is most convenient, covering all panels except for the broadcast set—which is open to family use—this would hide the enormous multiplicity of knobs in which the real enthusiast delights.

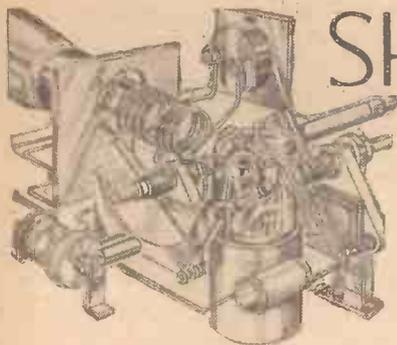
"Switching or plugs could be used for connecting the individual receivers to the universal L.F. amplifier.

"The gram. turntable would be mounted on a hinged board swinging outwards for record changing, with gram-radio switch mounted on the broadcast panel, so that it, also, would be available for family use.

"The chief advantage of all this is, of course, that as each copy of PRACTICAL AND AMATEUR WIRELESS comes to hand, one could remove and modify any section according to the ideas therein, without having to dismantle the whole radiogram, or leave the family without music. (The L.F. section could be two sections also.)

Arthur Askey's Life Story

SEEMS a long time ago now that most of England crowded round their loudspeakers every Wednesday night to hear Band Wagon with Arthur Askey. Many of the comedians who owe so much of their popularity to the radio are soon forgotten, but not "Big Hearted Arthur." I see he is now writing his life story for *Tit-Bits* and a most entertaining story it is too. He writes as he speaks. "Even when I cracked my first gag," he says, "It must have been an old one, because the rubber was perished."



SHORT-WAVE SECTION

A SUPER-REGENERATIVE FOR THE ULTRA SHORTS

A Good Single or Two-valve Circuit for Portable or Standard Use on the Wavelengths below 10 metres.
By W. J. DELANEY

ALTHOUGH the superhet is obtaining well-deserved popularity for wavelengths down to 10 metres, there are many difficulties which arise when an attempt is made to get down to 5 metres or below. These difficulties are especially noticeable when portable receiver design is contemplated, and one of the most important is that of size. The superhet must use at a minimum four valves if it is to be worth while, but the frequency-changing stage is not entirely satisfactory down to 5 metres, unless special circuits are adopted, and even then the results often do not justify the use of the superhet principle. An H.F. stage also fails to pull its weight on 5 metres, and this forces the listener to adopt a straightforward detector-L.F. combination, and the many faults of this type of circuit become intensified on the ultra-shorts. The main sensitivity of the reacting detector is obtained from the reaction circuit, and therefore with

noise level or hiss which is obtained, but when it is properly set up it is definitely superior to the ordinary type of receiver, and this fact is borne out by the popularity of the circuit in special portable apparatus used by the Police and Army authorities. The essential features of a self-quench type of super-regenerative stage are shown in Fig. 1. It will be noted that the tuned circuit is across anode and grid instead of across grid and earth as in the usual arrangement, and the H.T. is fed to the centre of the tuning coil. Whilst the value of the grid leak is not usually critical, the grid condenser, C1, and the quench condenser C2 are of the utmost importance, and it is due to wrong values of these two components that most super-regen. receivers fail to give the desired results. A standard L.F. coupling may, of course, be connected in place of the 'phone terminals, and as this will introduce the need for higher H.T. to feed the following valve, some form

value of about 20 or 30 m.mfd., and should preferably be of the ceramic type. A suitable component is obtainable in the range supplied by Webb's Radio, Raymart, Premier or Eddystone.

The condenser must be mounted on an insulated bracket. C1 and C3 are now indicated as variables, and the advantage of this is that it enables adjustments to be made when the receiver is first set up so that the maximum performance may be obtained. A small aluminium chassis should be used, and the two condensers, C1, an Eddystone type 978, and C3, a Bulgin C.P.4, should be mounted on the chassis—not the panel—as close to the grid and coil tap as possible. The H.F. choke, preferably the Eddystone wire-ended or a similar component on a ceramic base, should form the connecting link between the coil and C3. Other components may be perfectly standard, good-quality items, and no particular reference need be made. Wiring must, of course, be kept down to the minimum with due attention to spacing and right-angle crossings, and as the tuning of this type of receiver is not unduly sharp, there is no necessity for a high-class slow-motion drive for the tuning condenser. A moderately-g geared component in keeping with the general dimensions of the receiver should be used, coupled to the condenser through a ceramic type insulated coupling rod. The variable resistor in the H.T. feed must be a good component such as the Dubilier metallised, and if any alternative make is employed make quite certain that it has an insulated spindle and that it is smooth in its action. The remaining constructional details may be left to personal preference.

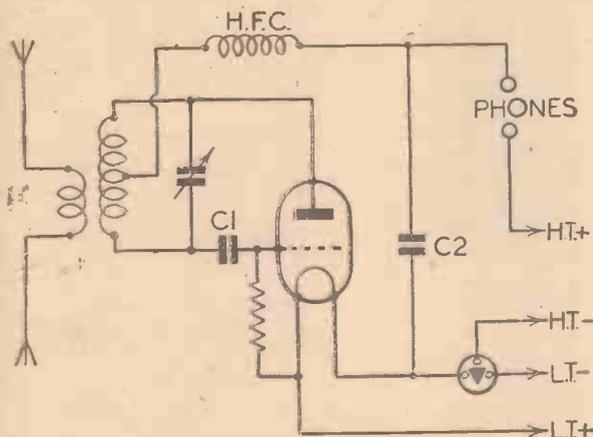


Fig. 1.—Main details of the self-quenching super-regenerative circuit.

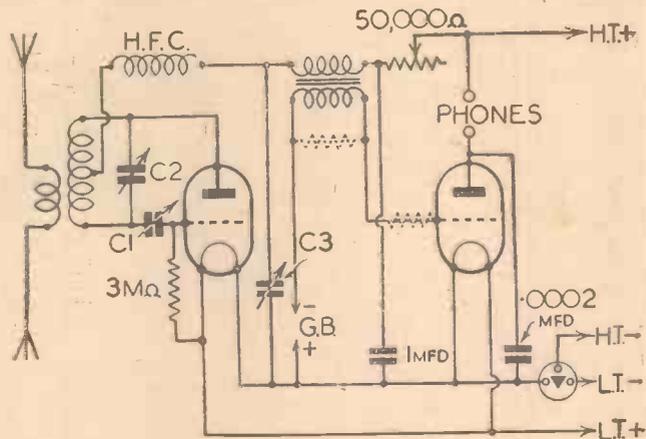


Fig. 2.—The complete 2-valve circuit using the super-regenerative arrangement.

a single valve it is necessary to rely upon some scheme which will enable the reaction arrangements to be operated faultlessly, especially if reliable long-distance reception is to be obtained. For the amateur transmitter this is one of the main points, and a receiver is needed with which the amateur band can be searched fairly quickly, but reliably.

Reaction and Tuning

With the ordinary oscillating detector it is not a simple matter so to arrange things that the reaction setting is constant or so that it does not affect tuning, should it be found necessary to make a modification in the reaction setting. The super-regenerative type of receiver, on the other hand, may be made in a very reliable form, is extremely sensitive, and calls for no more elaborate apparatus than is used in an ordinary detector stage. Its main defect, from many listeners' point of view is the

of variable H.T. device must be included for the first stage.

A Suitable Design

A two-valver is generally to be preferred on account of the better signal strength, where a portable type of aerial is employed, and this type of aerial will generally be used as no earth connection is then called for and the apparatus may thus be kept in use at all times. A full two-valve circuit is given in Fig. 2. and it will be seen that there is a minimum of components, thus enabling quite a compact set to be built up. For the tuning circuit and aerial coupling coil, the midget Eddystone coil units (type 1050) are ideal, and it will be noted that a dipole aerial connection is indicated. Two short lengths of rod may be used, or if the apparatus is to be used with a cycle or car, wires may be suspended in suitable positions for this purpose. C2 is a standard midget short-wave condenser having a

Operating Notes

When construction is completed, the receiver may be tested, and for preliminary working C3 should be adjusted to almost its maximum value and C1 to a mid-way setting. Connect phones and H.T. and slowly rotate the reaction control. A loud hiss should be obtained, and as the resistance is advanced this should cease. If the customary hiss cannot be heard, adjust both C2 and C3 slowly until you can obtain it, and endeavour to pick up a station—preferably a local amateur on 5 metres. When a signal has been obtained, it will be a fairly simple matter to adjust the two condensers mentioned until perfectly smooth results are obtained throughout the band covered by the coil in use. A setting of the resistance should be found, when the two condensers have been properly adjusted, where tuning may be carried out over the entire band of the coil

(Continued on the next page)

Leaves from a Short-wave Log

Rome on Ultra-short-waves

THE ultra-short wave transmitter which the E.I.A.R. recently opened at Rome (Italy) is now operating daily on 6.85 m. (43.8 mc/s) from B.S.T. 16.00-18.30. For the first time in the history of radio a new method of construction has been adopted. Instead of placing the transmitter at the foot of the aerial mast, it is actually built at the top, in a metal casing, and in this way loss of energy has been avoided. The station works with a power of 400 watts in the aerial.

The Voice of the Orient

XMHA, formerly XGSB, a 20-kilowatt station at Shanghai (China), now works on 25.26 m. (11.875 mc/s) every day at B.S.T. 15.00. A news bulletin in the English language is broadcast at B.S.T. 15.45, followed by the Chinese National anthem. The address is: 445, Racecourse Road, Shanghai (China).

Ici Radio St. Denis

FRSA, the 100-watt station at St. Denis, the capital of Reunion Island (French possession), has been heard by a listener in the British Isles between B.S.T. 19.00-20.00, broadcasting a programme of gramophone records. The wavelength is 31.25 m. (9.6 mc/s).

Spain's Short-wave Stations

ALTHOUGH details of a regular schedule have not yet been published of the innumerable short-wave transmitters used during the Civil War, it would appear that the only ones still in operation are the following: EAR, Madrid, 31.62 m. (9.49 mc/s); EAQ, Madrid, 30.43 m. (9.86 mc/s); Malaga, 41.55 m. (7.22 mc/s); Burgos, 42.43 m. (7.07 mc/s); Valladolid, 42.43 m. (7.07 mc/s); EAQ1, Barcelona, 42.7 m. (7.03 mc/s); EAJ1, Barcelona, 21.35 m. (14.06 mc/s).

It is reported that the entire broadcasting network both on medium and short waves is to be reorganised in the near future.

The 1940 Olympic Games

INFORMATION regarding the XII Olympic Games to be held in Finland next year is given out in a broadcast every first Monday and Tuesday in each month through Helsinki (3), Finland, on 49.02 m. (6.12 mc/s).

Paris-Mondial Changes Channel

THE French Paris-Mondial broadcasts previously carried out on 31.41 m. (9.55 mc/s) are now heard on 41.21 m. (7.28 mc/s) daily from B.S.T. 16.15-18.45, and from 19.00-23.15.

Radio el Mundo

THE Buenos Aires (Argentine Republic) stations LRU and LRX on 19.62 m. (15.28 mc/s), and 31.06 m. (9.66 mc/s) respectively, relay the programmes of the medium-wave studio LRI, operated by the owners of the daily newspaper *El Mundo*. LRU works from B.S.T. 13.45-15.30, and LRX from 15.45-05.00 daily. Address: Radio el Mundo, Calle Maipu, 555, Buenos Aires.

A Call from St. Kitts

THE Caribbean broadcasting service is now establishing a regular schedule of broadcasts from its 250-watt transmitter ZIZ, situated at Basse-Terre in that island. The station works on 49.3 m., 6.085 mc/s.

And from the Bahamas

ZNS, Nassau, a 200-watt station installed by the island authorities, provides a varied radio programme at B.S.T. 19.30-20.00, and from 02.00-03.00, on 49.26 m. (6.09 mc/s). The distance from London is roughly 4,400 miles. Address for reception reports: Office of Superintendent of Telegraphs, Radio Station ZNS, Central Pay Street, Nassau, Bahamas.



A studio portrait of Gloria Brent, the attractive "croquette," heard on the air with Bram Martin, Jack Jackson and other bands.

The Short-wavers of Panama

IN Panama City (Republic of Panama) there are now five short-wave transmitters, of which HP5J, *La Voz de Panama*, is the most important. This station operates with a power of 3 kilowatts on 31.23 m. (9.607 mc/s) daily and reception of its broadcasts is an easy matter from midnight B.S.T. onwards. The studio closes down with a march: *The Black Horse Troop*. HP5G, a 750-watt, is frequently heard on 25.47 m. (11.78 mc/s). In a similar way to the U.S.A. studios, it puts out its announcements and call every fifteen minutes. HP5H, *La Voz del Pueblo*, also in the capital, is recognisable by its single-chime interval signal; the wavelength is 49 m. (6.122 mc/s). HP5A, giving as its call *Radio Teatro de la Estrella*, on 25.64 m. (11.7 mc/s), works on 300 watts and may be identified by its two-toned gong. An English news bulletin by an Englishman is given out nightly at G.M.T. 23.30. HP5B, *Estacion Miramar*, on 49.75 m. (6.03 mc/s), as an interval signal has combined the stroke of a gong with a cuckoo call. The power is 200 watts. Coupled to the call is the announcement in English that the broadcasts are from the

land which is divided so that the world could be united and "where palm trees grow and two oceans flow." In addition to the short-wave stations at Panama City there are smaller stations at Aguadulce, such as HP5I, *La Voz del Interior*, on 25.22 m. (11.895 mc/s); at David (Chiriqui) HP5L, *La Voz del Istmo* (Isthmus), on 25.55 m. (11.74 mc/s), 300 watts, and two stations at Colon, namely *La Voz de la Victor* (HP5K), on 49.96 m. (6.005 mc/s), 1 kW, and HP5F, *La Voz de Colon*, on 49.59 m. (6.05 mc/s), 300 watts, which in the early hours of the morning closes down with that popular melody *The Whistler and His Dog*.

El Salvador Calls

SAN SALVADOR, in the Republic of that name (Central America), is said to be developing its broadcasting organisation. So far, only two short-wave stations in the capital have taken the air, namely, YSM, on 25.62 m. (11.71 mc/s), and YSH, on 31.51 m. (9.52 mc/s).

SHORT-WAVE SECTION

(Continued from previous page)

without any other adjustment than the rotation of the tuning dial. In the event of erratic action throughout the range the value of the grid leak may be changed, but with most valves which are suitable for this type of circuit a value of 3 megohms will be found satisfactory.

It will be noted that two resistances are indicated in broken lines on the L.F. side of the receiver, and these may be necessary with some layouts to prevent threshold howl, a peculiar form of squeal which is not easy to describe but which is immediately identified should it occur. The resistance across the transformer secondary should be about $\frac{1}{2}$ megohm, whilst the series grid-resistor should be between 15,000 and 25,000 ohms.

Mains Operation

This same circuit may, of course, be included in a mains-operated receiver, but there are one or two points which must be watched carefully. Firstly, the difficulty of hum is not easily overcome, and preferably the receiver should be self-contained, in a metal box, with the mains unit completely separated. The choice of mains components in the mains section is not unduly critical, but the smoothing is of the utmost importance. Either valve or metal rectifier may be used, but the smoothing condenser on the receiver side of the choke should be 16 mfd. at least. This may be obtained from two standard 8 mfd. electrolytics connected in parallel. As a general rule, however, a receiver of this type would not be recommended for general "indoor" use, and therefore its main utility lies in the direction of portability with high sensitivity, for which purpose battery supplies must be used. For standard reception at home, a receiver with a good H.F. stage preceding a standard reacting detector would be calculated to give better results, but, of course, the layout and general design would be much more critical and the receiver would not be so compact.

PATENTS AND TRADE MARKS

Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents, of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this paper.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

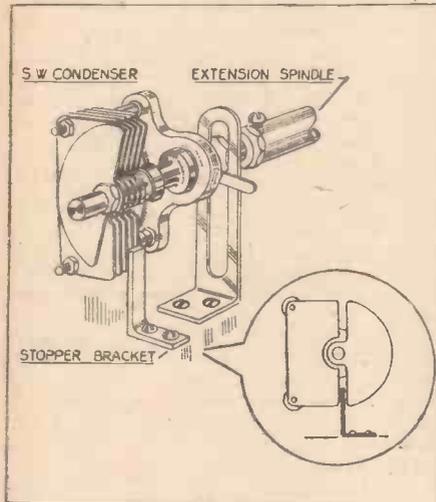
READERS WRINKLES

THE HALF-GUINEA PAGE

A Simple Stop for S.W. Condenser
 SOME short-wave condensers are not fitted with any stopping device, consequently the moving plates can make the full rotation of 360 degrees.

Though this does not, of course, affect the efficiency of working, it is sometimes a bit confusing when operating.

Most slow-motion drives do, of course, have a maximum and minimum position, but where this is not so, or where a plain dial or knob is used, the moving plates will make a full rotation.



Tuning difficulties may be overcome with a condenser stop as shown here.

Quite a simple stopping arrangement is illustrated in the sketch, and takes the form of a bracket screwed to the baseboard near to the fixed vanes of the condenser. This bracket should preferably be of insulating material, especially so if the moving vanes are above earth potential. In the writer's case, the bracket was cut from an old fixed condenser moulding, and was found to be quite rigid.—R. L. GRAPER (Chelmsford).

A Door Switch

THE light in my shed is provided by a 6-volt car bulb, illuminated by means of a few accumulators. To prevent the possibility of the light being left on overnight, I devised the following idea.

I obtained an old hacksaw blade, a strip of Paxolin, two bolts and nuts from an old bell battery, and a piece of fairly stiff wire. After breaking the blade in half, I sand-papered the end of the blades, passed a bolt through the hole in each, and secured them to the Paxolin. I then soldered a short piece of stiff wire to one of the blades so that it would just press against the other as shown in the diagram. When the shed is locked up at night, the light is automatically extinguished. A switch is installed to turn off the light in the daytime.—S. R. DODGE (Yeovil).

THAT DODGE OF YOURS!
 Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.

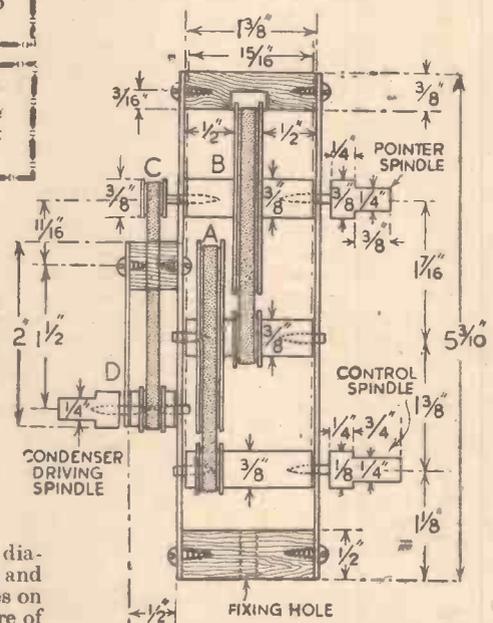
SPECIAL NOTICE
 All wrinkles in future must be accompanied by the coupon cut from page 405.

A Slow-motion Drive

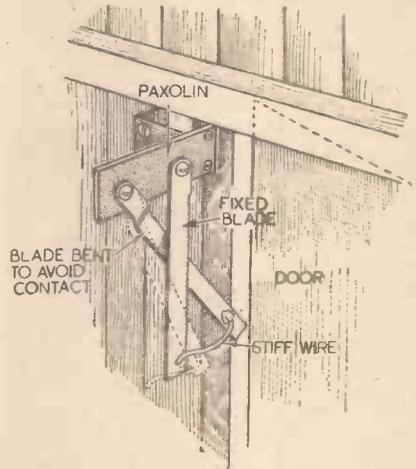
THE drive illustrated has recently been constructed from odds and ends of materials, namely, a piece of sheet tin 5½ in. by 4½ in.—actually taken from a standard flat cigarette tin—three small pieces of white wood, a 6 in. length of ¼ in. diameter wooden dowel-rod, some pieces of three-ply wood, thin cardboard, some ¼ in. diameter beheaded nails and nine small screws. The front and back bearing brackets are made from the tin as also is the much smaller rear bracket. All holes drilled in these are of ¼ in. diameter. The pulleys are plywood discs, centre-drilled to ¼ in. diameter, slipped on the dowel-rod and glued in position. The retaining flanges on the pulleys and the dowel-rod axes are of

they are made further secure with a trace of glue. The driving-bands are ordinary flat rubber bands. Before the final assembly all parts except the spindles are painted with grey "Bakelite" enamel, giving a finished appearance.

Since the reduction ratio is 60 : 1, actually 30 turns of the control-spindle and knob are required to effect the usual 180-degree rotation of the tuning condenser, and the



A simple, but effective, home-made slow-motion drive.



Avoiding waste of current by means of an auto-door switch.

thin card, centre-cut to ¼ in. diameter and glued in place on rods and against the sides of the pulleys. The spindles which run in the bearing-brackets are beheaded ¼ in. diameter nails forced into the dowel-rod axes which were previously centre-drilled for a short distance to accommodate them and

scale is twice as open as those normal to this type of drive, as the pointer attached to the top spindle makes one complete revolution for the half-rotation of the driving-spindle at the rear. The latter is low-set so that very short leads from coil-base to tuning-condenser are possible.

The dial is made from the same sheet tin as the bearing-brackets, being first roughened on one side with emery, smeared with glue and pressed on to a sheet of black crayon drawing-paper which is then trimmed to the edge of the tin. A ¼ in. diameter centre-hole has been previously drilled in the tin, and the drawing-paper is likewise trimmed to its edge. The markings are put on with white enamel paint, allowed to dry and then given two or three coats of clear varnish. The pointer is a piece of medium-gauge copper wire painted grey or white and secured in a groove cut in the pointer-spindle.

Only two ¼ in. diameter holes have to be cut in the receiver panel to accommodate the bushes for the control and pointer spindles, and the drive itself is attached to the chassis or baseboard by two 1 in. long bolts. The movement is very free with no slip.—G. BIRRELL (Dundee).

THIS receiver has been designed for the more advanced constructor, and incorporates practically every device known to modern radio to obtain the best possible results in the simplest form. The tuning unit used is accurately aligned and needs no trimming adjustments—the only trimming needed is that of the I.F. transformers which, as described later, is very simple indeed. The set has been designed to provide a high standard of reproduction from local stations, and sensitivity and selectivity are adequate for most Continental transmissions on the broadcast bands and principal short-wave transmissions.

The wave-ranges are: 16.5-51; 200-500; 800-2,000 metres, and it has excellent sensitivity, giving loudspeaker reception of the principal stations of the world, through a push-pull output stage ensuring distortionless reproduction.

Construction itself is not very difficult, but is best not attempted except by those who can solder well.

The circuit consists of a triode-hexode frequency-changer valve preceded by a set of H.F. transformers with an I.F. filter incorporated on the long waves. The succeeding valves comprise an I.F. amplifier, double-diode-triode for detection, A.V.C. and L.F. amplification, phase-reversing valve and push-pull output stage with valve rectification for the power supply.

A triode-hexode has been chosen for the frequency changer as it is easier to secure freedom from serious interaction effects between the signal and oscillator circuits, especially on short waves. Moreover, there is less chance of the oscillator frequency being affected by the A.V.C. voltage applied.

All the tuning equipment is built on a rubber-mounted sub-chassis, and the frequency-changer valveholder is also fixed to the main chassis through rubber grommets to reduce any tendency to microphony.

The 1939 ALL-W

A 6-stage, 7-valve (including Rectifier) Tuned Circuits which can be Built

tion on strong signals is considerably lessened.

The coupling between the frequency-changer and the I.F. valve is by means of a 465 kc/s I.F. transformer with top grid lead, and a similar I.F. transformer, but with all leads at the bottom, is used between the I.F. and detector stages.

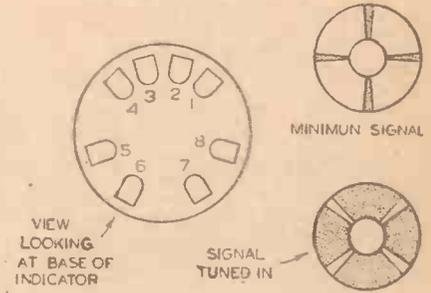
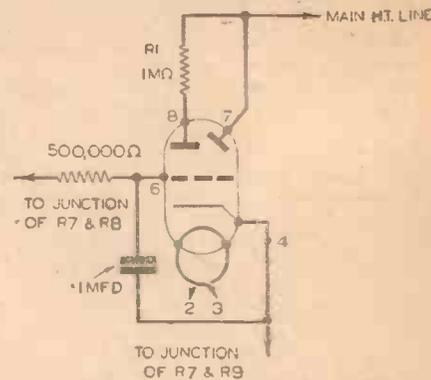
Second-channel Interference

An intermediate frequency of 465 kc/s has been chosen on account of the greater freedom from second-channel interference (in London, for instance, with two powerful local transmitters, there is one second-channel whistle only, and that occurs on the long-wave band and is greatly minimised by the filter coil incorporated in the tuning unit), and also because the tuning circuits in front of the frequency-changer can be made much more simple without sacrificing selectivity or sensitivity.

The diode detector is used in every way. One diode is used for detection and, after rectification, passed on to the grid of the valve for amplification in the usual manner. Note the use of the I.F. filter resistance and condensers. The other diode is simply used for A.V.C. and derives its voltages from the first diode by means of a 0.0001 mfd. coupling condenser. Full A.V.C. is applied to both the I.F. and frequency-changing valves.

The bias applied to the double-diode-triode valve has been reduced to approximately 2 volts and, as this voltage is also

useful on short waves. We cannot claim that it will hold a rapidly changing short-wave signal, but it has been found possible to listen to Schenectady, U.S.A., for in-



Connections and details of the visual tuning indicator.

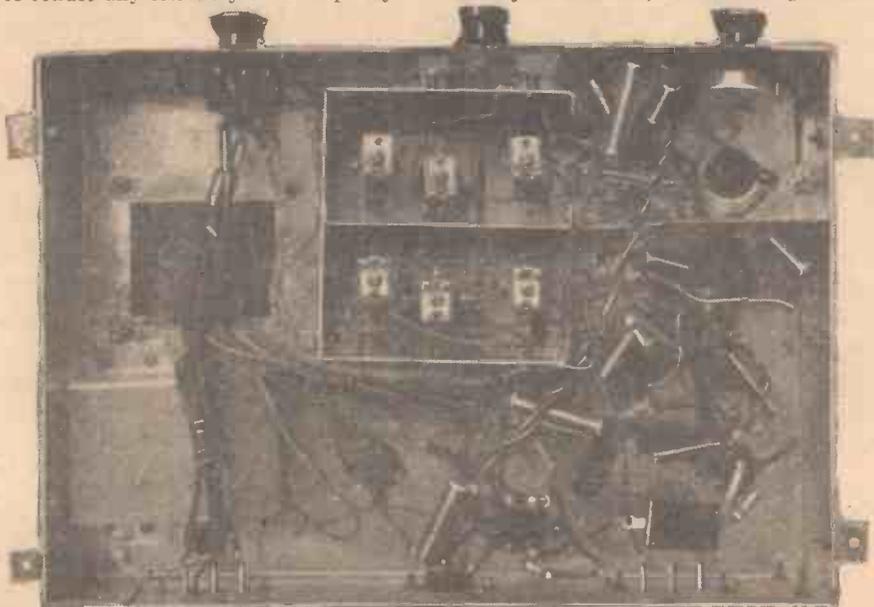
stance, for well over an hour without the volume changing very much, although a meter in the anode lead of one of the controlled valves showed that the station was continually fading, at times very quickly indeed. It was only on the latter occasions that change in volume from the loudspeaker was apparent.

The output from the double-diode-triode valve is fed by resistance-capacity coupling to the grid of the phase-changing valve.

In order to make use of one of the diodes of the double-diode-triode valve for A.V.C. purposes, it was not possible to have the cathode of this valve at the same potential above earth as the cathode of the phase-changing valve. This meant that the latter valve did not amplify, but to have made it do so would result in added complications in the receiver caused by the addition of a separate A.V.C. valve or Westector. It was also found that the detector valve was very prone to hum under these circumstances, so this valve was made normal in every way and the AC/HL used for frequency-changing only.

A Warning

It will be noted that the usual anode load resistance of the AC/HL has been split, and one half used in the cathode lead. It is well known that A.C. currents appear



This shows the underside, with the coil trimmers and screens.

The I.F. valve is a variable-mu H.F. pentode controlled by the A.V.C. system. The screen is fed direct from the main H.T. line instead of through the usual potentiometer so that the grid base of the valve is lengthened and the possibility of distur-

tion, results in the A.V.C. control being more than usually effective. It is not so great as to mar the performance of the receiver by cutting down sensitivity, but it is good enough to control all but the very weakest of stations, and is especially

1939 ALL-WAVE SUPERHET

(Continued from previous page)

The latter will almost certainly be picked up in the detector and phase-changing valves, and 10,000 ohm resistances and a 0.1 mfd. by-pass condenser should be tried in each anode lead in turn. It is probable that only one of the valves will need to be decoupled in this way, but in very severe cases, both valves may need this treatment. Instability will most likely occur in the anode of the frequency-changer valve, in which case a resistance of 2,000 ohms and a by-pass condenser of 0.1 mfd. in the lead to the I.F. transformer should effect a cure.

The mains equipment consists of a full-wave rectifying valve and reservoir condenser, smoothing being carried out by means of the speaker field and an 8 + 8 mfd. electrolytic condenser. All three condensers are contained in a common cardboard container.

The H.T. winding of the mains transformer is rated at 350-0-350 volts, the rectifier L.T. 2.0-2 volts 2½ amps., and the filament winding for the receiving valves 4 volts 10 amps. This winding allows ample reserve for the dial lights and a cathode-ray tuning indicator, if one is used. It is not centre-tapped, one end going to earth, simplifying heater wiring and minimising the possibility of hum, as one side of each valve-heater is taken direct to earth.

The mains transformer is of the skeleton type, but efficiency has not been sacrificed. Unnecessary trimmings only have been removed and colour-coded leads used as follows:

	PRIMARY.
Common ..	Black
200/210 ..	Yellow

220/230 ..	Blue
240/250 ..	Red
SECONDARY:	
Rectifier H.T.	Red with blue centre-tap.
Rectifier L.T.	Yellow
Receiver L.T.	White cotton cover
Screen	Bare wire

Tone control is carried out by means of an 0.05 mfd. condenser and a 50,000-ohms potentiometer connected between the anodes of the two output valves.

Construction and wiring is fairly simple and need not take more than an evening or two.

Having made the chassis, the first thing to do is to cut out a hole for the mains transformer and also one to enable the tuning condenser of the coil unit to project through the chassis. Mount these two components in place and then fix a metal screen, the total depth of the chassis (3in.), in the position shown by the wiring diagrams

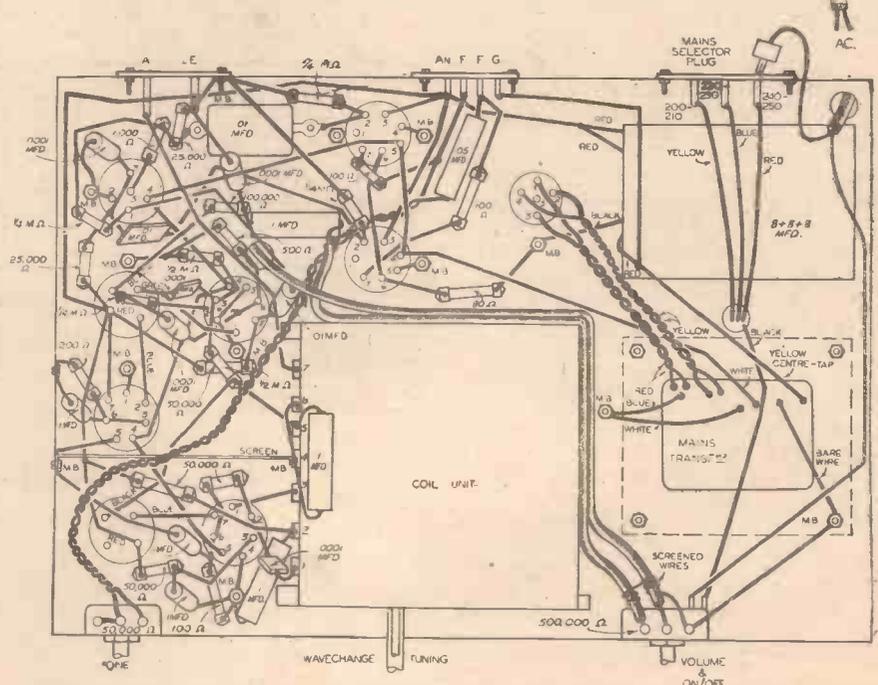
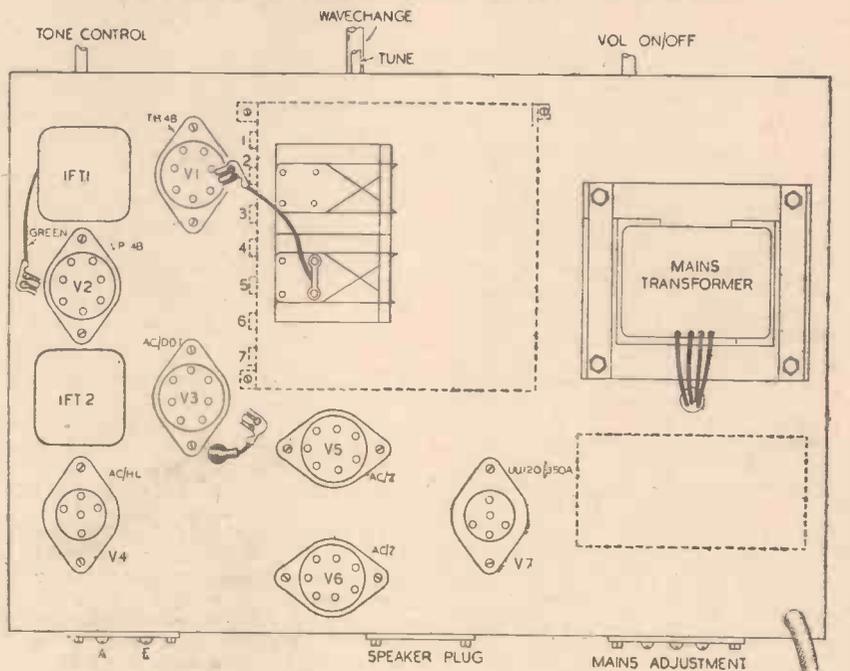
and photographs. This screen is a good aid towards ensuring stability in a simple manner.

Mount the rest of the components and then wire up. It is a good plan to solder up all the leads to the mains transformer first of all and then carry on with the heater wiring. After this, each valve may be wired complete, commencing with one of the output valves and proceeding to the frequency-changer. Having completed this, check very carefully and make sure that all joints are sound. Look especially for dry joints as these can greatly mar performance.

No fuses are incorporated, so if you are at all uncertain, put a temporary 150 mA fuse in the H.T. lead; that is, between the rectifier H.T. centre-tap on the mains transformer and the speaker field.

Operating Notes for this receiver will be given next week.

WIRING DIAGRAMS



LIST OF COMPONENTS

	£	s.	d.
One J. B. Linacore all-wave tuner (mains model)	2	15	0
One Varley 465kc/s I.F. transformer type BP.122	7	9	
One Varley 465kc/s I.F. transformer type BP.123	7	9	
One volume control with switch, Dubilier type J. 500,000 ohm.	5	0	
One tone control (50,000 ohm), Dubilier type B	3	0	
Three 5-pin valveholders, W.B.	1	6	
One 7-pin ceramic valveholder, W.B.	1	6	
Four 7-pin valveholders, W.B.	3	4	
One A.E. terminal strip, Bulgin P.51	4	½	
One mains adjustment strip, Bulgin P.62	1	17	4½
One mains transformer, Varley special	1	17	6
Six 0.1 condensers, Dubilier type 4503/3	8	0	
Five 0.0001 condensers, Dubilier type 4601/S	5	0	
Three 0.01 condensers, Dubilier type 691W	6	0	
One 8 + 8 + 8 mfd. electrolytic block, Dubilier C.3107	6	6	
One 0.05 mfd. condenser, Dubilier type 4602/S.	1	3	
Four 50,000-ohm resistances, Dubilier F½	2	0	
Three 100-ohm resistances, Dubilier F½	1	6	
One 200-ohm resistance, Dubilier F½	6		
Four 250,000-ohm resistances, Dubilier F½	2	0	
One 100,000-ohm resistance, Dubilier F½	6		
One 500-ohm resistance Dubilier F½	6		
One 1,000-ohm resistance, Dubilier F½	6		
Two 25,000-ohm resistances, Dubilier F½	1	0	
Two 500,000-ohm resistances, Dubilier F½	1	0	
One 100 less 15 per cent. resistance (80 ohm nearest), Dubilier BW.1	1	0	
	£8	0	4

- One Mullard TH4B.
- One Mullard VP4B.
- One Hivac AC/DDT.
- One Hivac AC/HL.
- Two Hivac AC/Z.
- One Hivac UU/350/120A.
- Speaker—1,250-ohm field, transformer to match 12,000 ohms load—W.B.



Practical Television

July 8th, 1939. Vol. 4. No. 159.

Using Extreme Caution

IF one takes the trouble to investigate the television position in any country where development is taking place, it would seem that the watchword of those in control is caution. The latest to come within this category is America, as shown in a report just published by the Federal Communications Commission. The F.C.C. and the R.M.A. do not appear to see eye to eye in matters relating to television, especially on the question of picture standards. A word of warning was issued telling both the public and the industry not to expect too much from television in the near future. They voiced the opinion that the best practices would automatically become standards without any attempt at fixing them, for if the latter course was adopted this would tend to restrict the art into a single groove. While not objecting specifically to the picture standards recommended by the R.M.A. the F.C.C. rather felt they were not at present really applicable to the higher frequency channels now reserved for television. This may be taken to mean that the line dissection standard of 441 lines is not really sufficient to give pictures of outstanding quality as improvements in technique are brought about, and this seems a very reasonable assumption. In spite of the very marked public interest in the television transmissions inaugurated in New York, only 200 sets had been sold in the first two weeks of May, and this slow start is regarded with dismay by those connected with the receiver industry. The average set price is much higher than that ruling in this country, and British sets imported into New York have given better results than the American ones, and yet they are only listed at half the price of the American sets. Everyone is looking forward to the advent of mass production, and until this does occur there seems little likelihood of the F.C.C. licensing stations on a commercial basis whereby they can derive revenue from advertising, as is done by the various radio chains.

Further Financial Inroads

THERE has been considerable controversy in the boxing world concerning the sum of money which can justifiably be expected as a contribution from television interests for rediffusion rights. First of all, the matter was considered by the British Boxing Board of Control at the annual meeting held in Cardiff. The board, in the past, has been paid a percentage on certain rights, but now a new resolution has been passed stating that in all championship contests and tournaments where the gross takings for admission, including fees for television, broadcasting, film and still picture photography are £2,500 or more, then 5 per cent of the gate receipts should be paid by the promoter to the B.B.B.C. It is significant that the television clause has now been included, it being felt that in the future this may represent a really substantial amount,

especially when more and more cinemas are equipped with big screen apparatus. Following on this, two of the foremost boxing promoters have decided that they will no longer accept the "facilities fee" of £75 to £100, usually paid by the B.B.C. for putting the match on the air as vision and sound signals. They maintain that the basis of investigation should be a percentage of the amount guaranteed to the boxers as purses. Whether this will prove satisfactory only time will tell, but as far as cinemas are concerned it would seem far more satisfactory to claim a percentage of the theatre's takings.

A Renewed Television Attack

CERTAIN Members of Parliament have renewed their relay of questions to the Postmaster-General on the subject of television, and the latest seem to be directed more towards the Television Advisory Committee, which, contrary to expectations, has delayed the issuing of its report. The reasons for this delay are something of a mystery, and the Parliamentary questions are designed with the object of clearing up this unsatisfactory

instead of a paltry one. Germany has already made known its plans in this connection, and unless moves are made swiftly, this country will be left behind in national television as opposed to a service from a single station. The radio, theatrical and cinema interests have all sent deputations to Major Tryon, and whereas the last two may be apprehensive of competition, it should be possible to introduce safeguards to ensure that existing forms of entertainment are not seriously injured by television. Readjustments must take place, and it is common knowledge that similar doubts and fears have been expressed from time to time, by the entertainment industry, on the effects of broadcasting from the theatres, cinemas and music-halls. It is now realised, however, that broadcasting can provide an invaluable publicity medium, and the same will ultimately be found with television if its progress is not restricted by the expression of petty jealousies from other quarters.

The Big Screen in New York

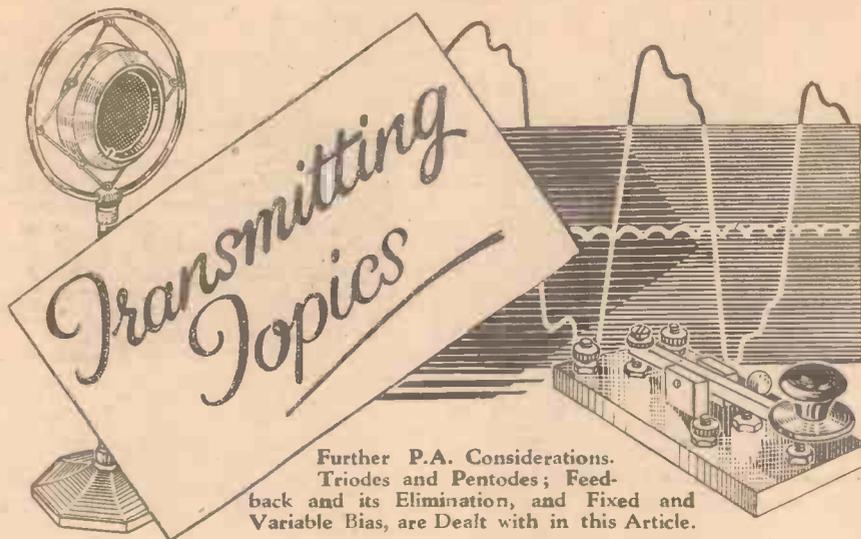
A FEW days ago the Baird big screen receiving equipment was demonstrated in New York to a large audience which included representatives of all the leading American newspapers, cinema circuits, and theatre interests. According to reports which have so far come to hand this event was acclaimed as an outstanding success, the programme being furnished by an hour's broadcast from a television studio. So far the Americans have only been able to see results on home receivers where the picture screen size has an average below that obtaining in this country. The occasion was historic, therefore, as for the first time those in the



W. Kirby, Managing Director of Currys Ltd., photographed "on the set" with stars Mary Maguire and Richard Ainley. The radio shop scene was built by Currys for the new film "An Englishman's Home," now being directed by Albert De Courville at Denham Studios.

situation. To his last two questions the P.M.G. had to admit that no decision had yet been reached regarding extending television facilities into the provinces, but said that due consideration would be given to the claims of all densely populated areas. Now that it is felt generally that Birmingham will be given the first provincial station, other big cities have put forward their claims with renewed vigour, and will not rest until provincial facilities are provided for several areas

theatre saw a 15ft. by 12ft. television picture, for no other television company in the United States has yet attempted to show results of this nature. It was conceded that this triumph of British enterprise should do much towards accelerating the development of the industry in that country. The equipment was identical in character to that used recently in London, except that alterations had to be undertaken in the electrical circuits to suit the standards of the American radiated picture.



Further P.A. Considerations. Triodes and Pentodes; Feed-back and its Elimination, and Fixed and Variable Bias, are Dealt with in this Article.

By L. O. SPARKS.

TO avoid any misunderstanding over Class B operation, as described in the issue of last week, it must be appreciated that the curves used to depict the operating conditions only applied to a single triode valve. This point is stressed as some readers might try to apply them to an L.F. Class B amplifier with rather confusing results.

When considering the L.F. application, the fact must be appreciated that two

It is highly probable that a beginner will think of a simple triode of the power or super-power type for use as a P.A. In view of the previous remarks it might seem that such an arrangement would be the easiest and most satisfactory, but, unfortunately, there are certain snags which reduce the advantages which appear to exist at first sight.

The first of these is the question of instability. It must be remembered that in a

circuits, it is usually essential to provide some means of nullifying the inter-electrode capacity of the valve itself, apart from paying attention to the layout and wiring of the associated components. The process of eliminating the inter-electrode capacity is known as *neutralisation*, but that must be dealt with in detail in the next article.

Apart from this little snag, if a triode is operated under Class A conditions its efficiency is on the low side, as it requires a comparatively powerful input signal to drive the anode circuit to maximum output.

The efficiency of such an arrangement can be improved considerably by using two triodes in Class A push-pull, as this will increase power output and reduce any, even harmonic, distortion. Neutralisation must, of course, be still applied to each valve; in fact, if perfect conditions are

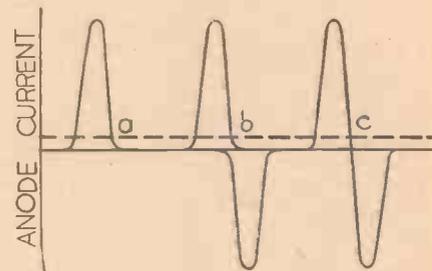


Fig. 2.—The output of a single valve is shown as "a". The effect of using two is "b" and the final result is as shown by "c".

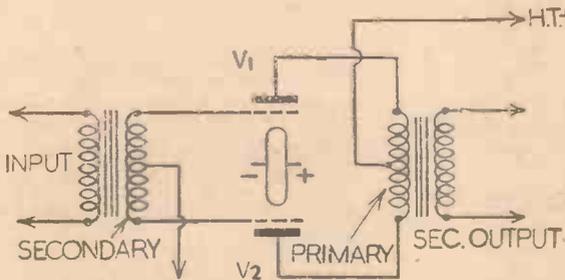


Fig. 1.—This shows the L.F. arrangement for Class B operation. Note the two triode sections.

required, the valves themselves should also be matched as regards loading and characteristics.

Pentodes

In view of, shall we say, the defects associated with triodes, they are not now so widely used in low-power rigs, as it has been found to be far more simple to take advantage of the characteristics of pentodes. By virtue of their construction the inter-electrode capacity of a pentode is practically eliminated owing to the screening between the grid and anode circuits, therefore, in the majority of cases when a well-designed pentode is used, neutralisation is rendered unnecessary. This not only simplifies construction but increases ease of operation. It must not be thought, however, that by using a valve of this type the question of layout and wiring can be treated lightly, as every precaution must still be taken to

separate triodes, or, as in the case of a modern Class B valve, where two triode sections are enclosed in a single glass bulb, are used, so that the single peak output waveform is converted into an amplified version of the input signal. Space does not permit a detailed description, therefore Figs. 1 and 2 must suffice to illustrate the operations. When the signal in the upper half of the input transformer is positive, anode current will flow in V1, while the anode current of V2 will be practically zero. Within a minute fraction of a second, however, the conditions are reversed, and the bottom half of the input secondary becomes positive, and current flows in V2, while V1 is idle.

The output transformer has a centre-tapped primary which enables these two distinct operations to combine to induce in its secondary a signal having a wave-form identical, though, of course, amplified to that of the input signal. Fig. 2 shows the actual result.

P.A. stage the grid and anode circuits are tuned to the same frequency, therefore, unless particular care is taken in circuit design and operation, the valve will act as a T.P.T.G. oscillator, and completely ruin the whole circuit.

With the grid and anode circuits tuned to the same frequency, the slightest trace

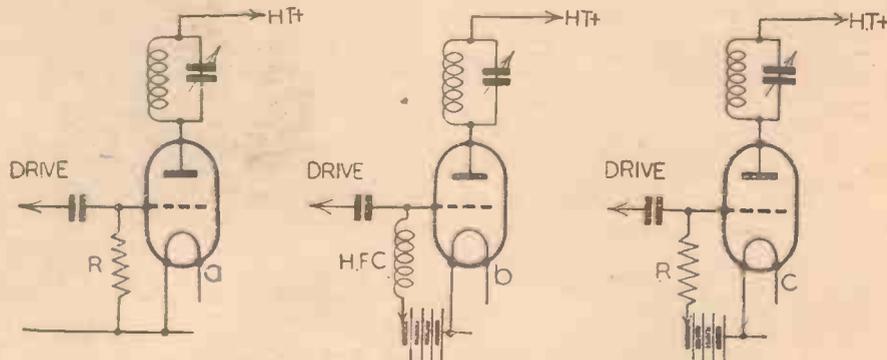


Fig. 3.—Biasing methods: "a" plain grid-leak; "b" batteries only, and "c" batteries and grid-leak.

Triodes and Pentodes

With so many of us, the choice of a circuit or apparatus is not always governed by technical considerations; more often than not the available components play an important part in deciding the issue. The selection of a P.A. circuit is no exception, so let us see what each form of amplification has to offer, so that full use can be made of the valves which might be to hand.

of feed-back will produce oscillations, and as such feed-back can be introduced magnetically, i.e., by poor layout, long connecting wires or interaction between the two circuits externally, and, secondly, by capacity between the grid and anode

see that no feed-back is introduced externally.

Class B

The efficiency of valves in a P.A. stage operating under these conditions is much

higher than similar valves in Class A, but, owing to the losses across the grid circuit which are introduced by the grid current, the preceding stage must be capable of providing the additional drive thus required. By the correct use of suitable meters it is not a difficult matter to produce the correct operating conditions, but, all the same, the beginner would be wise to avoid such circuits until a sound general knowledge of Class A and valve adjustments has been acquired.

In certain transmitting circuits, the radio-frequency currents are actually amplified after modulation has been applied, and in such instances it is essential for linear amplification to be obtained. It is in this connection that Class B amplification becomes essential. Another word of warning: The beginner is not advised to try his hand at this operation.

Class C

An amplifier operating under Class C conditions has very little application to low-frequency circuits, but, owing to its high anode efficiency, it is certainly very effective for P.A. work, providing the driving power, which must be even much greater than that required for Class B operation, is available.

General Considerations

With self-excited oscillators it has been mentioned that for stability and output a high value of capacity and low inductance were desirable. With P.A. circuits, however, the conditions are reversed and it is very essential to use the largest possible inductance together with the smallest capacity. There are, of course, limiting factors, and the question of the L/C ratio is one which should be fully investigated by all would-be transmitters, therefore more detailed consideration will be given to the subject at a later date.

Bias

With any of the forms of amplification already mentioned certain grid-bias voltages have to be applied, and in the case of Class B and Class C the safeguarding of the grid-bias voltage becomes absolutely essential if the life of the valves is of any consideration. It is possible to obtain bias by means of a simple grid-leak resistance, the bias voltage being produced across the resistance by the grid current flowing in the case of Class B and Class C operation.

It is quite usual, however, to employ suitable batteries to provide the required voltage, and this has the advantage of maintaining a constant value and protecting the valve in the event of the input signal failing or being suddenly removed. In many circuits use is made of a grid resistance and battery as this reduces the size of the battery required, owing to the fact that use is made of the bias voltage developed across the resistance, as mentioned above.

When a grid resistance only is employed, it must be appreciated that if the input signal is removed no grid current will be developed and likewise no bias voltage created, therefore the valve would be receiving a high anode voltage which, with no bias on the grid, would cause excessive anode current to flow, with detrimental effect to the valve.

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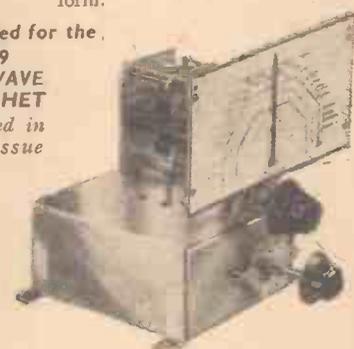
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3/6 down and 12 at 4/3. Or, for headphone use only there's the N.T.S. One-Valve with phones at 27/6 or 2/6 down; both kits mentioned are supplied with coils for 12 to 84 metres. You should certainly go in for a WORLD All-Wave Kit. The 3-valve SG model is a snip at 29/6 or the more powerful WORLD SG4 is bargaining off at 42/- or 3/6 down and 12 monthly payments of 3/6. Complete set of WORLD self-coating coils for 9 to 2,000 metres, costs 17/6 (add 1/6 to payments only). Don't forget you get FREE valves and station-name scale with all WORLD Kits.

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Relays and 'Phone Broadcasting

Report of Speech by the Postmaster-General, Major the Rt. Hon. G. C. Tryon, M.P., in the House of Commons on Friday, June 16th

THE following is a report of the main portions of the P.M.G.'s speech relative to the position of Relay Companies and the new 'phone broadcast system:

"I understand that at the request of the Opposition, the Committee will be discussing to-day the subject of wire broadcasting. This, of course, includes the problem of the Relay Exchanges.

"The House will, of course, be familiar with the Relay Exchanges which exist in many parts of the country for the purpose of receiving broadcast programmes and distributing them over a local wire network to subscribers. The phrase, 'Wire Broadcasting' is used in a wider sense to include any and every method of distributing broadcast programmes by wire to subscribers. That is, it includes both the Relay Companies' system and the proposed telephone broadcasting system.

"Three years ago this House approved the Government's decision that the licences of the Relay Companies should be extended for a further three years and that meanwhile the Post Office should undertake technical research and practical experimental work in distributing broadcast programmes by wire. Since then the position has changed in several very important respects. In the first place, technical research and practical experiments carried out by the Post Office have established the possibility of providing a wire broadcast service of high quality over our telephone wires without interfering with their normal use for telephone purposes.

"I now come to an even more important change which has occurred since we last debated this matter—the change in the international situation. This has led to a greatly increased recognition in all quarters of the importance of defence considerations and of the imperative necessity of doing everything possible to expedite defence measures. . . . The Ullswater Committee which considered the question of the future of wire broadcasting in 1935 made no reference in its Report to its importance from the point of view of national defence.

"As I informed the House on March 30th last the main consideration which led the Government to decide that the public interest would best be served by the development of both the Relay Companies' services and a Post Office telephone service, was its importance from the point of view of national defence and national safety.

Value in Time of War

"The Government recognised—as I think everyone in this House will recognise—the very great value of broadcasting in time of war, as a means both of communicating information of vital importance to the public and of maintaining morale. As I also said, although it is the intention that wireless broadcasting should be continued in the event of war, the wireless broadcasting service will be liable to deterioration or occasional interruption as a result of interference from which a wire service would be immune. The Government, therefore, came to the conclusion that it was important that wire broadcast-

ing should be developed to the maximum possible extent.

"In our earlier debates on this subject, the discussion centred round the question whether wire broadcasting should be exclusively conducted by the Relay Companies or by the Post Office. The Government, however, in reviewing the matter in the light of present-day circumstances, realised that the vitally important objective of securing the maximum possible degree of development would only be achieved by employing the resources of both the Relay Companies and the Post Office.

"It recognised on the one hand that the Relay Companies possessed important resources in the form of operational experience and technical skill as well as of physical assets, which would enable them, given reasonable security of tenure, to make a valuable contribution towards the achievement of this objective. At the same time it recognised that the Post Office, with its extensive network of telephone wires and its highly skilled engineering staff, was in an exceptionally favourable position to provide a complementary service over the telephone wires.

Tax on Resources

"At the present time the resources of the Post Office are being heavily taxed to meet the very great demands made upon it for the provision of telephone service for the defence services and to keep pace with the unprecedented expansion of the public service which has resulted from the progressive reductions of charges made in recent years. Its resources will be further taxed in the provision of the new telephone broadcasting service.

"It reflects no discredit on the Post Office to say that if it had at the same time to take over the separate-wire systems of the Relay Companies, wire broadcasting could not expand so rapidly as under the Government's proposals. On the contrary, the maximum rate of development will be ensured by the Government's decision to leave the Post Office to concentrate on the development of a system of wire broadcasting over telephone lines and to encourage the Relay Companies to expand their system.

"Before I proceed to deal with the Government's proposals in greater detail, there is one very important subject on which I should like to say a few words. I have shown that the Government attaches great importance to the development of wire broadcasting for defence purposes, and for this reason is particularly anxious that the Relay Companies should expand their activities as rapidly as possible. To this end the Government hopes that the Companies will establish relay services in fresh areas as soon as possible.

"The Government, however, has no power to grant Relay Companies the wayleaves which they must have before they can put up their distribution wires. It rests with the local authorities to give or withhold the necessary facilities.

"It has come to my notice that in a few cases local authorities have refused to allow the establishment of relay services in their areas. I should like to make a special appeal

to local authorities to co-operate in this work of national importance, by satisfying themselves first that applicants are suitably qualified technically and financially, and then giving expeditious and sympathetic treatment to their requests for the necessary facilities.

Details of the Government's Proposals

"In giving details of the Government's proposals, I will deal first with those that affect the Relay Companies. The function of Relay Companies' is to distribute programmes from recognised broadcasting stations and not to originate broadcasts themselves.

"As I informed the House on March 30th the Relay Companies' licences will be extended for a further period of 10 years from January 1st next, subject to certain modifications regarding the programme supplied to subscribers and the control of exchanges in time of emergency. Licences granted to new Companies will also be terminable on December 31st, 1949, and will be subject to similar conditions.

"The new licences will require that all existing services which give at present more than one programme, and all services opened in future, will have to offer a choice between at least two programmes. Furthermore, provision will be made for a definite percentage of B.B.C. programmes to be provided.

"(a) Existing one-programme services will have to provide a B.B.C. programme for at least 90 per cent. of the total time during which such a programme is available.

"(b) Two-programme services will have to provide a B.B.C. transmission on one programme at all times when it is available and in addition a second B.B.C. transmission for at least 75 per cent. of the total weekly time when two B.B.C. programmes are available.

"(c) Services giving more than two programmes will have to provide two B.B.C. programmes when they are available, or one B.B.C. programme when only one is available.

"Outside these limits, the Companies will be free to give what programmes, including advertising programmes, they like subject to the continuance of certain safeguards contained in the present licences. For example, the distribution of programmes containing religious, social or political propaganda in English from abroad is, and will continue to be, prohibited. The new licences will contain a provision enabling the Postmaster-General to require a Relay Company to lease wires at a suitable rental for the purpose of obtaining programmes from B.B.C. studios entirely by wire.

"The value of this provision in time of war when wireless reception may deteriorate or be subject to occasional interruption or interference, is obvious. Details of this arrangement are being worked out and will be discussed with the relay organizations. So far as control in time of emergency is concerned, the new licences will provide that the Postmaster-General may require the working of the exchange to be continued

(Continued on facing page)

RELAYS & 'PHONE BROADCASTING
(Continued from previous page.)

under his direction or subject to his instructions as regards the matter to be relayed.

"Provision will also be made enabling the Postmaster-General to require the Relay Exchanges in time of emergency to transmit any special announcements ordered by the local A.R.P., National Services or Police Authorities—this was done during the crisis last September.

"In this connection I should like to mention that I have received several applications from local National Service and A.R.P. organisations for permission to make announcements over the local relay exchanges in present circumstances. Similar requests have been received in the past for permission to relay charitable appeals.

"As I have said the function of the Relay Exchanges is to distribute programmes from recognised broadcasting stations and not to originate programmes themselves. In other words, they are concerned with the receiving and not with the transmitting side of broadcasting. There are obvious dangers in allowing them to extend their activities to the originating of broadcasts. It has, therefore, been the practice to refuse all requests for permission to distribute local announcements through the local relay exchanges in normal times.

"When I received some applications for permission to relay National Service appeals and the like, I thought it only right to consult the Departments responsible for A.R.P. and National Service publicity—the Lord Privy Seal's Department and the Ministry of Labour—as I felt that I must be guided in a matter affecting the whole country by their views. The conclusion was reached that the advantages were not sufficient to justify a departure from the rule in the prevailing circumstances.

Telephone Broadcasting

"I come now to the proposed Post Office Telephone Broadcasting Service for which a Supplementary Estimate will be required. Under this service a subscriber will be able to receive broadcast programmes over his telephone and will be able to telephone at the same time as his receiving-set is in use. This system differs from the separate wire system used by the Relay Companies in an

important respect. Under the Relay Companies' separate wire system, the listener only requires a loudspeaker.

"Under the telephone broadcasting system, the listener will have to have a receiving-set the same as—or similar to—those already in use for ordinary wireless reception. Indeed, he will be able to use his set as he wishes, either for ordinary wireless or for wire broadcasting, with its very much higher quality of reception and its freedom from interference. The new telephone broadcasting service will not, therefore, reduce the demand for receiving sets.

"I understand that the radio trade is prepared to supply and maintain receiving sets of special design which will enable the best use to be made of the telephone broadcasting service. On the assumption that these arrangements will prove satisfactory, I propose to start the service on the basis that all sets used by subscribers will be supplied and maintained through the usual trade channels. It follows, therefore, that the Post Office telephone broadcasting service will not compete with the radio trade.

"It is proposed at the outset to offer the Post Office service to telephone subscribers only. It would be technically possible to extend to non-subscribers, and the question of extending it in this way will be reviewed later. As regards programmes, it is proposed on the telephone broadcasting service to give a choice of three or four programmes, including the B.B.C. National and local Regional programmes at all times when they are available.

"The Post Office is in consultation with the B.B.C. concerning the arrangements to be made for the selection of continental programmes to supplement the B.B.C. programmes.

"As I told the House on the 30th March last, the service will, I hope, be started this year in a few districts and the charges and other details will be announced in due course. I am now able to tell the House that I hope about the end of this year to make a start with a Post Office telephone broadcasting service covering the Central London area and practically the whole of Edinburgh, Birmingham and Manchester.

"The charge for this service is not yet fixed, but I hope that it will be possible to make it less than 1s. a week. This does not include the receiving set, which in most cases the subscriber would already possess."

TELEVISION AND SCHOOL LIFE

ALTHOUGH the study of television and the use of receiving equipment has been included in the normal curriculum of several technical schools and colleges within the Alexandra Palace area, it is only of more recent date that the educational and interest items broadcast by the B.B.C. in their afternoon transmissions have been used by schools for instructional purposes. Those responsible for the training of the young mind realise that when there is an appeal to the eye as well as the ear the attention of scholars is arrested, and that is why television shows such a material advantage over the normal aural broadcasts to schools which have been undertaken for such a long period by the B.B.C. Headmasters have realised this, and when funds permit a set has been purchased and installed in the classrooms for the use of the boys and girls where the programme matter is suitable. A careful study of each week's programme reveals a surprising number of items which can be turned to educational account. Citizenship and general knowledge have been brought

home to both boys and girls through the medium of televised news reels, and outside broadcasts such as the Armistice ceremony, Trooping of the Colour, their Majesties' departure for America, etc. Then the series of talks from the farm near Enfield and the discourses on maps have proved invaluable to the child mind, which can very rarely form a true impression of things it cannot see. There is no doubt that as the television service extends the B.B.C. will give due consideration to the introduction of regular weekly items designed entirely for educational purposes, and this move will be welcomed by all progressive teachers who see in this new medium a means for supplementing lessons by specialists' talk and demonstrations.

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LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

Correspondents Wanted

SIR,—I have been a regular reader of your extremely fine paper for about one year, and I certainly intend to stick to it 'cause I always find interesting features in it.

I don't know too much about radio, but I am very keen on it. I should be very pleased if you would put me in touch with any of your readers residing in North Africa, South America or Egypt or elsewhere, preferably outside Europe.

I also should be very glad to exchange my S.W.L. card with anyone interested.—**RAGNAR A. ANDRESEN**, Kroketønnen, Dråbak, Norway.

SIR,—I have been a reader of your book for one year, and I have always been interested in your short-wave logs, so I submit mine to you.

From May 1st-20th: 14 mc/s: **WIQM**, 1AJW; 1BLO; W2DIQ, 2DH, 2EZI; W3AL, 3BEI, 3GFG; W4DIS, 4DIF, 4DI; W5CDD, 5CZ; W7GEA; W8OPD; W9FJT; ZB4AI, EA7BA, CY4FT, PY4EJ, PY5BL, CX2CO, VQ2PM. I should also like to correspond with a boy living in U.S.A. interested in S.W.L. I wish your book all the success in the future.—**GORDON ZEDY**, 6, Norfolk Park Cottages, Maidenhead, Berks.

SIR,—I have been a reader of the PRACTICAL AND AMATEUR WIRELESS since the first issue, and I find your articles very interesting. I am very anxious to correspond with any S.W. enthusiast in any part of the world. Every success to your fine paper.—**F. H. LADD**, Harold Court, Haroldwood, Essex.

SIR,—Here is my complete log of 20-metre 'phone amateurs, started on January 6th, 1939, to May 26th. My listening hours were varied: **W1**, 64; **W2**, 51; **W3**, 30; **W4**, 31 (**W5DNI**, **GYH**) **W6**, 7; **W8**, 22 (**W9MM**, **NER**, **ASK**, **RUK**); **VE1**, 10 (**VE3LL**, **QL**, **HG**, **XQ**); **VO2N**: **CT2BP** (**CO2WM**, **AM**, **JJ**, **3HY**, **7EV**, **SAR**); (**VP9L**) (**CP9AM**) (**CP2CP**) (**HH2B**); **PK1RI**; **VK2AGU**, **VU2FQ** (**ZB1L**, **E**) (**CN8MB**, **MT**, **BA**, **MI**, **AR**): **FA3FB**; **EK1AF** (**SV1CA**, **MP**, **KE**) (**SU1**, 7; **5BO**); **CT1**, 20; **II**, 11; **HB9**, 7; **YU7VX** (**YR5PB**, **VV**, **AA**); **HA**, 7; **PA**, 6 (**OK1SZ**) (**SPIQE**, **2OE**): **SM**, 13 (**ON4USU**, **LP**); **ES5C** (**LY1AA**, **S**); **LA**, 10; **F3**, 16; **F8**, 7; **LXTW**; **OH2QM**; **OZ**, 6.

My latest calls are: (**YV1AQ**, **4AE**, **5ABQ**); **VP3CO** (**YP2BH**, **BN**, **PY1GR**, **PY4??**); **LU5CZ**; **PZ2B**; **HR5C** (**TI2RC**, **AV**); **CX2CO**; **CE3AT**; **K4EJF**; **VQ2CM**, all during the last week 22.45-23.45 B.S.T.

The above was received on a battery-3 (except **VK** and **PK**) reception on 'phones; my aerial is the inverted "L" type, 60ft. long, 4ft. from the ground free end, rising to 28ft.

I would like to get in touch with a reader

living around my district, interested in C.W., as I would like to learn it, and if any reader in U.S.A. would like to correspond with me on S.W.L. and exchange news and magazines.—**T. DUMAYNE**, BSWL 1137, 65, Gaer Park Avenue, Newport, Mon.

A 40-metre Log

SIR,—I have been a regular reader of PRACTICAL AND AMATEUR WIRELESS for some time now, and I have been very interested in the short-wave logs submitted by readers each week.

Perhaps they would be interested in a 40-metre log that I received on Sunday morning, between 10.45 and 11.20 a.m.

My receiver is an 0-v-1/2 with a vertical aerial of 25ft.

W3DAJ, **4DIA**, **2DL**, **G4IK**, **G3RK**, **W26S**, **G5FA**, **G5IT**, **G4JP**, **CT2AB**, **G2PU**, **G8IT**, **G5MM**.

Besides the usual Americans and Europeans. I also find that in my case a power valve is better than a pentode output.—**A. SIMONS** (Newton Abbot).

14 mc/s Log

SIR,—Not having seen a log of stations from this district, may I submit my 14 mc/s log, which may be of interest to other readers: **W1**(33), **W2**(25), **W3**(77), **W4**(14), **W6**(8), **W8**(18), **W9**(5), **VE**(21), **VK**(8), **VU**(5), **PY**(17), **CO**, **CM**(8), **YV**(5), **LU**(4), **SV**(5), **ZS**(15), **CX**(3), **CE**(4), **KA**(3), **J**(2), **SU**(19), **VQ**(2), **ZEI**(2); also **VQ4KTB**, **K75ST**, **HP4DF**, **K4FAY**, **VP9L**, **PK4JP**, **H13N**, **V87RA**, **VP3CO**, **FNIC**, **ZP6HF**, **ZC6HS**, **K6MYV**, **VP5CF**, **CT2BP**, **17B** (located in Asmari in Ethiopia), **W6** has been coming in well around 06.00-09.00 G.M.T. the last fortnight. I use a 2-valve set with a 60ft. inverted L. Good luck to your fine paper.—**C. W. SPENCER** (Loughborough).

Card Exchange

SIR,—I would like to exchange my S.W.L. card with other S.W.L. throughout the world. I will reply to every card. **ROBERT D. PITTILO** (BSWL776) "Wansfell," Queen Margaret St., Kinghorn, Scotland.



Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

WOODFORD AND DISTRICT RADIO SOCIETY
Secretary: Mr. R. A. Ledgerton, (2ABC), 64, High Road, Woodford Bridge, Essex.

Meetings: Every Tuesday.

THE above society, which has recently been formed, held its first meeting on June 20th. A committee was elected, including Mr. John Hunt (2FSB) as chairman, Mr. R. A. Ledgerton (2ABC) as secretary-treasurer, and other A.A. licencees and short-wave listeners.

The aim of the society is to foster interest in short-wave radio, and to provide members with an opportunity of meeting and discussion, special attention being paid to Morse. It is also hoped to build a society receiver and transmitter; and to organise listening contests.

All radio enthusiasts in the district are cordially welcomed, and the secretary will be pleased to forward further particulars to anyone interested.

COXHOE AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters: Slake Terrace Inn, West Cornforth, Co. Durham.

Secretaries: D. F. Chatt, 23, North View, Sherburn Hill, Co. Durham. R. Bowes (2DTA), 10, Blackgate, Coxhoe, Co. Durham.

Meetings: Fortnightly at present. Under discussion.

A MEETING was held on Monday, June 19th, at the above H.Q. at 7.30 p.m. In the absence of Mr. Ayton, Mr. D. F. Chatt gave some Morse instruction, and Morse practice is becoming quite popular. Mr. W. Bates gave some instruction to beginners on the use of various components in the club receiver. The future course was discussed and it was decided to build the following apparatus for beginners.

(a) An O.V.O. receiver. (b) an L.F. amplifier for the O.V.O. receiver.

A committee meeting was called to further discuss the programme and also to arrange the times for meetings.

Further particulars may be obtained from the secretaries.

SALE AND DISTRICT RADIO SOCIETY

Headquarters: St. Mary's Schools, Barkers Lane, Sale, near Manchester.

Secretary: S. C. O. Allen (2FCQ), 31, Ennerdale Drive, Sale.

Meetings: Held weekly at 7.30 p.m.

MR. NORMAN POSTLES (2CXH) continued his series of lectures at the last meeting with an explanation of the Tuned Plate-tuned Grid and Crystal Controlled Transmitters. The operation of these circuits was considered and methods of tuning were fully covered. Mr. Postles pointed out that for amateur purposes crystal-controlled transmitters were essential unless elaborate frequency measuring instruments were available.

The Hon. Treasurer of the society (Mr. G. E. Taylor) has been allotted the call sign 2HDG.

Readers of PRACTICAL AND AMATEUR WIRELESS who are interested in amateur radio transmission and reception will be welcomed at any meetings of the society. Subscriptions: sixpence per week, with an entrance fee of one shilling.

BRISTOL EXPERIMENTAL RADIO CLUB

Headquarters: 21, King's Corridor, Old Market Street, Bristol 2.

Publicity Manager: D. J. James (2DCX), 40, Robertson Road, Eastville, Bristol 5.

Meetings (Summer Season): Second Tuesday of each month at 8.0 p.m.

AT the meeting of the above club held at headquarters on Tuesday, June 6th, a selection of amateur communication receivers was described and demonstrated. These included an Eddystone "All-World Two," a Halliester "Sky Chief," and a Meissner fourteen-valve superhet. The latter was of special interest, as it was home-constructed by a club member, Mr. J. Taylor. Although one section of this set had not been completed, excellent reception of American short-wave broadcast stations was obtained when using only a short length of flex as an aerial.

Arrangements were made for the first Club "Field Day" held on Sunday, June 11th. On this date a party of nine members with three receivers visited Dundry, and another of six members with two sets went to Penpole Point. A fairly good log of American and European amateur stations was obtained by each group; all those present had a very enjoyable afternoon and there were many requests that a "repeat performance" should be arranged as soon as possible.

The next meeting will take place on Tuesday, July 11th, when G3YT will demonstrate his transmitter and details of a suggested visit to the operating box of a local cinema will, it is hoped, be announced. All those interested are invited.

Music of the Week

EVERYONE, no matter in which direction his own particular tastes may lie, instinctively admires someone who has achieved indisputable success in another line. And with success, popularity. A thousandth broadcast is an event which few will ever be called upon to perform, but this remarkable feat is being done by Reginald Foort on the B.B.C. Theatre Organ on July 9th. His programme is made up of suitable "memories of the

Criticism & Comment

By MAURICE REEVE,
The Famous Radio and Concert Pianist.



A recent portrait of Mr. Maurice Reeve.

past." Let's all listen-in to it and congratulate him.

Another "Music Bee" is down for the same day, and also a concert by the B.B.C. Midland Orchestra under W. K. Stanton. During the close season in the concert world the B.B.C. Symphony Orchestra, their star performers, are not unnaturally taking a well-deserved rest. The arduous nature of their labours from mid-August till June is sufficient to compel this brief respite. Consequently the duties of providing us with studio programmes devolves on the excellent regional orchestras. They are all on this week from their various studios, and are giving us some really good programmes. It is usually the job of the Regional orchestras to play the excellent music for which the main orchestra hasn't the time. One will always find most interesting works, sometimes very seldom heard, in their programmes, and next Sunday's, which includes Chabrier, Boccherini, Dvorak and Grainger, is no exception.

The last two broadcasts from Glydebourne, where the audience spends the intermission strolling about the beautiful lawns and shady groves surrounding the opera house, are, on the 9th and 13th, Act 1 of Mozart's "Magic Flute" and Acts 1 and 2 of Donizetti's "Don Pasquale" respectively.

Schubert's Songs

Although Schubert's songs are often enough heard, we seldom have the oppor-

tunity of listening to his cycles in anything like their entirety. One of these, "The Fair Maid of the Mill," should not be missed on the 11th, especially as it is being sung by Keith Faulkner. Schubert discovered them in a book called "Poems found among the Papers of a Travelling French Horn Player," one Wilhelm Muller. So successful were they that he turned to the same source for the even greater set, "Die Winterreise."

A welcome return to the studios is made on the 13th by the Edric Cundell Chamber Orchestra—leader, Carl Taylor. Mr. Cundell got his orchestra well under way before he was made Principal of the Guildhall School of Music. The programme contains the type of work just mentioned as usually appearing in the programmes of either the Regional or visiting orchestras: Schubert's 5th Symphony, a beautiful work from his early twenties.

Music libraries may sound rather stuffy and not made of very entertaining material, but my interest, at any rate, has been aroused by an item down for the 13th, a description of the library of St. Michael's College, Tenbury, one of the most famous private collections in the world. When it is learnt that the manuscripts include that of the "Messiah," that W. K. Stanton will conduct the strings of the B.B.C. Midland Orchestra in illustrations to the Rev. Canon E. H. Fellowes' talk on the library, of which he is the librarian, it should be agreed that a most satisfactory half-hour is in store for us.

The Harpsichord

The gay and chivalrous old-world is nowhere more perfectly symbolised than in the "Sonatas" for harpsichord of old Domenico Scarlatti, 1683-1757. All the grace and charm of that fast-receding world are contained in the 500 examples in the Longo edition. Our curiosity is awakened by the news that four unpublished examples, together with one with violin, will be performed by Richard Newton and Lionel Salter from Mr. Newton's home at Yardley, Birmingham, on the 14th. No previous performance of them has been traced. The performance will be given on Mr. Newton's own harpsichord.

Mr. Victor Hely-Hutchinson is known as one of the best of the younger British musicians, and he has done crowds of good work for the B.B.C. in London and Birmingham. On the 14th he is conducting the Midland Regional Orchestra and singers in a concert of his own compositions.

The story of how Beethoven wrote some of the world's greatest musical masterpieces, either when partially or totally deaf, is the story of one of the Wonders of the World. The whole of Beethoven's life, in fact, is so packed with drama and incident that it is strange it should not have been made into a play as successful as were the "Damask Rose" or "Lilac Time." On the 9th, however, the omission will be partly repaired, at least, when a version of Arthur Watkyn's "Muted Strings," first produced by the Birmingham Repertory Co., will be brought to the microphone. It should afford an absorbing entertainment as it sets out to tell the story of the years when the Master, only just over thirty, first realised that the impairment of his hearing would be a lifelong affliction. More next week.

ELECTRADIX BARGAINS

Summer Redecoration Sale !!!

We are having a rapid clearance sale to clear goods from our Stores at rubbish prices, as space is needed. **TRANSMITTERS.** Aircraft 2-valve, old type, R.A.F. with valves, 17/6. Field Transmitters, old Army type, 1 and 2 valve, portable, totally enclosed with Valves, folding key and aerial meter, 40/-, Sullivan variable R.F. inductances, 7/6. A.C. Hand Generators; P.M., geared drive, 80 volts, 20 m.a., 5/-. **100-ELECTRIC DRILL STANDS.** Massive Wolf polished Steel Stand. Geared rise and fall with counterweight. Suitable large or small machines, 7/8, carr. fwd. **MORSE PRACTICE SETS,** No. 3, with key buzzer and lamp for sound and visual, line plug, etc., 7/-. Sound Type, 1A type key and buzzer, 3/-. Visual-Type 2A, key and lamp, 2/-. **ONE HUNDRED** 10-watt Moving Coil Magnets by Darwin. New 4-claw 4lb. weight, 4s. each, post 1/-. **5,000 RESISTORS,** 1 and 1 watt, .01, .025, .05, .1, .5 and 1 meg. Glass vacuum, wire ends, worth 1/- each, at 1/- per doz., or 9/- gross. **400 VARIABLE CONDENSERS,** single, .005 mfd. Tekade, 1.3, .005 S/W Formo, 2/-, 2-gang, 2/6, 3-gang, 3/6. **200 EARTH** ground spikes for radio or telephones, 6/- doz., carr. fwd. **60 NEW** V.A. Valve unwired Battery Sets with oak cabinet, aluminium panel, lettered, fitted 2 valve condensers 13 x 7 x 6. Suitable A.R.P. valve or crystal set, 10/-, 2/- post and packing. **X-RAY TUBES.** Brand new W.D. pattern, cost 5 gns., 10/- each. As we must clear these quickly for the room, 2/5 packing.

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MICROPHONES AND PARTS—W.W. No. 11 **TABLE MIKE.** A splendid Microphone for speech and music. Bakelite case, containing a 2in. transmitter and transformer on bronze pedestal, detachable Switch and plug. Unrivalled for quality and price, 15/-. Other types: Lesdix No. 10B Pedestal, 10in. high, 12/6; Lesdix Superior No. 12BB Ring 14 in. Pedestal, 15/6; Hand Mikes in 2in. case, No. 11 at 5/6; Superior type No. 11A, 7/6. Buttons, 1/-; Ellisel public address and band Mike (Reisz principle), 55/-. Ask for Illustrated Mike List of 25 models. Our Famous PARTS for making your own mikes. Carbon Granules in glass capsule: Grade No. 2, 1/-; No. 3, fine, 1/6; No. 4, extra fine, 2/-; Black Blocks, 4d.; Diaphragms, thin carbon, 6d.; Button in 1 1/2 in. hard wood case with 2in. mica diaph., 2/6; Ditto mounted on pedestal, 3/6.

METERS. Weston model 354, Central zero 1 to 15 amps, 2lb. mag. Flush panel, 2in. diaf. Sale price, 7/6. 0-20 volts, 5/9; 50 volts, 5/9; 0-100 volts, 5/9; D.C. units, 6/-; for A.C. or D.C.: Hoyt CZ mov. coil milliammeters, 25-0.25 m.a., 10/-; Weston 0 to 30 m.a. mov. coil milliammeters, 17/6. 0-100 m.a., 17/6. Switchboard Meters all sizes, cheap.

CAR CHARGERS. From A.C. Mains for 5 amps., D.C., 24/17/6. Smaller Model for 2 amps. charge, 75/-.

CHARGERS—WESTINGHOUSE Metal Rect. Units. 110 volts 1 amp., 35/-; 55 volts 1 1/2 amps., 37/6. 20 volts 3 amps., 40/-; 8 volts 2 amps., 26/-.

The **FEIGH RECORDER.** Still a Few Left. Positive drive, worm gear and rack. Complete for use, only 37/6. Super Feigh Fidelity Set, 42/6. Tracking Gear only 21/-. Either 4/- doz. metal blanks can be used or the glass-coated simplets, 10in., 3/- each. Pre-amplifiers for Recording Mikes, 1-valve Battery Model in cabinet, 25/-; A.C. Mains pre-amplifiers, with valve rectifier, steel-cased model, 60/-.

GREAT BARGAIN in 5/- PARCELS. 10lbs. of Servicing parts, resistances, tubulars, micas, variables, wire, sleeving, vol. controls, coils, magnets, chokes, switches, terminals, mouldings, etc.

ELECTRADIX RADIOS

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PRACTICAL AND AMATEUR WIRELESS, 8/7/39

LATEST PATENT NEWS

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume or in bound volumes price 2s. each.

Abstracts Published.

ELECTRIC SWITCHES.—Compton Organ Co., Ltd., J., and Bourn, L. E. A. No. 499330.

In an electrical musical instrument wherein the partials of the notes are separately produced, vertical rows of contacts may be operated by the electromagnetic means shown in Fig. 1. The contacts consist of horizontal silver wires 1 whose free ends pass through apertures in insulating vertical slides 4 and project under bus-bars 2.

Depression of a key energizes a magnet 5, the L-shaped armature 8 of which, loosely pivoted at its angle on a rib 13 and controlled by an adjustable screw-head 11, lifts the slide 4 against the action of a spring 10 and allows the wires to make contact with the bus-bars by their own resiliency. The wires 1 are connected to resistances 14 inserted in holes in the board 15. Specifications 403444, 433050 both in Group XXXVIII, and 501339 are referred to.

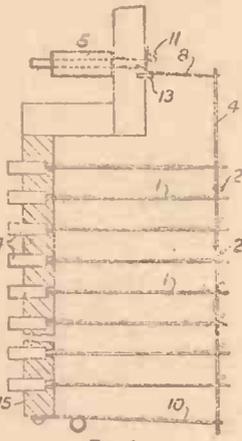


Fig. 1.

ADJUSTING WIRELESS APPARATUS; GEARING.—Marconi's Wireless Telegraph Co., Ltd., and Norwood, H. C. No. 501348.

Coarse and fine adjustment mechanism having a single operating-knob and a train of gears is provided with means operated upon endwise movement of the driving member for locking the gear train so that no slip occurs during gear change, a solid drive occurring during coarse adjustment. The knob C, Fig. 2, is held in position for fine adjustment by a light spring N, the drive being through gear D, F, D', J to the shaft M. The gear train is mounted between carrier plates E, H on which are formed friction surfaces engaging the knob C and fixed ring member G respectively. Endwise movement of the knob for coarse adjustment first overcomes spring N, closes clutch members E, C, and then opens the clutch parts G, H, the gear train driving solid with the knob.

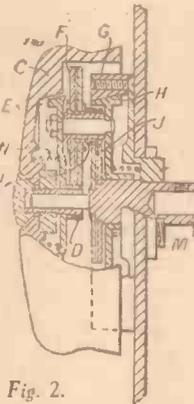


Fig. 2.

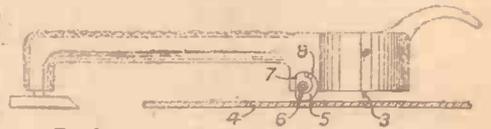


Fig. 3.

is placed on a record for playing, to be rotated so as to lower the stylus gently. According to the invention, the protecting device consists of a rotatable disc or roller 5, Fig. 3, pivoted so that it normally projects below the pick-up casing. The disc may, as shown, be pivoted at its centre 6 and be partially flattened at 7, a spring 8 so acting upon the disc that the circular part normally extends beyond the point of the stylus 3. When the pick-up is placed on a rotating record 4, the latter turns the disc 5 sufficiently to lower the stylus into engagement. A modification is described, in which the protective device consists of an eccentrically pivoted circular disc, weighted near its periphery.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

A CHANGE OF FRONT?

THE Secretary of the Football Association, when expressing a personal opinion recently, warned football league clubs against the fear of innovations. He said it might not be wise for them to refuse to allow matches to be televised. The reason for this was the possibility of big-screen rediffusion allowing the clubs to claim an agreed percentage of the cinema takings when the televising of a match was undertaken. The same feeling seems to be growing in the boxing world, where there is a fear that actual attendance at a fight may be adversely influenced if television pictures are radiated for both home and public viewing. A readjustment of financial returns is always necessary when a new method of presentation is developed, and past history has shown that in the long run no one actually suffers. The position was ably summed up by Thermion, in a recent issue, in his usual trenchant and provocative style. Opposition only stimulates a new development to unexpected lengths to gain its ends, whereas co-operation brings a train of benefit, and a quicker settlement of differences with value to all concerned. All new inventions pass through the same phase, and yet we do not seem to benefit from past experience. Old industries that are in the least affected very often adopt a truculent attitude, refusing to give way a little because of the benefits they have enjoyed for a long period, but this has always proved to be a short-sighted policy. The public are always ready to try something new, and in television there is the essence of a new form of education and entertainment which may alter the whole outlook of life in general.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office. The Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

- 16956.—General Electric Co., Ltd., Bligh, N. R., and Bloch, A.—Wireless heterodyne receiving apparatus. June 9.
16955.—General Electric Co., Ltd., Jacob, J. E. B., and Jesty, L. C.—Cathode-ray tubes. June 9.
16958.—General Electric Co., Ltd., Turner, H. C., and Tomlin, G. M.—Thermionic valve circuits. June 9.
17286.—Kolster-Brandes, Ltd., and Tiller, P. A.—Adjustment devices for radio-receivers. June 13.
16820.—Liguori, G.—Electromagnetic sound-recording, etc., apparatus. June 8.
17323.—Monge, G. de.—Television. June 13.
17275.—Scophony, Ltd., and Lee, H. W.—Television receivers. June 13.
16803.—Thornton, A. A. (Philco Radio and Television Corporation)—Detector coupling-circuits. June 8.
16804.—Thornton, A. A. (Philco Radio and Television Corporation)—Wide-band amplifiers. June 8.
16805.—Thornton, A. A. (Philco Radio and Television Corporation)—Synchronizing-circuits. June 8.
17261.—Thornton, A. A. (Philco Radio and Television Corporation)—

Electrical discharge circuits. June 13.

17262.—Thornton, A. A. (Philco Radio and Television Corporation)—Power supply systems. June 13.

Specifications Published

- 506911.—Ring, F.—Fluorescent screen arrangement particularly for television purposes.
507059.—McGee, J. D., and Lubyszynski, H. G.—Television transmitting systems.
507144.—Kolster-Brandes, Ltd., and Smyth, C. N.—Combined apparatus for television reception and film projection.
507146.—Scophony, Ltd., and Okolicsanyi, F.—Television receiving-apparatus.
507181.—Marconi's Wireless Telegraph Co., Ltd., and Wright, G. M.—Direction-finding radio receivers.
506933.—Ferranti, Ltd., and Taylor, M. K.—Electron beam discharge tubes.
506856.—Ferranti, Ltd., and Wood, H.—Television and like receiving systems.
506876.—British Thomson-Houston Co., Ltd.—Automatic frequency control circuits for radio receivers.
506877.—Toulon, P. M. G.—Television and like electric systems. (Addition to 497367.)
506977.—Lorenz Akt.-Ges., C.—Radio systems.
506987.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Radio-receivers comprising means for suppressing disturbances of short duration.

WORKSHOP CALCULATIONS TABLES AND FORMULÆ

By F. J. CANN

3/6, by post 3/10 from

George Newnes, Ltd.,
Tower House, Southampton St., Strand, W.C.2.



QUERIES and ENQUIRIES

World Time

"I find it very difficult to know when to search for certain long-distance signals. I am keen on getting an 'all-world' log, but the different times confuse me. Is there any book or table published which gives the equivalent times in different places, as most of the time tables I have seen give the actual station time and not G.M.T.?"—L. D. (N.W.5).

MOST programmes published in this country give G.M.T. or B.S.T. (British Summer Time). However, there is always a certain amount of interest in knowing the exact time at any given moment in various parts of the world, and although they may be computed from the World Map or Globe obtainable from Messrs. Webb's Radio, the Willis All-World clock is very much more useful as it is a standard time-piece and indicates G.M.T. or Summer Time, and enables the differences in various places to be seen at a glance. Correction for Summer Time may be instantly made in any part of the world.

A.V.C. Circuits

"I wish to add A.V.C. to my superhet, which is a mixture of commercial and home-made apparatus. There are two I.F. stages and although a double-diode-triode is not fitted, I can easily re-wire the second detector stage to take this valve. Could you supply me with a suitable high-efficiency circuit for the purpose?"—N.M.W. (Belfast).

UNFORTUNATELY there are many types of A.V.C. circuit and, therefore, without a diagram or details of your receiver, and full details of the type of set you need, we cannot supply constructional or circuit data. In its simplest form A.V.C. would probably be of little use in a really high-class superhet. Amplified, delayed or a combination of these is to be preferred, and if the receiver is for short-wave use it may also be desirable to include a circuit which also gives noise suppression. We are, however, preparing an article on the subject, and this will be published within the next week or two, and we think this will assist you.

Earth Connection

"The house into which I have moved has three-socket mains connectors, one socket being, I understand, an earth connection. Is this sufficiently reliable to warrant its use as an earth connection to my radio, and, if not, is there any way of getting a good earth as the building is let off in flats and I am on the upper floor, leading to a long wire to the ground level?"—L. W. (W.14).

THE earth pin may certainly be used as an earth point for your receiver and would no doubt give very much better results than would be obtained by a long lead running down to ground level, although the mains earth pin eventually has to go to earth. The connection from the mains supply is no doubt made to iron girders in the building or some similarly well-earthed metal body and, therefore, may be regarded as quite efficient from a radio point of view.

Aerial Mast

"I should like to erect a fairly high mast in the garden and require about 40ft. My garden is, however, only 15ft. long, and I wonder what is the best way of setting about the mast. I anticipate having a transmitter eventually and, therefore, should like a reliable structure. Do you recommend the lattice type or a skeleton built from material such as 2in. by 2in. batten? Could you recommend any book on the subject?"—F. S. (S.E. 10).

THE ordinary type of mast has to be laid along the ground and hoisted into position, and this means that you would have to have an unobstructed 40ft. of garden space available for your proposed mast. In view of the restricted space we therefore suggest a lattice structure, made in sections. The top section should be placed on the spot where the mast is to stand and guy wires or ropes attached to the top and taken out to suitable anchor points. You will need assistance, and preferably should have someone at each guy point. Placing the

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

sections handy, the top section should be lifted and the next section slipped beneath it. If the right material is used and the sizes are correct each section may be lifted quite easily. Bolt together, and lift the two sections and so on. Towards the end, owing to the weight, you may find that small pulley tackle is needed to lift, but three persons should be able to manage a well-constructed lattice mast provided that the guys are suitably held to prevent side sway. We do not know of any book on the subject, but we have published constructional details in the past.

Stage Gain

"I am rather at a loss to know how to compute the gain of an L.F. stage where resistance-capacity coupling is concerned. I believe that the anode load should be as high as possible, but this in turn governs the anode current and, incidentally, the voltage drop across the resistance. On the other hand, an optimum load value is always given for an output valve. Why not for an L.F. valve? Perhaps you could help me on these points."—D. R. B. (Wealdstone).

THE anode resistance value must be chosen both in conjunction with the valve impedance and with the H.T. voltage which is available. Obviously an increase beyond a certain value will be of little use owing to the voltage drop, but the amplification of the stage is dependent upon the value of the load resistance, just as the output stage has to be matched, and most manufacturers give suitable values for the resistance.

Battery Leads

"My receiver is battery-operated and I have a small cabinet which I wish to use. Unfortunately, there is only room at the top for the set and the batteries must therefore go down below. To make the appearance tidy I was thinking of taking H.T. and L.T. leads all together up the back of the set, but I wonder if this will lead to any trouble, or whether they should be well separated. Perhaps you could help me in this direction."—W. W. (Rotherham).

H.T. and L.T. leads may be bunched, and the only point to watch is that insulation is adequate to prevent short-circuits between the two sets of leads. To keep the appearance neat the leads should be laid side by side and tied with good twine in half-hitches throughout the length. It is also possible to place loudspeaker leads with these, but the aerial and earth leads should preferably be kept at the opposite side of the cabinet, and if the aerial lead has to cross over the speaker leads it would be preferable to allow a long length of wire for the lead-in, let this droop to the floor and then rise up to the aerial terminal.

Stations Receivable

"I have received the blueprint No. A.W. 449, which illustrates the Twenty Station One-valver and I would like to know the names of the stations which the receiver will receive."—M. W. (Manchester, 9).

IT is not possible to give a complete list of the stations which formed the title of the above receiver as so much depends on local conditions, efficiency of aerial in use and such things as operating considerations. It is not a difficult matter, however, to receive more than the twenty stations, providing local conditions are normal. If the object of the question is to make a station-named dial, we would suggest that you select the most powerful stations received in your area and mark off a dial accordingly.

Faulty Oscillator

"I have built a 5-valve all-wave battery-operated receiver which is perfect on all bands except the medium wave. On that section I can only get the local (Athlone 531 metres). Coils and everything else appear to be O.K."—P. J. F. (Co. Westmeath).

AS you do not give complete details of your receiver, we are unable to determine whether it is a straight employing ordinary H.F. amplification, or whether it is of the superhet type. If it is the former, we should imagine that some trouble must exist in the H.F. section, such as incorrect coil connections, instability, or a fault in the aerial tuning circuit. If, however, it is a superhet circuit, the trouble is no doubt in the oscillator stage, which we should imagine is not functioning on the particular band mentioned.

The coupon on page 405 must be attached to every query.

Practical and Amateur Wireless BLUEPRINT SERVICE

These Blueprints are drawn full size. Copies of appropriate issues containing descriptions of these sets can in some cases be supplied at the following prices, which are additional to the cost of the Blueprint. A dash before the Blueprint Number indicates that the issue is out of print.

Issues of Practical Wireless .. 4d. Post Paid.
 Amateur Wireless .. 4d. ..
 Practical Mechanics .. 7 1/2d. ..
 Wireless Magazine .. 1/3 ..

The Index letters which precede the Blueprint Number indicate the period in which the description appears: Thus P.W. refers to PRACTICAL WIRELESS, A.W. to AMATEUR WIRELESS, P.M. to PRACTICAL MECHANICS, W.M. to WIRELESS MAGAZINE.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS		No. of	SUPERHETS.	
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CRYSTAL SETS.				
Blueprints, 6d. each.				
1937 Crystal Receiver	—	PW71	Battery Sets: Blueprints, 1s. each.	
The "Junior" Crystal Set	27.8.38	PW94	£5 Superhet-(Three-valve)	5.6.37 PW40
STRAIGHT SETS. Battery Operated.				
One-valve: Blueprints, 1s. each.				
All-Wave Unipen (Pentode)	—	PW31A	F. J. Camm's 2-valve Superhet	13.7.35 PW52
Beginners' One-Valver	19.2.38	PW35	F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37 PW75
The "Pyramid" One-valver (HF Pen)	27.8.38	PW93	Mains Sets: Blueprints, 1s. each.	
Two-valve: Blueprints, 1s. each.			A.C. £5 Superhet (Three-valve)	— PW43
Four-range Super Mag Two (D, Pen)	—	PW36B	D.C. £5 Superhet (Three-valve)	1.12.34 PW42
The Signet Two (D & LF)	24.0.38	PW70	Universal £5 Superhet (Three-valve)	— PW44
Three-valve: Blueprints, 1s. each.			F. J. Camm's A.C. £4 Superhet 4	31.7.37 PW59
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2	F. J. Camm's Universal £4 Superhet 4	— PW60
Selectone Battery Three (D, 2 LF Trans)	—	PW10	"Qualitone" Universal Four	16.1.37 PW73
Sixty Shilling Three (D, 2 LF RC & Trans)	—	PW34A	Four-valve: Double-sided Blueprint, 1s. 6d.	
Leader Three (SG, D, Pow)	22.5.37	PW35	Push-Button 4, Battery Model	— PW95
Summit Three (HF Pen, D, Pen)	—	PW37	Push-Button 4, A.C. Mains Model	22.10.38
All Pentode Three (HF Pen, D Pen, Pen)	20.5.37	PW39	SHORT-WAVE SETS.	
Hall-mark Three (SG, D, Pow)	12.6.37	PW41	One-valve: Blueprint, 1s.	
Hall-mark Cadet (D, LF, Pen (RC))	16.3.35	PW48	Simple S.W. One-valver	9.4.33 PW88
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW49	Two-valve: Blueprints, 1s. each.	
Genet Midget (D, 2 LF Trans)	June '35	PM1	Midget Short-wave Two (D, Pen)	— PW38A
Cameo Midget Three (D, 2 LF Trans)	8.0.35	PW61	The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.38 PW01
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	—	PW53	Three-valve: Blueprints, 1s. each.	
Battery All-Wave Three (D, 2 LF RC)	—	PW55	Experimenter's Short-wave Three (SG, D, Pow)	30.7.38 PW30A
The Monitor (HF Pen, D, Pen)	—	PW61	The Prefect 3 (D, 2 LF RC and Trans)	7.8.37 PW63
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW02	The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.38 PW08
The Centaur Three (SG, D, P)	14.8.37	PW04	PORTABLES.	
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW60	Three-valve: Blueprints, 1s. each.	
The "Colt" All-Wave Three (D, 2 LF RC & Trans)	13.2.39	PW72	F. J. Camm's £1F Three-valve Portable (HF Pen, D, Pen)	— PW65
The "Rapid" Straight 3 (D, 2 LF RC & Trans)	4.12.37	PW82	Parvo Flyweight Midget Portable (SG, D, Pen)	3.6.39 PW77
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	28.8.37	PW73	Four-valve: Blueprint, 1s.	
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.33	PW84	"Imp" Portable 4 (D, LF, LF Pen)	19.3.38 PW86
F. J. Camm's "Sprite" Three (HF Pen, D, Det)	26.3.38	PW87	MISCELLANEOUS.	
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38	PW89	S.W. Converter-Adapter (1 valve)	— PW48A
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Det)	3.9.33	PW92	AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.	
Four-valve: Blueprints, 1s. each.			Blueprints, 6d. each.	
Sonotone Four (SG, D, LF, P)	1.5.37	PW4	Four-station Crystal Set	23.7.38 AW427
Fury Four (2 SG, D, Pen)	8.5.37	PW11	1934 Crystal Set	— AW444
Beta Universal Four (SG, D, LF, Cl. B)	—	PW17	150-mile Crystal Set	— AW450
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B	STRAIGHT SETS. Battery Operated.	
Fury Four Super (SG, SG, D, Pen)	—	PW34C	One-valve: Blueprint, 1s.	
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46	B.B.C. Special One-valver	— AW387
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All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79	Melody Ranger Two (D, Trans)	— AW388
"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	12.2.33	PW83	Full-volume Two (SG det, Pen)	— AW392
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.9.38	PW90	Lucerne Minor (D, Pen)	— AW426
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A.C. Twin (D (Pen), Pen)	—	PW13	Three-valve: Blueprints, 1s. each.	
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Selectone A.C. Radiogram Two (D, Pow)	—	PW19	Fan and Family Three (D, Trans, Class B)	25.11.33 AW410
Three-valve: Blueprints, 1s. each.			£5 5s. S.G.3 (SG, D, Trans)	2.12.33 AW412
Double-Diode-Triode Three (HF Pen, DDT, Pen)	—	PW23	Lucerne Ranger (SG, D, Trans)	— AW422
D.C. Ace (SG, D, Pen)	—	PW25	£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34 AW435
A.C. Three (SG, D, Pen)	—	PW20	Lucerne Straight Three (D, RC, Trans)	— AW437
A.C. Leader (HF Pen, D, Pow)	7.1.39	PW35C	Transportable Three (SG, D, Pen)	— WM271
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B	Simple-Tune Three (SG, D, Pen)	June '33 WM327
U'bique (HF Pen, D (Pen), Pen)	28.7.34	PW36A	Economy-Pentode Three (SG, D, Pen)	Oct. '33 WM337
Armad Mains Three (HF Pen, D, Pen)	—	PW38	"W.M." 1934 Standard Three (SG, D, Pen)	— WM351
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50	£3 3s. Three (SG, D, Trans)	Mar. '34 WM354
"All-Wave" A.C. Three (D, 2 LF (RC))	—	PW54	1935 £6 6s. Battery Three (SG, D, Pen)	— WM371
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	—	PW56	PTP Three (Pen, D, Pen)	— WM389
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70	Certainty Three (SG, D, Pen)	— WM393
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Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47	Self-contained Four (SG, D, LF, Class B)	Aug. '33 WM331
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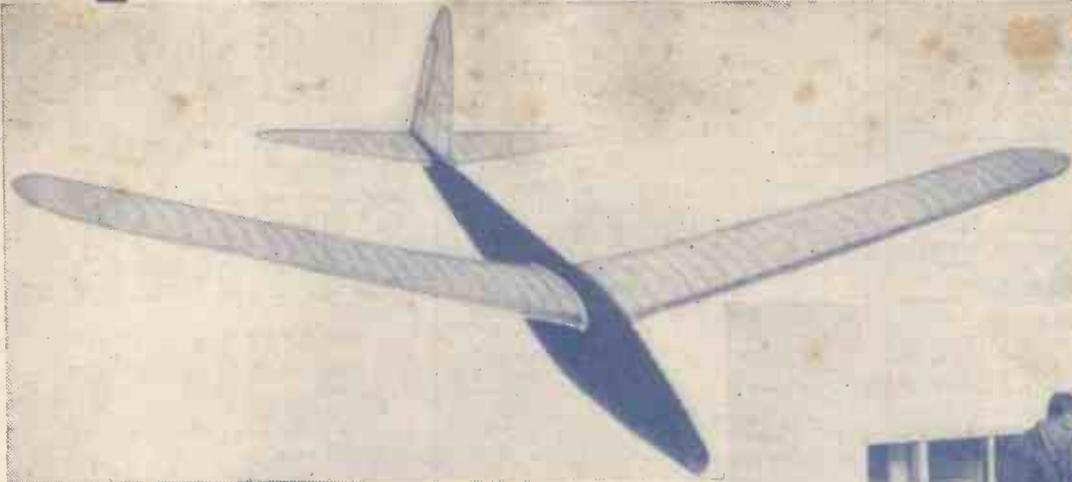
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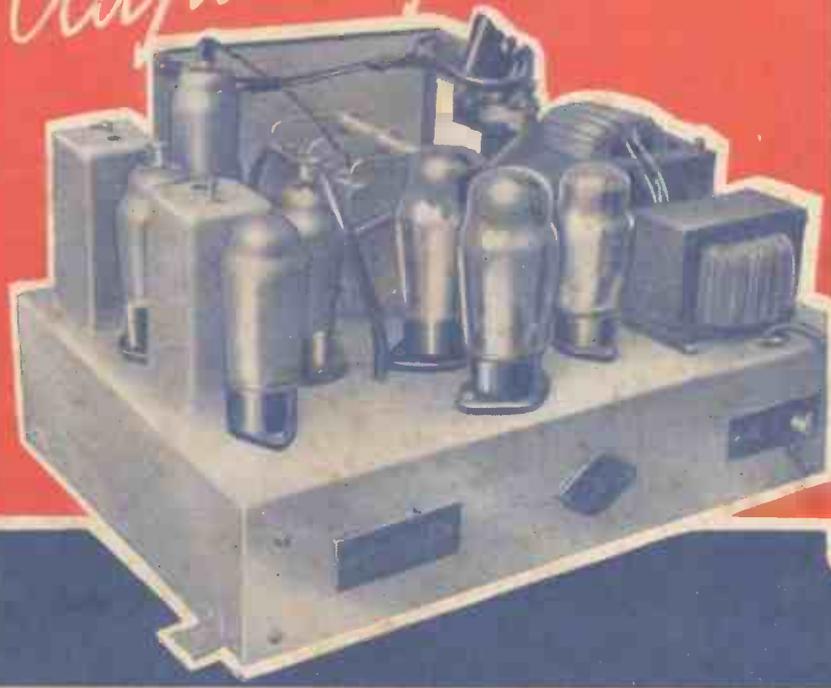
Edited by F.J. CAMM

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AND PRACTICAL TELEVISION

Vol. 14. No. 35A.
July 15th, 1939.

Adjusting and Operating



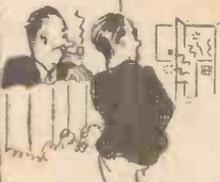
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A QUESTION OF VOLTAGE SEE PAGE 411



Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh.Sch.,
B.Sc., A.M.I.E.E., Frank Preston.

Vol. XIV. No. 356. July 15th, 1939.

ROUND *the* WORLD of WIRELESS

America's Listeners

ACCORDING to the latest published statistics some 82 per cent. of households in the United States possess a radio receiver. This percentage represents 26,666,500 of the 32,641,000 families computed to be resident in the North American continent. Of the 18,920,000 families dwelling in cities, 91 per cent. are radio listeners, but on the land 69 per cent. only take any interest in broadcast programmes.

Prague's Radio Journal Deposed

NO longer in the Czech programmes will you hear the call *Radio Journal, Praha*. This organisation, now controlled by the Germans, has been renamed *Tschechische Rundfunk Gesellschaft mit beschränkter Haftung* (Czech Broadcasting Company, Limited).

Altered Wavelength

RADIO LIEGE (Belgium), which hitherto has been working on 203.5 m. (1,474 kc/s), has now adopted 208.6 m. (1,438 kc/s). The station has been particularly active during the last few days in connection with the Liege Water Exhibition.

Careful Identification Necessary

THE fact that so many European stations are broadcasting news bulletins and talks in languages other than their own is making the identification of transmitters a difficult one. Always wait for the call or interval signal, if the latter is familiar to you. French stations since June 19th have also initiated foreign transmissions. P.T.T., Grenoble, Nice and Marseilles broadcast daily in Italian between B.S.T. 22.45-23.00; Strasbourg, Lyons and Rennes-Bretagne in German at the same time; Lyons and Rennes in Serbo-Croatian from 23.00-23.15, and Bordeaux-Lafayette and P.T.T. Toulouse in Spanish from 22.45-23.00.

More High-power Stations

THE German Reich has decided to increase the power of most of its transmitters in the immediate future many of them will go to 120 kilowatts, including Prague and Melnik. Norway is also busy erecting two 100-kilowatt stations at Hennesberget and Namsos; this will give the country seventeen stations with an aggregate power of 360 kilowatts.

Sweden this autumn will inaugurate a new 100-kilowatt transmitter at Storatuna, in Dalecarlia.

Radio in Iran (Persia)

THE Iranian Government has placed a contract for the construction and supply of thirteen broadcasting stations on medium waves and three on short channels; two of the latter are to be installed at Teheran.

An Alternative Drink

IN view of the scarcity of coffee in Italy the E.I.A.R. stations include in one of their programmes a short talk in which the

"How They Become Observers"

THE Royal Air Force recently published the news that it was open to recruit air observers direct from civil life, to supplement those in training through the normal channels. The B.B.C. proposes to give listeners an insight into the training of these young observers on July 17th. One of the Corporation's officials, C. J. T. Gardner, will undertake a routine training flight on which two young observers are progressing towards the end of their training. The aeroplane and its crew and trainees will take off from Hendon and fly across country to a point 20 miles away. Here the 'plane will circle and return to Hendon. One recruit will navigate on the outward journey and the other on the return. The B.B.C. observer, with a lip microphone, will tell listeners what happens on the aerodrome at Hendon at the take-off and throughout the flight.

Continental Exchange

IN the winter before last, Midland began an occasional exchange of programmes of like type with continental stations. Male voice choirs, chiefly composed of miners, brass bands, children's singing games and carillons (twice) have been contributed to "Continental Exchange" with France, Germany or Belgium. The Eastwood Colliery Male Voice Choir, from Nottinghamshire, will appear on July 16th for the second time in one of these programmes. It was in an exchange programme with a French miners' choir the last time; and on this occasion it will share a programme with a German choir, not necessarily of miners and probably from Bavaria. The Eastwood Choir was formed in 1920 and is conducted by Granville Mee. It has won first prizes at Cleethorpes and Birmingham Festivals.

Radio Society of Gt. Britain.

THE R.S.G.B. announce that the Council has decided not to exhibit at the Radio Exhibition. Instead, arrangements are being made to organise a private Radio Exhibition during the period fixed for the society's 14th Annual Convention—September 21st, 22nd, and 23rd, 1939. The venue is The Royal Hotel, Woburn Place, Russell Square, London, W.C.2, and will be confined to society members only.

ON OTHER PAGES

	Page
A Question of Voltage ..	411
Operating and Adjusting the 1939 All-wave Super-het ..	413
A.V.C. Elaborations ..	414
On Your Wavelength ..	415
Car-radio Controls ..	417
An Improved Variable Selectivity Circuit ..	419
Readers' Wrinkles ..	421
Practical Television ..	423
Transmitting Topics ..	424
Readers' Letters ..	429
Queries and Enquiries ..	431

speaker gives recipes for the preparation of substitutes for the morning meal and after-dinner refreshment!

That Holiday Weather

IN addition to the daily weather report during the holiday season German stations now broadcast every Wednesday a special ten-day forecast; its accuracy, however, is not guaranteed.

ROUND the WORLD of WIRELESS (Continued)

Welsh Motor Rally Trials

FROM all over the country enthusiastic competitors will converge on Cardiff, the finishing point of the Welsh Motor Rally, on July 20th. This is the fifth Rally which Wales has organised, and it is a tribute to the work which has been put into it that these Rallies now rank with the much older established first-class Rallies



Gerald Cook, Director of Television, chatting to Sir Ian and Lady Fraser at the Television Party recently held in Broadcasting House.

in the country. On July 21st, the spectacular eliminating tests will be held at Cardiff, when a running commentary will be broadcast by K. Rowland Harris in the Welsh programme from the course-side in Museum Avenue, Cathays Park, Cardiff.

Strolling Players

THE next talk in the series entitled "Running Your Own Show" will be given on July 18th by Laurence Neal. He has had ten seasons with the Fortune Players of Leicester, and will tell of the experience he has gained in a repertory of several plays, performed with a minimum of scenes in villages up and down the country. These strolling players were in their second year when he joined them. He had to take over the part of Mephistopheles in Marlowe's "Dr. Faustus" in the early days. One of the favourite plays in the repertoire of the Fortune Players is "A Winter's Tale," which they have given thirty times.

Television Interference

IN view of the fact that diathermy apparatus causes such widespread interference on the television wavebands, it is interesting to note that the Federal Communications Commission is expected to recommend that all such apparatus should have adequate filters in the power lines and be confined to one frequency band so as to reduce the interference to a minimum.

Finnish People's Set

FOLLOWING the popularity of the German and other "people's" receiver, a campaign is being run by Finnish newspapers calling for the adoption of a similar type of receiver for use by the population of Finland.

INTERESTING and TOPICAL NEWS and NOTES

Aotearoa

"AOTEAROA," title of a programme to be broadcast on August 1st, is the Maori name for the Islands of New Zealand and means "the land of the long white cloud." It is just a hundred years ago that a party of 500 colonists set sail from Gravesend for the other side of the world. The programme, which is in honour of New Zealand's centenary, has been prepared by A. L. Lloyd, who will be remembered as the author of "The Voice of the Seamen." It will be produced by Laurence Gilliam.

Special music has been composed by Leslie Woodgate, the B.B.C.'s chorus master. In addition to the special music, records of a Maori canoe song sung by a choir, and a love song sung by a Maori girl, will be included. The programme traces in dramatic form the hardships undergone by the early settlers before the Maoris were finally won over to British rule. Included in the broadcast will, it is hoped, be a short speech by the High Commissioner for New Zealand in London

on the goodwill and solidarity that exists between the Mother Country and its most distant Dominion.

Organ Exchange with Radio Eireann

THE second of the series of four organ recitals exchanged between the B.B.C. and Radio Eireann, will be broadcast on July 18th, from Armagh Cathedral. The organist will be Reginald West, who is well known to Ulster listeners. West began his musical career in 1914 as a chorister at Hereford Cathedral under Dr. F. R. Sinclair. Later on he was a pupil of Dr. Percy Hull, organist at Hereford Cathedral, and in 1919 he won the Sinclair Scholarship for organists. In 1921 he became deputy organist at Hereford Cathedral, and from that year until 1935 he was Music Master at Hereford Cathedral



Blindfold transmitter operation, to provide efficiency for night work, being carried out by Cambridge undergrads at their O.T.C. camp.

School. Since then he has been organist and master of the Choristers at Armagh Cathedral.

French Short-wave Stations

IT is stated that by 1940 two new 100 kW. short-wave stations will be put into service in France. Other stations are being built and these will bring up the total of French short-wave stations to nine.

Sunday Broadcast by Reginald Dixon

BLACKPOOL'S popular organist, Reginald Dixon, who plays at the Tower Ballroom, will be heard by Northern listeners on July 16th. His programme will include a "Vagabond King" selection, the Waldteufel waltz, "Etinzelles," and, to end the broadcast, the Sibelius tone-poem, "Finlandia."

Songs about Smoking

A BLAST FOR TOBACCO" is the name of a programme of songs and choruses about smoking and tobacco which is to be broadcast on July 17th. Period items of a programme which is subtitled "variations on a favourite theme" are to be sung by Hamilton Harris (bass) and a male voice octet. Some modern versions of Jacobean and old English "ayres" will be heard. Arthur Spencer, of the North Region's music department, has arranged the broadcast.

SOLVE THIS!

PROBLEM No. 356

ROGERS built a three-valve battery set which gave fairly good results, but he decided to improve reproduction by converting the last stage from transformer coupling to resistance-capacity coupling. He found a suitable condenser, anode resistance and grid leak in his spares box and used these components in place of the transformer. He connected them up exactly as shown in a diagram and then switched on. The set was tuned to the local station and signals came through for a few seconds, after which they grew distorted and finally ceased. He switched off and checked connections, but found them all in order so switched on again. The same thing happened—signals for a few seconds followed by distortion and then silence. What was the cause of the trouble? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 356 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, July 17th, 1939.

Solution to Problem No. 355

When Jackson added the resistance in series he modified the value of the potentiometer and thus altered the H.T. applied to the screen. He should have used resistances of greater wattage rating and not changed the values.

The following three readers successfully solved Problem No. 354, and books have accordingly been forwarded to them:

E. Trowell, 27, Unity Street, Sheerness, Kent;
A. J. Hall, 16, Shrewsbury Fields, Shifnal, Shropshire;
G. Bagrie, 24, Whittington Green, Newcastle-on-Tyne, 5.

A QUESTION OF VOLTAGE

The Experimenters Show Here that there are Sometimes Factors which Render the Direct Application of Ohm's Law Rather Difficult and Complicated. It is, however, Explained that Experimental Methods of Checking may be More Reliable than those Arrived at Mathematically

EVERY reader must by now know Ohm's Law and its general applications, but it is often evident from inquiries which we receive that there are many who overlook small practical points when making use of it. For example, consider the very simple detector anode circuit shown in Fig. 1. There is a 10,000-ohm decoupling resistor, and also a 25,000-ohm coupling resistor (for an R.C.C. inter-valve circuit). If the total H.T. voltage available is 100, you might wish to

conditions represented by the circuit. It would also be found—if sufficiently accurate means of measurement were available—

by The Experimenters

that the voltage on the anode would be appreciably in excess of 12.5. Where is the fallacy, then? It is in assuming that the current is 2.5 mA. As the applied anode voltage is reduced, the current also must be reduced—and as the current is reduced the voltage drop across the resistors is smaller.

The fact of the matter is that you cannot find the actual applied voltage by simple calculation, although a fair approximation would be possible if the calculation were based on the total resistance of the resistors and valve in series. The A.C. resistance of the valve could be employed in working out, but the result would not be absolutely correct. There are few instances, however, in which a greater degree of accuracy is necessary.

this case, of course, the bias voltage dropped across the cathode resistor must also be taken into account. Another method of looking at the question is that, since 10 mA is the current passed and the total H.T. voltage is 250, the equivalent resistance of the valve and its associated anode and cathode leads is 25,000 ohms. Then knowing the values of the anode and cathode resistors it is possible to determine the equivalent resistance of the valve, and then to estimate the voltage applied

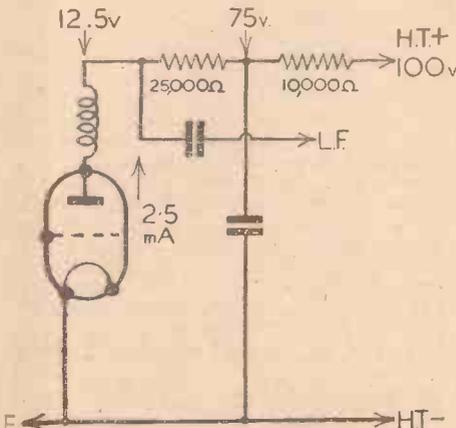


Fig. 1.—A typical R.C.C. coupling, and a decoupling arrangement in the anode circuit of a detector valve.

know what voltage would be applied to the detector valve; conversely, if the resistors had not already been chosen, it might be desired to know what values would be necessary to produce a certain anode voltage.

Current Variation

On the face of it, we have here a very simple problem. We know (from Ohm's Law) that the voltage drop can be found by multiplying the current in amperes by the total resistance in ohms. But we do not know what the current is. By consulting valve tables it might be found that the average anode current of the valve in use is, say, 2.5 mA. It might, therefore, be concluded that such a figure could be used in the simple calculations. Thus, you could determine that the voltage drop across the decoupling resistor would be $2.5/1,000$ multiplied by $10,000=25$ volts. The voltage between the low-potential side of the decoupler and earth would consequently be 75 volts. Following the same procedure you would find that the voltage drop across the coupling resistor is $2.5/1,000$ times $25,000=62.5$. This means that the voltage applied to the anode (if we neglect the very low-resistance of the H.F. choke) would be 12.5.

That, of course, is absurd, despite the fact that there might not appear to be any doubt that the calculations have been correctly performed. In almost every instance it would be found that the valve would perform fairly efficiently in the con-

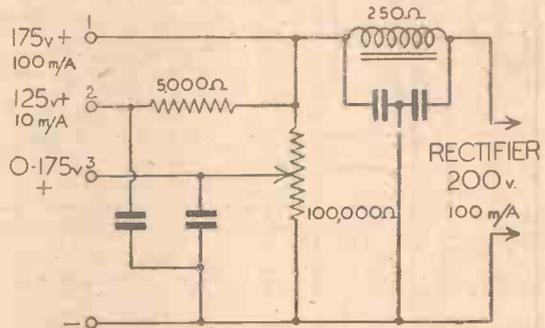


Fig. 3.—The output from different tappings of a mains H.T. unit varies according to the load applied to all of the tappings.

between the anode and cathode by simple proportion.

But even when doing this, there is another factor to be taken into account: the parallel resistance of the screening-grid potentiometer. Knowing that the overall resistance of resistors in parallel is the "reciprocal of the sum of the reciprocals"

$$(R = \frac{1}{1/r_1 + 1/r_2})$$

it is possible to work out the individual values. Still, it's a matter that the average constructor finds very tedious and worrying. So he prefers to acknowledge the difficulty and to be guided by the results of practical experiments. We are not going to worry you here with the theory and mathematics of the thing: our purpose in writing this was, rather, to show that it is easy to make false premises and to become thoroughly confused by theoretical results unless you are technically-minded.

S.G. Voltage

When you try to find the exact screening-grid voltage applied in a circuit of the type shown in Fig. 2 there are more snags ahead. You might assume that the voltage would be just half that between the H.T.+ line and the cathode—half of 242—since the two limbs of the fixed potentiometer are of equal value. Do not be alarmed when we point out that it is not. If there were no current passed by the screening grid the supposition would be correct, but since the screening grid does pass a current, we have the position of two similar resistors in series, one of which passes more current than the other. Because of this, the voltage drop across the "upper" one, which passes the greater current, is greater than across the "lower"

Equivalent Resistance

A more involved set of conditions is presented when dealing with a circuit of the type shown in Fig. 2. As in the Fig. 1 arrangement, it is possible to measure the anode current passing through the valve and its associated anode and cathode-circuit resistors, and knowing that the probable anode voltage can be determined by looking up a set of valve curves. In

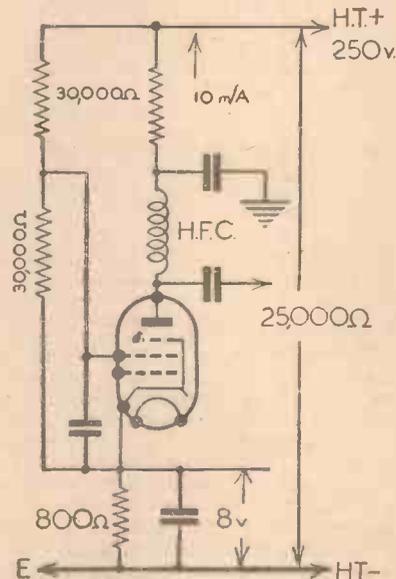


Fig. 2.—Many problems are introduced when an attempt is made to calculate the exact S.G. voltage supplied by a potentiometer, as shown here.

(Continued on next page)

A QUESTION OF VOLTAGE
(Continued from previous page)

one. In other words, the screening-grid voltage is less than one-half the H.T. voltage. Here again we refuse in this article to give the full details of calculation; they have been given in previous issues for those who insist on getting to the bottom of the matter, but they are seldom of great importance to the constructor or the average experimenter who, if he is wise, will employ the values recommended by the makers of the valve employed and given in their literature.

H.T. Supply-unit Output

Let us now turn to the output arrangements of a mains H.T. unit, as represented by the diagram in Fig. 3. The output from the rectifier we will assume to be 200 volts, 100 mA. Since there is a 250-

ohm smoothing choko in series with the positive lead, the maximum output from the eliminator, at 100 mA, is 175 volts. Number 2 tapping would give 125 volts at 10 mA, since there is a 5,000-ohm resistor in series with the 175-volt lead. But if the maximum-output tapping were not being employed, the output from number 2 point would be higher. This is because there would be a voltage drop of only 2.5 across the smoothing choke when the total current load were 10 mA.

Awkward Calculations

With a potential divider (not very often used these days) as shown in Fig. 4, similar conditions apply, but with even greater force. For one thing, a current is always flowing through the resistor forming the potential divider and through each of the circuits connected to the tappings. This

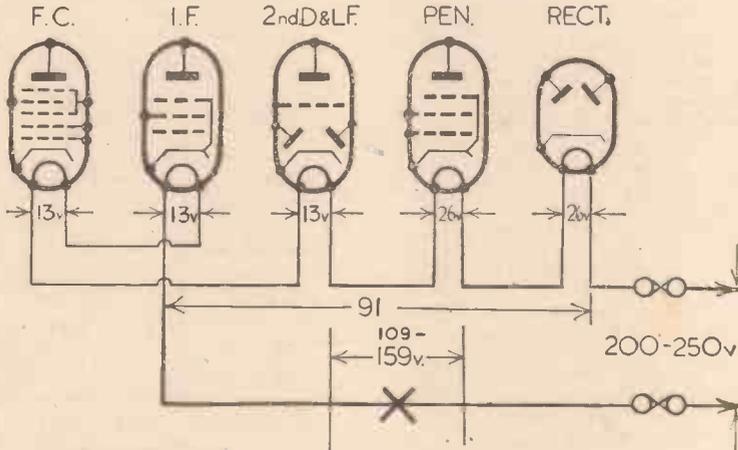


Fig. 5.—The allocation of voltages between the heaters of the valves in an A.C./D.C. circuit.

means that we have a number of parallel resistors forming a network which, although simple in the practical senses, is extremely complex when you start to make attempts to assess the voltage and current outputs from any of the tapping points.

Unless you are something of a mathematician we advise you to save yourself from headaches by not attempting such calculations. We confess that we shirk them whenever possible, although at times our readers have insisted on our doing the calculations to settle a wager or because some unfortunate soul has been "pipped" in an examination because of one of these nightmare calculations. By the way, we hope that the "highbrows" among our readers will not take us to task and say that we ought to be ashamed of ourselves because we are not competent to deal with these problems with absolute ease. We are not ashamed, for we lay claim to practical experience and ability rather than to mathematical honours.

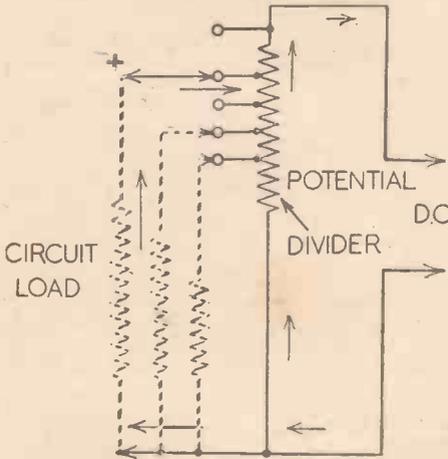


Fig. 4.—When a potential divider is used we have, in effect, a number of resistors in parallel with each other and with parts of the divider resistor.

A.C./D.C. Heater Voltages

There are some voltage questions that can be settled easily, and they are problems that must be solved when designing a receiver. One of these concerns the heater circuits in an A.C./D.C. circuit, a small portion of which is shown in Fig. 5. In this case, all the heaters are wired in series, and all should be rated at the same current—it matters not whether all have the same voltage rating or not. You can find the voltage required to feed them by the simple process of adding together the voltages of the individual valves. Thus, in Fig. 5, there are three valves with 13-volt

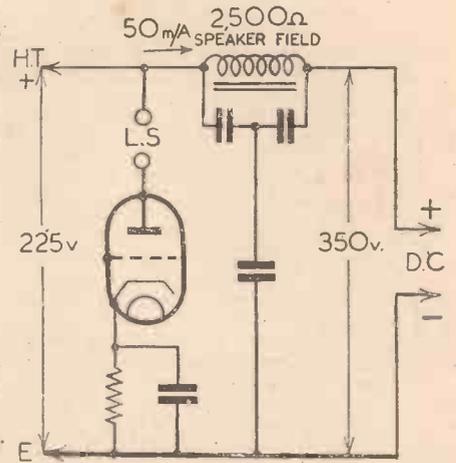


Fig. 6.—A speaker field winding produces a pronounced voltage drop.

heaters, and two whose heaters require 26 volts each. When these are added together we get the total voltage of 91.

The receiver has to be suitable for operation from mains voltages between about 200 and 250, so we need some form of resistor at the point marked X. By subtracting our 91 from 200 and from 250, we find that the voltage drop required is 109 to 159. We could, of course, use a tapped wire-wound resistor with a maximum value of 530 ohms (assuming the use of the usual .3-amp. valves), but a far better method is to employ a self-compensating resistor, in the form of a barretter. There is a standard type with a range of 112 to 195 volts at .3 amp., and this would be quite satisfactory in practice.

Energised Speaker

Some constructors who propose to employ an energised moving-coil speaker overlook the fact that the field winding is of necessity responsible for a fairly heavy drop in voltage. In the example shown in Fig. 6 it is assumed that the H.T. current consumption of the receiver is 50 mA. At that current, the voltage dropped through the 2,500-ohm field winding is 125 volts, and thus the available H.T. voltage is 225, the output from the rectifier being 350 volts.

A sidelight on the voltage question here is the wattage available for energising the speaker. It can be found in one of two ways: by multiplying the current in amperes by the voltage drop; or by multiplying the ohmic resistance of the field by the square of the current. The result is 6.25 watts. This is adequate for most types of energised speaker, but in some circuits the efficient use of an energised unit might be precluded by the fact that the available current and voltage are insufficient. Most small speakers will operate fairly well when the available energising power is 3 watts or over.

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(Editor of "Practical and Amateur Wireless")

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Wireless Construction, Terms, and Definitions explained and illustrated in concise, clear language

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A.V.C. ELABORATIONS

Complicated A.V.C. Circuits are Now Employed in some Modern Receivers. The Reasons and the Method of Working are Described in this Article = = By W. J. DELANEY

THE A.V.C. circuit is, as most readers are by now aware, an arrangement whereby the gain of a receiver is controlled by the incoming signal. The idea underlying the scheme is to avoid fading, and this is accomplished by using in the early stages of the receiver valves with what are known as "variable-mu" characteristics. That is to say, the amplification of the valve is dependent upon the applied grid bias, and by rectifying the H.F. component of the signal which is received, and by applying this rectified voltage to the early valves it is obvious that the input will be controlled. With a variable-mu valve maximum bias gives minimum amplification, and thus a powerful signal will reduce the gain and a weak signal will increase gain, hence the output will remain sensibly constant irrespective of variations in the input consequent upon fading.

The first point which should be obvious from the above remarks is that even the weakest carrier wave will be fed back to the early valves and thus maximum amplification will not be obtained. As, however, a very weak signal will no doubt be accompanied by a fairly heavy background of noise, it may not be desirable to receive such a station so this point is not regarded by some as important. If, however, one is searching for distant stations it is obviously desirable that the receiver should be in its most sensitive condition.

Delayed A.V.C.

Some receivers have a switch whereby the A.V.C. action may be cut out and a manual control substituted, and this enables searching to be carried out in the desired manner, but another idea is to impose at the A.V.C. circuit a preliminary voltage which will prevent the required bias being applied to the controlled valves until a desired signal level has been reached. This is therefore known as delayed A.V.C. In some circuits this is accomplished by using a double-diode-triode valve as the rectifier, A.V.C. and L.F. valve, and making use of the bias for the triode section as the delay voltage, whilst other more com-

plex scheme is to use a variable bias resistance so that the amount of delay may be controlled, but this is not very general

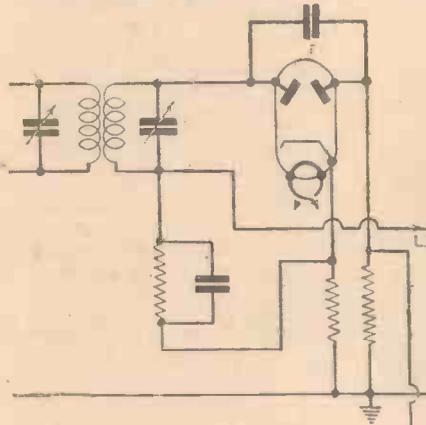


Fig. 2.—The basic form of delayed A.V.C.

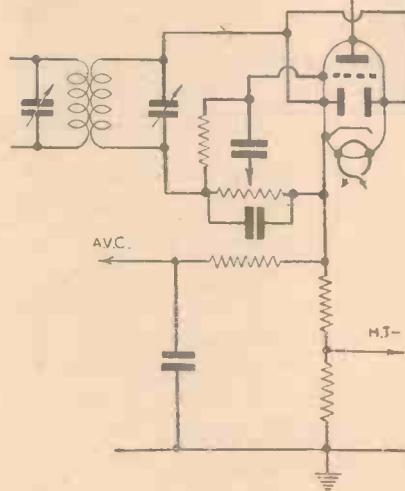


Fig. 3.—Amplified A.V.C. using a double-diode-triode.

signal will control the bias, and therefore it is desirable to introduce the delay voltage again, giving rise to delayed amplified A.V.C. There are also several different schemes by which this arrangement may be introduced, and one circuit used in a popular British receiver is shown in Fig. 3.

Quiet Tuning

A moment's thought will reveal that a very serious defect may become prominent when any of the forms of A.V.C. already mentioned are employed. In the "no signal" condition the gain of the valves is at a maximum. Hence, when tuning through the band, background noise will rise to a maximum in between stations and this will be distressing, especially if 'phones are in use. It is true that by using a visual tuning indicator the manual L.F. gain control may be turned to control the gain until the indicator shows that a worthwhile station has been located, but this is not a desirable method of working, especially for those who are anxious to make keen searches over the band for long-distance stations. Circuits have, therefore, been introduced to "mute" the receiver until a suitable carrier has been located, and these circuits are known as "Quiet A.V.C." arrangements. They may, of course, as in the previous instances, be combined to provide delay and amplification, and special valves have been introduced in some cases to enable maximum benefits of the system to be obtained. Of these the triple-diode-triode is probably the best known. The most interesting circuit which we have tried in this connection is shown in Fig. 5, recommended by Mullard for their "E" series valves. In this circuit, the valve EF6 operates as an L.F. amplifier and the triode section of the double-diode-triode provides a negative voltage which "blocks" the L.F. valve on weak signals. The L.F. voltage on the grid resistance of the diode D2 is applied through condenser C8 to the grid of the EF6. After smoothing, the negative D.C. voltage on the leak resistance controls the grid of the triode section of the first valve. The anode current of this valve flows

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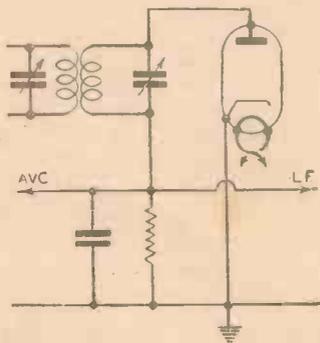


Fig. 1.—The basic circuit for automatic volume control, using a diode.

licated arrangements are also introduced. Fig. 2 shows one form in which this L.F. bias is utilised as described. Another

now as more elaborate schemes are introduced. One of these is amplified A.V.C.

Amplifying A.V.C. Action

Certain simple types of receiver are in use where only two or perhaps three valves precede the second detector. This means that the amount of signal voltage fed to the detector is hardly sufficient to provide enough bias to give control to the valves over the necessary limits required for the counteraction of fading. It is, therefore, necessary to augment the bias carried which is obtained, and this may be carried out by using a separate valve which is so arranged that its normal anode current is used as bias when it is "triggered" or brought into action by the preliminary bias obtained as already mentioned. It will be obvious, however, that this arrangement suffers from the drawback mentioned for the simple scheme, namely, the weakest

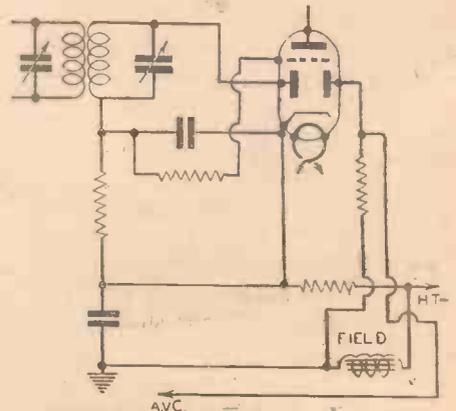


Fig. 4.—This shows one form of amplified and delayed A.V.C.

ON YOUR WAVELENGTH



A Smirch on the Smiths

A READER, signing himself S. Smith, has dropped a full-size blot on the family escutcheon of that famous name. He has sent me a letter without giving his address. I wish he had done so, because I should have liked to have written him concerning a suggestion he makes. He thinks that we should have a repetition of some of our early sets, such as the Fury Four, brought up to date. Mr. Smith signs himself "A Regular Reader," and he should therefore consult his back issues, where he will find that we have consistently modified our old sets when such has been found necessary owing to lack of components or because more efficient components have become available. He thinks that very few people understand theoretical circuits, that we should abolish them and give only wiring diagrams.

We shall, of course, do nothing of the sort, and if Mr. Smith after all these years is still unable to understand a theoretical diagram, wireless has failed to teach him what it should have taught him. Anyone who has been associated with wireless for more than five years, as he claims to have done, and cannot understand a theoretical diagram, cannot lay claim to be a successful amateur.

Another Shack

MR. R. G. PERRY, of Bedminster, has sent me a picture of his shack. He tells me that the mains supply is 220 volts, and that the gear consists of two speakers—one Stentorian and one Blue Spot. The power pack delivers 100 mA at 350 volts, with four outputappings. The short-wave set covers 10 to 160 metres. It is transformer-coupled, utilising three transformers. He has two aerials, both facing E.-W. One is 20ft. high and the other 5ft. high. He keeps a supply of PRACTICAL AND AMATEUR WIRELESS and a bundle of data and interesting articles extracted from issues. The shack is 8ft. long by 5ft. wide and 8ft. high, and contains three benches. What about the photograph of your shack?

Sceptic!

SPECIAL NOTE.—A correspondent recently wrote to me asking if I believed the report that a certain

By Thermion

doctor can hear wireless signals from outside, without the aid of any apparatus whatsoever. My reply was: I dismiss the suggestion with contumely. Torch does ditto!

Doctor of medicine, skilled in arts profound,
What wondrous powers beneath thy hat
are found!

Oh, wonder brain! Dispensing with a set,
Which any programme on the air can
swiftly get!

Straight sets or superhets for you are quite
redundant;

You just "think-in" and programmes are
abundant!

Pray use this gift to aid your healing art.
No longer need we from our domiciles
depart.

But stay indoors when weather's cold and
airy,

Tapping our summons, "I've pain in Little
Mary."

You, being always tuned in, hear our
S O S,

And soon are with us per aerial express!

Ah! Heed them not, the sceptics, basely
born,

Who at thy powers so rudely scoff and
scorn,

And tell the world in language plain and
flat

That you're not listening, but "talking
through your hat"!

Oh, greedy P.M.G.! the doctor's got you
beat;

He needs no licence to hear your pro-
grammes bleat!

A "wireless station" you cannot call his
hat—

He'd soon demand "What are you getting
at?"

He'd look at you in sorrow mixed with
pain,

Put on his hat and listen in again!

Unless, of course, the writer has been
gulled;

The "innocents" so often have their legs
well pulled.

Praps, after all, the sceptic critic's right—
We'll still need sets for listening day or
night.

Unless, of course, the writer has been
gulled;

The "innocents" so often have their legs
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tivity, said to be twenty times more sensitive than ordinary photo-elements.

While the new photo-elements are applicable for a number of purposes, they have so far been used only for the perfection of sound cinematography. The Institute, in conjunction with the "Kinap" (Cinema Apparatus) Works in Leningrad, has turned out a cinema apparatus using the sensitised photo-elements. Excellent results were obtained with the new apparatus when it was tried out at a Leningrad cinema-theatre. The usual noise and crackling was absent in the new photo-elements, due to the fact that they do not require outside electro-motive power, but work by light.

It is said that the new photo-elements will considerably simplify cinema apparatus and lower their cost of production. In the near future ten Leningrad cinemas will be equipped with the new apparatus in order to try them out on a mass scale.

So far the highly-sensitive photo-elements have been produced only at the Physico-Technical Institute, but their mass manufacture is now under consideration.

Pioneer of Wireless Telegraphy

EVERY schoolboy knows that Marconi was the first to exploit wireless telegraphy and wireless telephony. He did not "invent" it. Many years ago when Marconi made a claim for American royalties in regard to wireless, the claim was rejected by the American courts of law on the ground that the transmission of wireless messages had been made by a Russian scientist named Popov before Marconi achieved his successes. In actual fact, Marconi took out his patent for the transmission of signals by means of electromagnetic waves a year after Popov had successfully transmitted messages by wireless telephony.

A. S. Popov was born eighty years ago this month, in the Ural province of Russia. In his early years he had a hard struggle, but finally he managed to get to St. Petersburg University. While studying, he had to work to keep himself and his sisters, and during his last year at the University

he became an electrician. Electric lighting had just been introduced into Russia, and he was responsible for its installation in a number of St. Petersburg cafés and restaurants. Next he obtained a teaching post in the mines school of the Russian Baltic Fleet, but he spent all his free time experimenting in the field of wireless transmission. Success came in 1895, when for the first time he transmitted signals by wireless telegraphy. He proposed that the vessels of the Russian fleet should be equipped with the apparatus he had invented, but the Tsarist admirals were contemptuous of the whole idea. Not even when he successfully communicated from the shore to vessels at sea were they convinced.

Despite these rebuffs Popov and his assistant, Rybkin, who to-day is a leading professor in the Soviet Union, continued with their work of perfecting their invention. And on June 10th, 1899, Rybkin invented telephonic apparatus for the reception of spoken wireless messages.

Chance played a great part in focusing attention in Russia on Popov's work. At the end of 1899 a newly-launched Russian battleship set out from Kronstadt on a world cruise. In the Gulf of Finland the vessel ran on to a rock and stuck fast. Kronstadt was over 150 nautical miles from the scene of the disaster, and if the vessel was to be saved, some urgent means of communication was necessary. Popov's experiments were recalled, he was provided with the necessary financial resources for equipping a wireless station, and from that first wireless telegraphy station over four hundred messages were sent out.

Now Popov's work was given its due recognition. He was made an honorary electrical engineer, and an honorary member of the Russian Technical Society. His portrait and that of Rybkin even found their way on to cigarette and confectionery boxes, and their lectures were more popular than concerts given by celebrated singers. But he did not live long to enjoy his success, for he died in 1906. Some of his early apparatus, including several wireless transmitting instruments, are to be seen at the Leningrad Museum of Communications. And on the eightieth anniversary of his birth his work as a pioneer of wireless telegraphy is being fittingly commemorated in the Soviet Union.

New Two-way Telephone

I AM interested in a new two-way radio telephone just announced by the Western Electric Company for use in police radio cars and fire departments for mobile communica-

Notes from the Test Bench

Battery-Charging

MANY constructors use metal rectifiers in conjunction with a mains transformer for accumulator charging. An important point to be borne in mind in this connection is the current which is permitted to flow, and therefore an ammeter in series with the accumulator should always be used. Some rectifiers are used with a tapping on the transformer, whilst others are used with a variable series resistance, and care should be taken to follow the rectifier makers' instructions regarding the particular circuit adopted, the accumulator makers' instructions regarding the current used during charging, and the hours during which the cell is allowed to remain on charge.

Fuses

IN view of the valuable protection offered by fuses, they should be more commonly employed in experimental apparatus. It is important, however, to select those which have a suitable rating for the circuit which they are designed to protect. Another point of interest is that, although they offer protection, if too many are included in a piece of apparatus, some difficulty may be experienced when one "blows" due to the difficulty of finding which one has broken down. It may be necessary to make several tests to locate the fault owing to the inclusion of too many fuses and therefore the circuit should be so wired, and an appropriate fuse used, that maximum protection is afforded with the minimum number of fuses.

Transmitting Coils

PLATE or tank coils for transmitters must be wound to high efficiency and in some cases it is recommended that tubular coils be wound—that is, coils in which the windings are made from copper tubing. Whilst $\frac{3}{8}$ in. tubing is suitable for small powers, it is sometimes recommended that $\frac{3}{4}$ in. or $\frac{1}{2}$ in. tubing be employed in the interests of rigidity and large conducting surface. When endeavouring to wind such tubing in a neat coil, bends or even cracking may take place, and therefore some steps should be taken to maintain the round cross-section of the tubing during the winding process. The simplest way of doing this is to fill the tubing with silver sand, plugging the ends so that the sand cannot be forced out. Wind the coil very carefully, easing the turns round the former, and afterwards empty out the sand by removing the plugs and rotating the coil whilst it is held at an angle.

tion. Because of its remarkable efficiency, they claim that the new equipment promises to extend the protection of short-wave radio telephone to hundreds of communities.

Police officials and technical experts who witnessed trials of the system in New York, Kansas City and other metropolitan centres have commended engineers of Bell Telephone Laboratories on the excellence of the communication. Although these tests were conducted under the most unfavourable conditions likely to be encountered, the voice came through clearly and with good volume.

I understand that two major improvements account for the new instrument's performance. First, its output has been stepped-up to fifteen watts—three times as much power as used previously. Yet almost no increased demand is made on the car's storage battery. This high efficiency is made possible by the introduction of several recently developed circuits including a coupling arrangement which transfers almost 100 per cent. of the energy from the high-frequency valves to the aerial.

The second and equally important improvement, in effect, peels the envelope of noise from around all incoming speech. Three elements in the receiving set combine to achieve this automatically. The first is an electrical network or equaliser which blocks out most electrical interference. Secondly, an improved automatic-volume-control maintains the speech at a constant level. The most interesting innovation, however, is a new type of vacuum tube relay used in the "codan" circuit.

Carrier waves from the distant station actuate this device. In the absence of a signal, the codan shuts off the output of the receiving set. As a result, almost no sound comes through the hand-set receiver or loudspeaker except during periods of transmission. Unwanted sounds, such as ignition noise created by passing motor-cars, or similar forms of electrical disturbance, produce negligible action in the codan.

Thus, in effect, the "voice" of the transmitter is made stronger and the receiving set becomes more sensitive to the voice and the voice only.

The transmitter and receiver are built in the form of two compact units which slide into slotted mounting plates attached to the floor of the car's luggage compartment. This method of installation permits either unit to be interchanged easily between various cars of a fleet or to be quickly removed to the maintenance shop for inspection.

CAR-RADIO CONTROLS

In this Article Constructional Details are Given of Practical Direct and Remote Control Systems for Car - radio

THOSE readers who have made their own car-radio, or who contemplate doing so, may have had some difficulty in arranging the controls, and a suitable scale to indicate the stations.

Most car sets are mounted under the dashboard just over the passenger's feet, and to fix a scale on the front of the set with a volume control and possibly wave-change switch is not easy. Unless a very small speaker is used there is not much room left without making the set casing bigger than need be.

Controls in commercial sets are usually at one end, and flexible cables are used, but having experimented with speedometer cables I found them unsuitable and failed to get anything but a very jumpy movement. To mount an ordinary dial or circular scale on the end of the set means putting it in a place extremely difficult to see.

After trying many ideas, I eventually found two ways of doing the job, both easily made and effective, one being direct control on the set, and the other a form of remote control, the cost in either case being very small.

Direct Control

To deal with the direct control first, a glance at Fig. 1 will give a general idea of the arrangement.

The controls are at the right-hand side of the set, and the long straight scale has a

cut about $\frac{3}{16}$ in. wide. The open end of the drum is towards the outside, and has a gear wheel, about $1\frac{1}{2}$ in. diameter, fixed on the same centre, but about $\frac{1}{2}$ in. from the drum. This is illustrated clearly in Fig. 3.

The gear and the drum are soldered to a piece of tube about 1 in. long, with a grub screw to secure it to the condenser spindle,

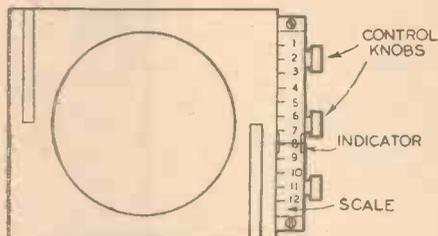


Fig. 1.—Showing the application of the direct control arrangement to a car-radio.

a piece of larger tube acting as a distance piece between the drum and the gear.

Four grooved pulleys are provided for the cord to travel over, their positions being shown in Fig. 2 by "BB" and "C.C."

A scale of white celluloid, $\frac{1}{2}$ in. wide, is fixed by brackets near to top of the case, and has a piece of tin bent along the bottom and over the top edges to act as indicator (see "A," Fig. 3), a wire soldered on the top making a hair line.

A brass bar pivoted at one end, and with a tension spring at the other, is fitted just clear of the drum, and has a bush in the centre in which revolves a pinion to drive the gear wheel, the arm and tension spring keeping them always in mesh without backlash.

Driving Cord

The indicator is driven by a length of fishing line (20ft. for 3d.), one end having a knot and passing through the drum; it then travels half-way round, over two pulleys and under the reverse side round to the reverse side of the drum. This end also passes through a hole and is tied to a tension spring inside the drum. This is necessary to keep the cord tight, otherwise the indicator would jump.

If the indicator is made a very easy fit on the scale, turning the pinion will drive the condenser and the indicator quite smoothly.

The gear and pinion were taken from a clockwork train; clock gears would answer equally well. The pinion needs to be soldered into a piece of $\frac{1}{4}$ -in. brass rod to take a standard knob.

Having got this mechanism fitted up and working, it is only necessary to fit a cover, which is secured by two screws and nuts with distance-pieces; these are not shown in the drawings.

Illumination

If internal illumination is required, flash-lamp bulb-holders can be fitted where convenient, and wired to the battery leads; if the tuning condenser is not in the centre, then the pulleys may have to be shifted, but this is easy to arrange. The sharp edges round the holes in the drum should be removed, otherwise the cord may cut through.

After several months use the device is thoroughly satisfactory.

The same idea can very well be applied to the home set, by lengthening the cord, a scale being put at the top of the cabinet, similar to some of the latest commercial sets, and no doubt other applications will suggest themselves to readers.

Remote Control

The other device is a form of remote control by means of two rods, the set being mounted under the dashboard and the control panel screwed to the dashboard itself. The connection between them can be a piece of $\frac{1}{4}$ -in. diameter tube which controls the tuning, and a $\frac{1}{8}$ -in. diameter rod, running inside the tube, to control volume, and on-off switching. This is quite a neat job and works excellently.

Wave-change switching, if separate from the other controls, is best left for direct operation on the set itself, being only occasionally used.

There are a number of novel points in the design, one being that the set is very easily removed for servicing, leaving the controls on the car. Both tuning-condenser and volume control project at the end of the set, and bevel wheels are used to reverse the motion to right-angles.

The details of the arrangement are given in Fig. 4. The four bevel wheels are mounted on a simple frame consisting of a piece of metal bent to the shape shown at

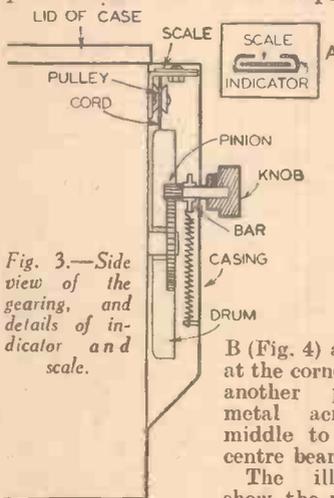


Fig. 3.—Side view of the gearing, and details of indicator and scale.

B (Fig. 4) and joined at the corner. It has another piece of metal across the middle to act as a centre bearing.

The illustrations show the method of mounting the wheels, and also the springs to keep them in mesh without backlash. The making and assembling of this fitment is a simple mechanical job. When finished, it is screwed to the box, and the bevel wheel screws tightened to the component spindles. A simple cover finishes this part, which is just a gear box.

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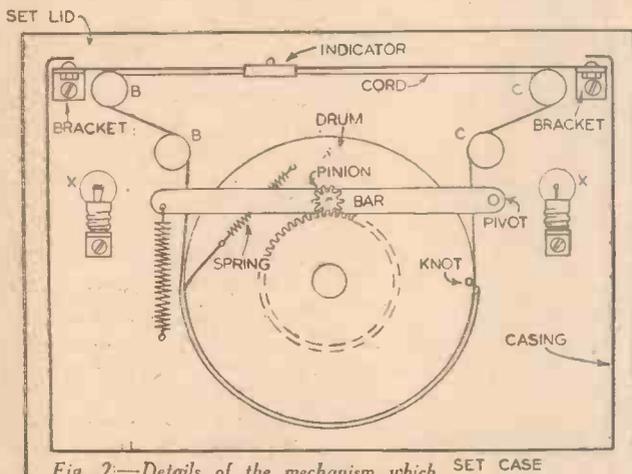


Fig. 2.—Details of the mechanism which is mounted on the side of the receiver casing.

pointer moving up and down. The pointer is driven by a cord, but the tuning condenser is gear driven, and has no backlash; also it never slips.

This arrangement has proved excellent in practice, and even our worst roads fail to make the tuning slip.

In my case the tuning condenser is in the centre, but it can equally well be at one side if needed; the other controls merely have extended spindles and ordinary knobs.

Fig. 2 shows the mechanism which is mounted on the end of the casing, a thin box-like cover being slipped over for appearance, and to keep dust out.

On the end of the condenser spindle is mounted a drum about 3 in. diameter, nine being the top of an old coil-screen

CAR-RADIO CONTROLS

(Continued from previous page.)

Control Panel

The control panel is fixed to the dashboard, and everything is mounted on one sheet of metal, a cover on the back enclosing the whole.

A piece of $\frac{1}{4}$ in. diameter tubing long enough to reach from the panel to the tuning condenser is fitted at one end with a disc about 2in. diameter; this should be about $\frac{1}{4}$ in. down the tube.

The panel plate has a $\frac{1}{4}$ in. hole in the centre to take the projecting end of the tube.

This disc is driven by the friction device shown at "C," Fig. 4, and is the usual method used in radio, and needs no description.

After the $\frac{1}{4}$ in. tube complete with disc is put through the hole in the plate a pointer is soldered to the top of it, and travels over a scale stuck on the top of the plate. The whole is covered by a celluloid or glass cover.

In the writer's case an old watchcase was taken, cut in half and soldered to the top of the plate, the cover of the watch, complete with glass, was then clipped on to it in the same way as it was put on to the original watch.

This glass or celluloid cover has a hole in the centre through which protrudes the inner volume control rod, which is fitted with a knob.

By fitting another pointer to this rod before fitting the glass cover it can work on the bottom half of the scale to indicate the volume setting, as shown at A, Fig. 4, and

square tobacco tin provides the right size and shape.

If the watch cover to be used has a glass face it would be best to scrap the glass and have a celluloid one fitted by a local watchmaker. Glass can be drilled but it is a very delicate job. Celluloid can be easily drilled.

Should internal illumination be required, drill a ring of small holes about $\frac{1}{4}$ in. diameter just inside the half watchcase and fit a motor-car direction indicator bulb behind the plate; this will be found to provide ample light for tuning in the dark.

The direct control which is in use at the present time cost, apart from knobs, threepence for fishing line to drive the indicator; the pulleys are grooved wheels as used on curtain rails, and can be obtained

at any sixpenny store.

The bevel wheels in the other device are taken from a well-known mechanical toy.

A. L. J.

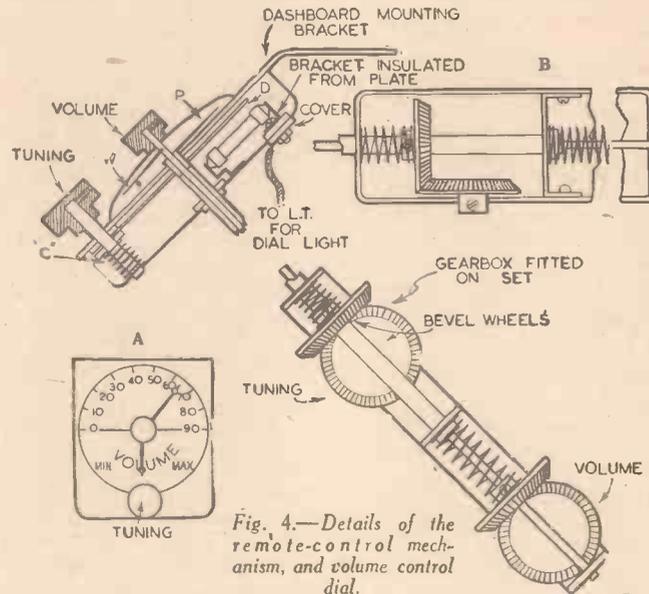


Fig. 4.—Details of the remote-control mechanism, and volume control dial.

by making the pointers different lengths it would have the appearance of a clock.

A metal cover fixed to the underside of the plate encloses the control panel, and a

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, July 12th.—Don Pasquale, Act 1, from Glyndebourne.

Thursday, July 13th.—Lucky Dip, light entertainment.

Friday, July 14th.—French Revolution, feature programme.

Saturday, July 15th.—Blackpool Tour, light entertainment.

REGIONAL (342.1 m.)

Wednesday, July 12th.—Strength of the Land, a programme in praise of the English village.

Thursday, July 13th.—Week-end Return, a musical comedy.

Friday, July 14th.—Concert Party programme.

Saturday, July 15th.—Marseillaise, a play.

MIDLAND (296.2 m.)

Wednesday, July 12th.—Strength of the Land, a programme in praise of the English village.

Thursday, July 13th.—A programme from the Library of St. Michael's College, Tenbury: orchestral and choral music.

Friday, July 14th.—A programme of unpublished works by Domenico Scarlatti.

Saturday, July 15th.—Choral programme.

WELSH (373.1 m.)

Wednesday, July 12th.—Choral programme.

Thursday, July 13th.—Revue of Summer (A Summary Review).

Friday, July 14th.—Silver Screen, a panorama of the early days of the cinema in South Wales.

Saturday, July 15th.—A talk by T. Richards.

WEST OF ENGLAND (285.7 m.)

Wednesday, July 12th.—Variety programme from the stage of the Palace Theatre, Plymouth.

Thursday, July 13th.—The Last of the Waterwitch: an account of the last square-rigged merchant vessel to fly the Red Ensign.

Friday, July 14th.—National Swimming Championships of England: a commentary on some of the Finals from the Minehead Swimming Pool.

Saturday, July 15th.—Instrumental programme.

NORTHERN DIALECT POEMS WANTED

THE B.B.C. in the North Region is inviting the public to take part in yet another broadcast programme, though this time the invitation is to writers of Northern dialect poetry. D. G. Bridson, feature programme producer, and himself a poet, is again arranging a programme called "The Northern Muse"—a Dialect Poetry Festival of radio, to be broadcast on the main Northern and the Stagshaw wavelengths on Monday evening, July 31st, between 8 and 8.45. He requires contributions of dialect poems for possible inclusion in this broadcast, and it is hoped that verses will be received from all the counties in the North Region; Yorkshire, Lancashire, Durham, Northumberland, Cumberland, Westmorland, Lincolnshire, Derbyshire, Cheshire, and the Isle of Man.

The poems, which should not take longer than three minutes to read, must be original, though they may have been published. There is no restriction as to subject, but it may be pointed out that in the past humorous recitations have flowed in strongly, whilst little serious poetry, a class of contribution which will be particularly welcomed, has been submitted.

Dialect poems should be sent to the B.B.C., Broadcasting House, Piccadilly, Manchester, 1, marked "Northern Muse."

NORTHERN (449.1 m.)

Wednesday, July 12th.—Public Enquiry: Sunday Games and Sunday Cinemas.

Thursday, July 13th.—Organ recital from Chester Cathedral.

Friday, July 14th.—Reconstruction of the Manorial Court, from Bayte Court, Bridlington.

Saturday, July 15th.—Boy Scouts' Sing-Song from Gosforth Park, Newcastle-upon-Tyne.

SCOTTISH (391.1 m.)

Wednesday, July 12th.—Antrim Days: A reminiscent programme of events in Scotland during the year 1896.

Thursday, July 13th.—Strike up the Band! New series—No. 1.

Friday, July 14th.—Band programme.

Saturday, July 15th.—Orchestral programme.

NORTHERN IRELAND (301.1 m.)

Wednesday, July 12th.—Dance Music from the Palladium Café and Ballroom, Portrush.

Thursday, July 13th.—Triple Bill: Julia Elizabeth, a comedy by James Stephens; Concerning Plate, a play by John Bailie, and Mrs. McAllister reads the News, a sketch by Anna McClure Warnock.

Friday, July 14th.—The Second Concert of Ulster Festival Prizewinners.

Saturday, July 15th.—Flute and Accordion Bands.

An Improved Variable Selectivity Circuit

The System Described Incorporates a Three-winding I.F. Transformer, with Suitable Switching Arrangements

IT is now the practice in high-fidelity receivers to provide a switch for the purpose of varying the selectivity of the high- or intermediate- frequency circuits, so that when the station being received is very strong, compared with interfering stations, it is possible to make the selectivity of a low order so that the high frequencies in the transmission are not removed by sideband cutting. When weak stations are being received it is necessary to turn the switch to the position

of maximum selectivity in order to avoid interference from stations on neighbouring channels. With such receivers it is rather difficult to tune in the required station when the switch is in the non-selective position, due to the flat-topped characteristic of the tuned circuits.

The Radio Corporation of America have designed a very interesting and simple method of avoiding this difficulty. In brief, the method consists in providing a three-winding intermediate-frequency transformer with a suitable switching arrangement for obtaining varying degrees of selectivity, a resistance being connected in series with one of the windings and being so arranged that the resistance is shorted out during the tuning operation by means of a switch operated by the tuning knob so that for all positions of the selectivity switch, a single peak characteristic is obtained thereby making the tuning very accurate.

control of the network 8, which imparts to the amplifier a predetermined selectivity characteristic, and is adjustable to provide differing degrees of selectivity in any desired number of steps in each of which a sharp peak may be produced to provide a sharp tuning response.

Coupling Network

The coupling network is arranged to provide the sharp response or peak referred to for tuning purposes regardless of the selectivity adjustment for normal reception of signals, and comprises a transformer having three windings 22, 23 and 24 arranged in axially parallel relation to each other as indicated, to provide electromagnetic coupling between the coils or windings 22 and 23 and electro-magnetic coupling between the coils 23 and 24 as indicated. The inductance of each of the windings is adjustable by means of magnetite movable cores and each winding is tuned to substantially the same intermediate frequency by shunt tuning capacitors 26. A resistor 27 connected between the third winding 24 and the tuning capacitor 26 therefore is normally connected in series with the tuned circuit as shown, but may be shorted out by a switch 28 for reasons which will be explained later.

The second winding 23 is connected in circuit with a fourth winding 30, and a switch 31, providing additional electromagnetic coupling between the circuit including the coil 23 and the first coil 22, the degree of coupling being controlled by the switch 31. In the position shown, the switch 31 is connected to eliminate the winding 30 from the circuit of the second coil 23 and provides two additional coupling steps, including a portion and all of the coil 30 in the circuit with the winding 23 and the shunt capacitor 26, and correspondingly decreased selectivity for the coupling network.

The winding 22 and shunt capacitor 26 provides a tuned output anode circuit for the first amplifier 7 and may be considered as the primary winding of the transformer. The winding 23 and the tuning capacitor

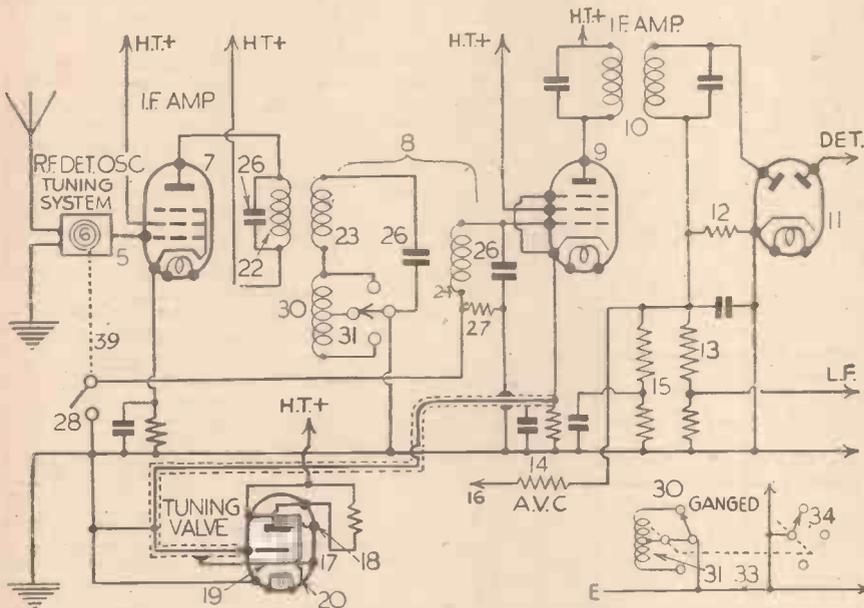


Fig. 1 (above).—Main circuit details incorporating the selectivity scheme mentioned in this article, and Fig. 4 (right) a modification for switching purposes.

of maximum selectivity in order to avoid interference from stations on neighbouring channels. With such receivers it is rather difficult to tune in the required station when the switch is in the non-selective position, due to the flat-topped characteristic of the tuned circuits.

The Radio Corporation of America have designed a very interesting and simple method of avoiding this difficulty. In brief, the method consists in providing a three-winding intermediate-frequency transformer with a suitable switching arrangement for obtaining varying degrees of selectivity, a resistance being connected in series with one of the windings and being so arranged that the resistance is shorted out during the tuning operation by means of a switch operated by the tuning knob so that for all positions of the selectivity switch, a single peak characteristic is obtained thereby making the tuning very accurate.

Oscillator Tuning System

Referring to Fig. 1, a radio receiving system is shown comprising the usual radio frequency detector, and oscillator tuning system, indicated in the rectangle 5, and provided with a manual or other suitable tuning control element 6. The tuning system supplies intermediate-frequency signals to an intermediate-frequency ampli-

fier tube 7, which is coupled through a coupling network 8 with a second intermediate frequency amplifier tube 9 which, in turn, is coupled through a suitable tuned intermediate frequency output transformer 10 with the second detector 11.

Rectified signals from the detector appear across the output resistor 12, supplied through a resistor network 13, 14, and 15, to a suitable audio-frequency amplifier (not shown), an automatic volume control circuit 16, and a tuning indicator tube 17.

Signals applied to the intermediate frequency amplifier are subjected to the

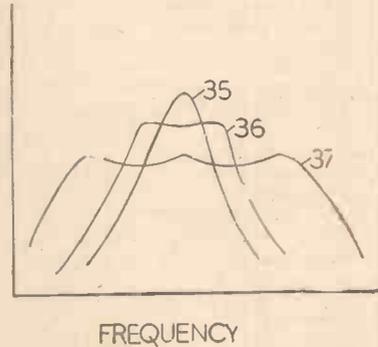
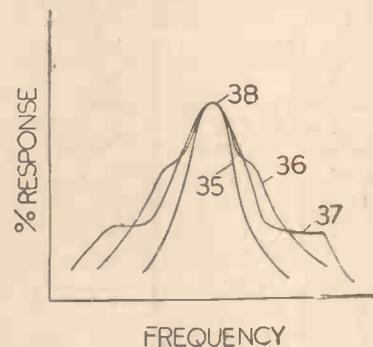


Fig. 2 (left) and Fig. 3 (right).—Curves showing the effects of the variable selectivity device on tuning.

26 together with the winding 30, when in circuit, provides an intermediate secondary or tuned link circuit for transferring energy from the input or primary winding 22 to the output, or tertiary winding 24, which is connected to the grid circuit of the second amplifier 9.

(Continued on page 420)

AN IMPROVED VARIABLE SELECTIVITY CIRCUIT

(Continued from previous page)

The transformer arrangement shown is known as a three-circuit intermediate frequency coupling transformer having input, intermediate, and output tuned circuits and additional variable or adjustable coupling between the intermediate and input circuits, and resistance damping for the output circuit co-operating to vary the selectivity characteristic of the network in a pre-determined manner. This characteristic with resistance in the tertiary, or output circuit, is as shown in Fig. 3 by the curves 35, 36 and 37 for three degrees of selectivity as provided by the switch 31, the curve 35 being the response characteristic for the network with the switch 31 in the position shown in the drawing. It will be seen that, except for the curve 35, the response for the two lesser degrees of selectivity is flat topped, and such that an accurate tuning response to a signal tuned in is not possible. It is necessary, ordinarily, to increase the selectivity by reducing the coupling through the switch 31, to provide the response characteristic shown by the curve 35 in order that the tuning indicator valve may indicate accurately an exact resonance with a received signal. By damping the circuit by resistance means, as shown, the desirable response characteristic for signal reception with high fidelity is provided.

Damping Resistance

As shown in Fig. 3, it has been found that the curves 36 and 37 may be made to assume a sharp peak corresponding to the peak of the curve 35, by controlling the same damping, resistance 27 provided in the tertiary circuit for the broad tuning response. For example, when the switch 28 is closed to short circuit the resistor 27 in the tertiary circuit, the response characteristic assumes the peaked form shown in Fig. 2 for the three degrees of selectivity shown by the curves 35, 36 and 37. It will be seen that all of the curves have a peak characteristic 38 providing sharp tuning indication at resonance without necessitating changing the selectivity characteristic of the interstage network by operation of the switch 31.

The switch 28 may be a simple single-point switch which may be moved to the closed position for tuning, by a suitable connection with the tuning control element 6 as indicated by the dotted line 39 in Fig. 1. The intermediate circuit is earthed, and the resistor 27 is short-circuited by earthing the resistor at the opposite end through a single circuit connection 30. With this arrangement, the resistor 27 is momentarily shorted out, during the tuning operation to provide the sharp tuning response, and the overall selectivity adjustment remains unchanged in whatever position it is adjusted for. The response is then restored to normal as shown in Fig. 3 upon releasing the tuning control element by causing the switch 28 to open.

The coupling network shown may be applied between other amplifier stages in a similar manner, the single coupling network being shown in the present example in order to simplify the drawing and the description.

Referring to Fig. 4, along with the preceding figures, the circuit of Fig. 1 may be modified as indicated, to provide a switch 34 corresponding to the switch 31 in the number of contacts or operating positions, and conjointly controllable therewith to connect the lead 33 to earth for the position of the switch 31 corresponding to the highest degree of selectivity.

This arrangement, in effect, is the same as permanently closing the switch 28, and making it unnecessary to operate the switch 28 when tuning, when the highest degree of selectivity is desired. This is possible for the reason that the curve 35 in Fig. 3 is only slightly broader than the same curve in Fig. 2, thereby providing substantially the same fidelity.

While three degrees of selectivity are provided in the system shown, additional contacts may be provided with suitable connections to coupling windings in the coil 30 to increase the number of steps in the selectivity adjustment. Where a greater number than that shown are provided in the circuit, it is desirable to utilise the circuit of Fig. 4 for the most selective position of the control switch, in order to eliminate the necessity for actuating the switch 28 when manually tuning for distant stations.

Leaves from a Short-wave Log

Good Signals from Costa Rica

ON a recent evening a broadcast from TIEM, San José (Costa Rica), was logged on 29.87 m. (10.042 mc/s). The call was: *La Voz de Alma America*, and the interval signal heard consisted of four chimes struck every 15 minutes. TTPG, *La Voz de la Victor*, in the same city, which could not be traced on its habitual channel, was finally found to be working on 31.21m. (9.612 mc/s).

Another Mystery Station

ON many evenings a station of which the exact location is kept secret may be heard broadcasting in several European languages on 29.88 m. (10.04 mc/s). The purport of its broadcasts is anti-Soviet propaganda.

Athlone Logged in U.S.A.

EXCELLENT reception is reported from various parts of the U.S.A. of transmissions from Radio Eireann (Moydrum), on 16.82 m. (17.84 mc/s). The station broadcasts a news bulletin in the English language nightly at B.S.T. 22.30.

First German Radio Relay from Steamer

THE Munich transmitter recently carried out an interesting experiment with a small motor-launch on Lake Constance. The motor-boat *Allgau* when crossing the lake broadcast a two hours' concert by means of a small 40-watt installation. The signals were picked up on a receiver at Lindau, conveyed by landline to the 100-kilowatt Munich transmitter and thence re-diffused.

International Concert No. 7

THE *Union International de Radio-diffusion* has made all arrangements with the Brazilian broadcasting authorities for the transmission of a special radio programme of international interest to take place in the spring of 1940. The broadcast will be relayed to stations in North, South and Central America and to most of the important European transmitters.

Another Shanghai Broadcaster

A CORRESPONDENT writes that he has picked up a broadcast news bulletin in English emanating from a new Shanghai (China) station on 11.81 mc/s (25.4 m.). The call-sign, he believes, was XVOK. This would appear to be the 18-kilowatt transmitter registered in official lists as XGBC on 11.801 mc/s (25.42 m.).

Short-wave Stations of Honduras

OF the three short-wavers in the Republic of Honduras (Central America), HRN, in the capital city, Tegucigalpa, is the best heard. The station works on 51.06 m. (5.875 mc/s) with a power of 500 watts, the call being *La Voz de Honduras*. HRD2, *La Voz de Atlántida*, at the port of La Ceiba on the Atlantic coast, operates on 48.12 m. (6.235 mc/s), 250 watts. The broadcasts open with a marimba foxtrot, *Solo Tuyo*, and close down with that popular melody, Ted Lewis' *Good Night*. At San Pedro Sula there is also a small 100-watt transmitter HRP1, *El Eco de Honduras*, on 47.24 m. (6.351 mc/s), but it does not appear to have been heard in the British Isles. The distance between Honduras and London is roughly 5,000 miles.

C.E.A. EXHIBITION

EACH year the Cinematograph Exhibitors' Association holds an exhibition and conference at a well-known holiday resort, and all the latest developments in cinema equipment are featured. This year is no exception to the rule, and with Blackpool chosen as the venue for activities a preview was arranged on the Sunday so that any projectionists who are normally employed during week days could have an opportunity of examining the exhibits. The only big-screen television receiver to be shown was the Baird set on the Gaumont British stand. This is the latest form of the twin cathode-ray tube projector as installed at the New Victoria Cinema, London, and scheduled for a number of other cinemas within the London service area. It incorporates certain improvements in design when compared with the earlier big-screen models, but still employs the cathode-ray tube whose screen is obliquely scanned and whose front surface brilliance is projected directly on to the 15ft. by 12ft. silver screen. The latest form of lens is 12½ins. in diameter, having an f/2 aperture. This is made by Taylor, Hobson, who at the C.E.A. exhibition made a special feature of the construction on their stand. Bearing in mind the attitude of the C.E.A. and K.R.S. to television in general it will be interesting to learn later what were the nature of the discussions that took place on this vital topic.

NOW READY!

WORKSHOP CALCULATIONS,
TABLES AND FORMULÆ

By F. J. GAMM

3/6, by post 3/10, from George Newnes, Ltd.,
Tower House, Southampton St., London, W.C.2.

A PAGE OF PRACTICAL HINTS

**SUBMIT
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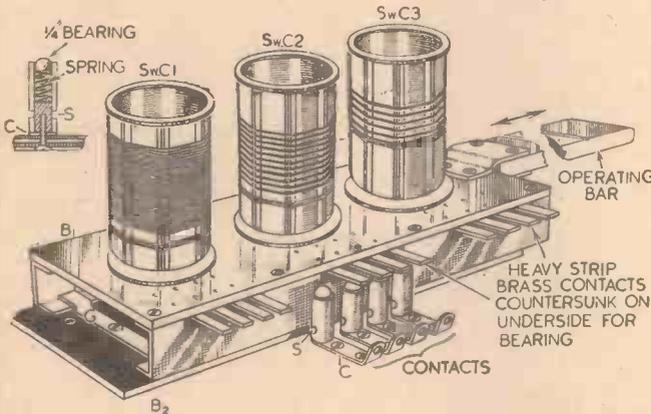
READERS WRINKLES

**THE
HALF-
GUINEA
PAGE**

A Novel Coil Switching Unit

WISHING to incorporate a new short-wave receiver in a cabinet on its completion, and in view of the fact that I am using plug-in coils, I decided to try my hand at constructing a switching unit in which the three plug-in coils could be permanently fitted. The accompanying illustration shows the scheme adopted, and from this it will be observed that a minimum of wiring results, whilst to reduce the tendency of contact noises, the bearing movement has a continually self-cleaning action on the brass contact segments.

The three coil-holders are mounted first of all on an ebonite base (B1), which is drilled and tapped for the contact pieces at equidistant points relative to each coil. This base is fitted to the aluminium (16 gauge) runners by 6B.A. bolts and nuts, whilst for the push-pull control I have cleated a strip of ebonite, previously buffed



A coil switching unit to avoid coil changing.

down, the cleats being easily made from some odd brass pieces handy at the time.

To ensure a smooth action in the push-pull control, I then mounted another ebonite base (B2), this time directly on the wooden baseboard of the receiver, thus by bending three aluminium strips to act as guides (G)—one of which is clearly depicted—the completed coil chassis or unit would freely slide from one position to the other when wave-changing, whilst white lines made in the control bar indicate the exact position of the switching.

The inset diagram shows the construction of the four bearing contacts which are wired to the receiver, and there are one or two points here which need enlarging. A reasonably light spring is used under each ball bearing so that when the last contact in each instance is passed, the bearing will not spring out of the brass tube, and for the same reason, and to allow the tension of the spring to be such that a good contact (electrically) is obtained, the bearing in each assembly is well recessed.

A hole drilled through each tube is provided so that the brass plug, which is tapped for the baseboard mounting screw, may be finally soldered in; this is depicted by (S).—E. R. ADAMSON (Smethwick).

THAT DODGE OF YOURS!

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.

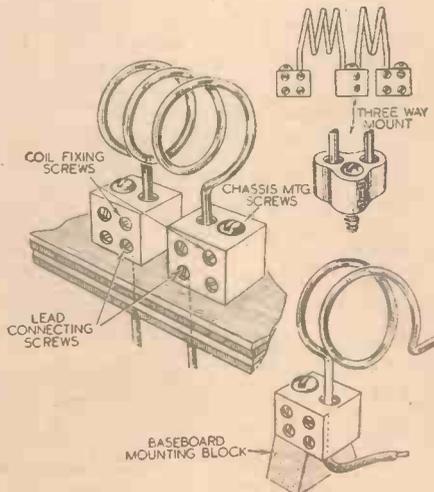
SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page iii of cover.

U.S.W. Coil Mounts

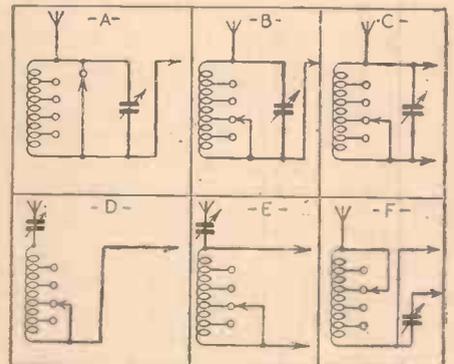
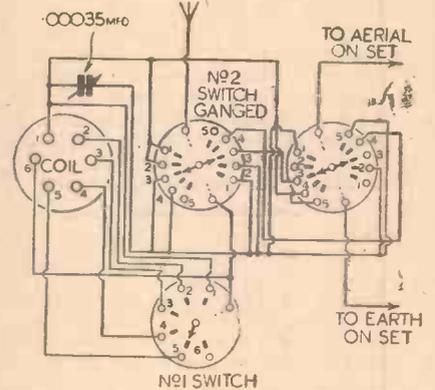
THE accompanying diagrams show an improved and cheap form of mount-

ing for ultra-short-wave coils. It will be seen that porcelain cable connectors are used. This form of mounting besides being cheaper is, I have found, very versa-



Home-made U.S.W. coil mounts

tile in its application. It can be used in many varying situations, both for chassis and for baseboard work. Also, the changing of inductances, and leads to the in-



Connections and circuit combinations which are possible with Mr. Marchant's 6-in-1 wave-trap suggestion.

ductances, is an easy matter, as is the coupling of one coil to another.

The diagrams show several ways in which this form of mounting can be used.—J. SEARS (Potters Bar).

A 6-in-1 Wave-trap

THIS "six-in-one" wave-trap is very compact, and is useful for eliminating code and other interference, and increases range, selectivity and volume. The two six-prong coils, which cover from approximately 20 megacycles to 465 kilocycles, are wound as follows:

Coil 1.—150 turns of 28 gauge enamelled wire close wound and tapped at every thirtieth turn.

Coil 2.—30 turns of 20 D.C.C. tapped at every sixth turn and space wound to cover approximately 2ins.

Switch No. 2 is a two-gang unit having four separate circuits, each circuit consisting of five contacts. Switch No. 1 is a single unit.—E. C. V. Marchant (S.E.26).

READ "THE CYCLIST"
2d. Every Wednesday.

TELEVISION SERVICE AREA MAP

A Valuable Guide for the Listener, Service Man, or Dealer who is Interested in the Present Television Transmissions

AS announced last week, the Radio Manufacturers' Association have prepared a map showing clearly the area of reliable reception which is served by the present television transmitter at the Alexandra Palace in North London. The map, which is printed on good stout paper, measures approximately 31in. by 28in., and below we give a reproduction showing some of the more important places which are included in the area. The original map gives many more place-names, but these have been deleted so that the reproduction would be legible. It will be seen that there are two shaded areas, the outer light area denoting the limit of reliable reception, and the inner small dark areas outlining places where difficulties have been experienced due to particular local conditions.

The circular rings are indications of

10-mile steps from the transmitter, and it will be seen that the original estimate of 25 miles as a reliable distance for reception has been considerably exceeded. On the other hand, at only 10 miles in a south-westerly direction—at Brentford—an area of indifferent reception is met.

What It Shows

The R.M.A. make the following observations regarding this map, which, as already mentioned, will enable dealers to prove to their customers that they are definitely in a reliable area or to otherwise provide convincing sales talk. It also enables those who are at present doubtful regarding the value of television to see whether or not they should take advantage of the existing programmes. "It proves that, if it is desired to quote a round figure

for the effective radius of the television station, a figure of 40 miles can safely be used.

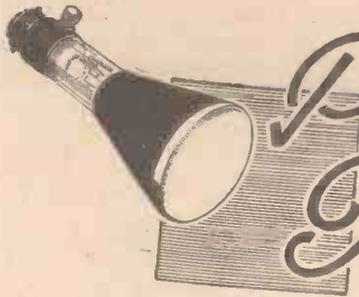
"Areas where reception may be unsatisfactory due to local characteristics are indicated in a distinctive colour in order to assist dealers in explaining the circumstances to potential customers, who, although within the outer boundary of the map, live in a house, road or district where the signal is not satisfactory.

"It is, of course, impossible to lay down a hard-and-fast line between the area where reception is satisfactory, and that where it is unsatisfactory, so the outer boundary has been indicated by a broad shading covering an area roughly five miles wide."

Copies of this map are available from the R.M.A. at 59, Russell Square, London, W.C.1, at 2s. 6d. each.



A reproduction of the R.M.A. Television Service Map. The original map shows many more place-names, these having been deleted on the above map for clarity.



Practical Television

July 15th, 1939. Vol. 4. No. 160.

More Teething Troubles

SOME of the television teething troubles which America is experiencing after two months of experimental transmissions furnished by one company are due directly to antagonism from cinema interests. The supply of standard talking films does not appear to be forthcoming at the moment, with the result that the technicians have turned their attention to the design of film transmitting equipment capable of using 16 m.m. films. Judging from American reports it would seem that if the film distributor companies could visualise a really lucrative rental market for their films they would not be averse to a measure of co-operation with television interests, but their greatest fear is associated with the reaction of the exhibitor to the adoption of such a policy. It is for this reason that the Hays Television Committee is content at the moment to hold a watching brief in the hope that any commercial developments which do materialise will be satisfactory to both sides. It is not yet known whether the use of 16 m.m. film has occurred to the B.B.C. as a way out of the impasse which exists in this country. If not, then the possibilities should be explored, for there is no doubt that carefully-selected films form an admirable alternative in television programmes, and English-speaking films are to be preferred to continental ones with English sub-titles. There is no doubt that certain film interests show willingness for co-operation, and quite recently the Paramount Company, who have acquired a major interest in the Du Mont Television Laboratories, stated that in their opinion television contains no threat to motion pictures. They incline to the belief that it will afford a new outlet for the brains and genius of the picture industry, be an adjunct to the film business and not a competitor, and in the big towns and cities provide a new source of theatre revenue through the medium of big screen installations.

Spontaneous Appreciation

IF any further evidence was required of the value of outside broadcasts in connection with big screen television presentation in cinemas, this was readily forthcoming on the occasion of the return of Their Majesties after visiting North America recently. At each of the five London cinemas where equipment was installed, large audiences had assembled for the actual broadcast from 5.15 p.m. to 6.15 p.m. In spite of an overcast sky the two B.B.C. outside broadcast units at Waterloo Station and Buckingham Palace provided some really excellent pictures, although from time to time defects were apparent. With one camera horizontal bands moved up and down the picture, and this was apparently due to synchronising pulses actually becoming superimposed on the vision modulation. With another camera a large dark area was prominent, but as this usually coincided with the sky it introduced no prime difficulty. The

spontaneous applause rendered by the audience when the King and Queen arrived and were seen by television on the big screens, however, was a gratifying indication of the way in which the audience appreciated that this was an actuality transmission and they were participating in a scene the intimacy of which was only made possible by this latest of inventions. When the scene was faded over to Buckingham Palace, not only did the powerful 20in. telephoto lens fitted to one of the super Emitrons give a memorable close-up of the Royal Family on the balcony, but also sections of the crowd which unwittingly provided humour for the occasion. The whole production was carried out in a first class manner and calls for praise to those responsible for the organisation. With reference to the actual equipment employed

in the cinemas the accompanying illustration is interesting, for it shows the dual high tension units as installed for the Baird apparatus at the Marble Arch Pavilion. Safety catches on the doors prevent the E.H.T. cubicles from being entered, while the electrical supply is alive, and each unit is capable of furnishing a current of 10 milliamperes at 60,000 volts for full output. Technical data concerning this part of the equipment was furnished in a recent issue of

PRACTICAL AND AMATEUR WIRELESS, and all L.C.C. regulations have been complied with to ensure that the installation is foolproof.

A Deaf Aid

ON more than one occasion these columns have recorded news items where the value of television reception has been brought to the fore as a deaf aid. In those cases where any affliction of the hearing is present the person concerned is, as a rule, an expert reader of the lip language. The televised pictures as shown on a good quality home receiver, especially with close ups, enable a deaf viewer to enjoy programmes denied him by ordinary broadcast radio. It appears however, that this is regarded as a *new discovery* by America and accounts have already appeared in the press showing how this opens up a new vista. One particular aspect which was stressed was the value of an internal television system in those business houses where members of the staff are deaf. Visual telephonic conversations could then be undertaken

and so avoid the necessity for writing messages or using an intermediary as interpreter.

Where Is That Report?

THE Postmaster-General is still receiving deputations from bodies whose interests are allied to television in one form or another. The last one presented the case for the retailer, and since all branches of the country were represented, there is little doubt that once more the P.M.G. was urged to give immediate attention to provincial television. A three-year plan was suggested whereby an 85 per cent. national coverage would materialise by the end of 1942. While promising to give full weight to representations made to him, Major Tryon brought out the stock reply that he was waiting for the Television Advisory Committee's report. Why this irritating and annoying delay should be necessary on so vital an issue is beyond the comprehension of all those who have the development interests of television at heart. The television home receiver market will depend on the Post Office recommendations and with Olympia fast approaching, manufacturers are naturally very concerned, because of their inability to settle the question of production numbers. Then, again, the cinema industry is vitally concerned, for as was said the other



The Baird E.H.T. unit in duplicate as installed in the Marble Arch Pavilion.

day after the rediffusion of the arrival home of Their Majesties, the trade is keeping abreast and featuring news of public importance, but it, as yet, has no idea of the extent of its relationship to television for the future. News reels were televised and rediffused during the time which elapsed between the departure from Waterloo and the arrival at Buckingham Palace, but what sort of copyright situation was involved by this procedure? The Director of Television speaks of difficulties with the film companies, theatrical managers, artists and so on; in fact, everyone is anticipating a settlement of at least the major problems as a result of the very lengthy and tedious deliberations of the Advisory Committee. Apart from any question of entertainment, employment will be affected, export problems settled; in fact, the whole gamut of indecisions hinge on this one report and still the industry has to wait. The only saving grace is to hope that when eventually made public, the recommendations will be found worth waiting for.



Peculiar Results are Often Obtained when Tuning the P.A. Stage, and Unless the Operator Knows what Indications to Expect, Serious Losses will be Introduced. The Question of Neutralisation is also Dealt with in this Article. By L. O. Sparks.

BEFORE discussing neutralising the P.A. stage it becomes necessary to devote a few lines to the question of tuning a power amplifier, as many A.A. licence holders appear to be rather uncertain concerning the correct procedure and what visual indications should be expected.

The first thing to remember—and this can be applied to all stages in a transmitter—is that it is far easier to take simple precautions, when experimenting or carrying out adjustments, to protect the valve against excessive anode current than to have to replace it with a new one. For example, in a P.A. stage, the anode current of a valve under normal operating conditions usually associated with such circuits can be greatly in excess of its rated current when the full anode voltage is applied, and the circuits are not tuned to resonance or the grid circuit suitably biased or loaded. This, therefore, necessitates watchfulness on the part of the operator, and it is always advisable to reduce the value of the anode voltage supply when the time comes for it to be applied.

Procedure

We will assume that the stage has been properly neutralised, if this happens to be necessary with the valve in use, and that the apparatus is ready for tuning.

The preceding stage, usually referred to

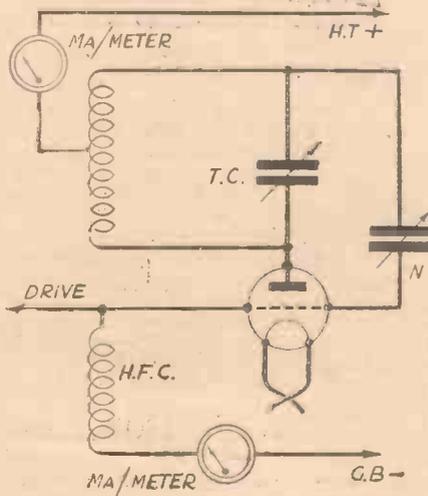


Fig. 1.—A normal neutralised P.A. stage showing where meters should be fitted for preliminary tuning.

as the "driver," must be tuned for maximum output before any H.T. voltage is applied to the anode circuit of the P.A. valve. The maximum output of the driver can be determined by the simple loop-lamp method, but bearing in mind the adjustments which have to follow, it is more satisfactory if the arrangements given below are employed. It was mentioned in the article in the issue of last week how grid current flows in the grid return circuit of a P.A. valve, and it should be noted that if the value of the grid current is measured it will give a very satisfactory indication of the power of the drive applied to the grid circuit. To do this it is necessary to connect in series with the grid return

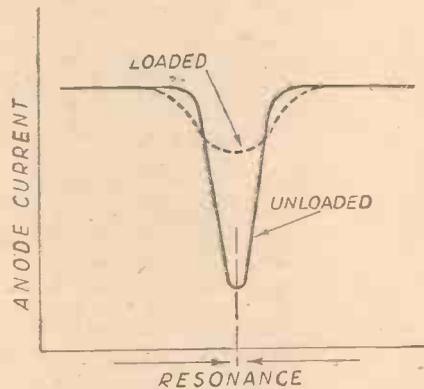


Fig. 2.—A typical anode current curve of a P.A. Note variation when load is applied.

circuit, i.e. the source of bias, a suitable milliammeter to register the current, and it will be found that the more powerful the drive the higher will be the grid current reading.

With the meter in position and the driver tuned for maximum output, the coupling between the two stages should be completed and the current reading noted. A simple adjustment of the driver tuning will show that, due to the application of the coupling, the tuning has been thrown slightly off the maximum setting, so—and bear this point in mind—for any and every experiment made with the coupling always remember to re-tune the driver to resonance.

Re-tuning

At this stage adjustments must be carried out to determine the most satisfactory

degree or form of coupling to be used for maximum excitation of the P.A. grid circuit. The grid-current meter will prove most valuable in such instances as direct observations can be made. The re-tuning business does not apply only to the driver valve if the grid circuit of the P.A. is of the tuned type, as it will be equally essential to tune that section as well after each adjustment.

Don't carry out these preliminary, though very important, operations as quickly as possible, but take ample time to note all the effects produced and try to reason out for yourself the whys and wherefores of the various results obtained. When all is to your satisfaction, a reduced anode voltage can be applied, not forgetting to include, in series with it, a suitable milliammeter to register the total anode current of the P.A. valve. The essential requirements are shown in Fig. 1.

The anode tank circuit can now be tuned to resonance and, owing to the possibility of high current readings as mentioned above, this should be carried out as quickly as possible. When the circuit is brought into

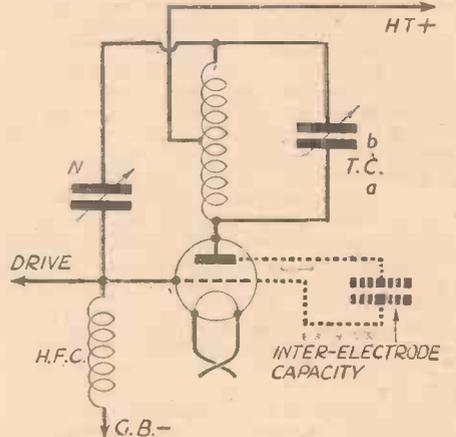


Fig. 3.—Showing how a neutralising condenser is fitted to nullify the inter-electrode capacity.

resonance with the drive, the anode current will fall very suddenly and then rise again, equally as quickly, when the tuning point is passed. The drop or dip in the anode current can be taken as a very rough guide to the efficiency of the stage, but as this can be dependent on other factors than the drive only, too much faith should not be placed on that method. As a general approximation, it can be assumed that the drop in the anode current should be in the neighbourhood of 15% to 20% of the rated current consumption of the valve in use. Checks can be applied to the P.A. anode circuit by using the loop-lamp test to indicate the amount of R.F. present in that section.

Applying the Load

The next thing to do is to apply the load to the tank of the P.A. anode, and whether the load is in the form of an artificial or radiating aerial, the procedure is practically identical.

As soon as the load is connected, the anode current meter will indicate an increase in current above the maximum dip value, and if the tank tuning is varied slightly either side of the resonance point, it will be noticed that variations in current are not so sharply defined as when the stage is unloaded. A typical curve is shown in Fig. 2.

As in the case of the coupling between the driver and the power amplifier, it will



Impressions on the Wax

A REVIEW OF THE LATEST GRAMOPHONE RECORDS

BENIAMINO GIGLI, now the highest paid singer in the world, sings two favourite Italian songs from his concert repertoire—"Aprile" (April) and "Notte d'amour" (Night of Love) on *H.M.V. DB 3815*. Gigli made this record at the H.M.V. studios at St. John's Wood during his recent visit to sing at Covent Garden.

"Because" and "For You Alone" had a great attraction for Caruso, who made records of both of them, and now, many years after, Webster Booth, the English operatic tenor, has recorded both of these songs on *H.M.V. B 8920*.

Two other famous singers, Paul Robeson and Peter Dawson, have also made new recordings this month. Paul Robeson, who during his recent visit to Russia was greatly attracted by the Russian folk songs, sings one of them—"Night," in Russian and English, on *H.M.V. B 8918*. On the reverse he sings William Blake's "The Little Black Boy."

Peter Dawson chooses an old favourite, "Somewhere a Voice is Calling," for his latest, and couples it with "Just for To-day." The organ accompaniment for the former song is most effective.—*H.M.V. B 8919*.

Records by the Kentucky Minstrels are generally in demand, and there have been numerous requests for some of the Plantation Songs introduced into their earlier programmes. Most of these are short and just the thing for the tuneful medley they have now made on *H.M.V. BD 707*.

Orchestral

SCHUMANN'S "Symphony No. 4 in D Minor," which still figures in symphony concert programmes, has been recorded by the London Symphony Orchestra, conducted by Bruno Walter, on *H.M.V. DB 3793-5*.

"The Dance of the Seven Veils" is a powerful piece of work, and when the opera "Salome" was first produced in 1905, it greatly shocked opera-goers of that day. It demands a big orchestra and therefore has been recorded by the Dresden State Opera Orchestra on *H.M.V. DB 4639*. The orchestra is conducted by Karl Bohm, one of Richard Strauss's most intimate friends. Strauss, by the way, recently attained his 75th birthday.

Short and most delightful is Constant Lambert's conducting of the Sadler's Wells Orchestra in the Ballet "Les Patineurs" (The Skaters), which will find great favour. The music is mostly taken from Meyerbeer's Opera "L'Etoile du Nord."—*H.M.V. C 3105*.

Aldershot Tattoo

RECORDS that will be in demand are those just released of the Aldershot Tattoo. It has been recorded on three double-sided 10in. records, *H.M.V. B 8921-3*.

Dick Todd, the Canadian singer, who made his debut on H.M.V. last month, has recorded a new song by Hoagy Carmichael

called "I Get Along Without You Very Well Except Sometimes." Coupled with this is "You're the Only Star in My Blue Heaven."—*H.M.V. BD 719*.

America's Radio Sweetheart, Kate Smith, sings "Don't Worry 'Bout Me," from the World's Fair edition of the famous Cotton Club Parade, and "And the Angels Sing," on *H.M.V. BD 718*, while two other records of note are "Deanna Durbin Memories" on *H.M.V. BD 711*, and a medley of hits from the Astaire-Rogers picturisation of "The Story of Vernon and Irene Castle," on *H.M.V. BD 721*.

Swing Music

ARTIE SHAW has recorded "Prossachai" and his own "Non-stop Flight" on *H.M.V. B 8925*, whilst Benny Goodman has recorded "Rose of Washington" and "And the Angels Sing" on *H.M.V. B 8926*.

This month H.M.V. have revived "Dardanella" and "Sugar," by Paul Whiteman and his orchestra. These ten-year-old masterpieces feature some of the most brilliant solos ever recorded by Bix Beiderbecke, the genius of the trumpet, whose career was so tragically cut short by death a short while after these records were made.—*H.M.V. B 8931*.

There is a story behind the Frankie Newton record of "Romping" and "Who" on *H.M.V. B 8927*. Some months ago, Hughes Panassie, the French jazz critic, went to America to arrange a series of special recordings for H.M.V. This was Panassie's first visit, and his knowledge of jazz had been obtained entirely from records. Before he went, he had mentally assembled a series of ideal compositions. These he put into practice with quite remarkable results. No restrictions were placed on the musicians, who were given carte blanche to play just as they felt. This, the first record to be released, is as fine an example of pure jazz as one could wish for. The uninitiated may find them a little difficult at first but after a while it will be seen how perfectly the different improvised parts (there was not a note written down in advance) dovetail together.

Decca

ALEXANDER BOROWSKY presents another Bach Piano Concerto arranged by Busoni. It is the delightful concerto in F Minor—a very short work but very complete—*Decca LY 6154*. Bach is represented again by an entirely new orchestral arrangement by Alois Melichar of the ever popular D Minor Toccata and Fugue—*Decca LY 6162*.

Then there is the first appearance on records in England of the Stross String Quartet, who give an excellent performance of the Beethoven String Quartet in A Major, Opus 18, No. 5—*Decca LY 6165-7*.

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by T. Alec Bacon

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NOTES FROM THE TRADE

New Drydex Battery

THE Chloride Electrical Storage Company announce a further L.T. battery for use in the new all-dry battery portable radio receivers. This is a 1.5 volt battery, fitted with a socket for 2-pin plug, and it measures 3½ in. by 2½ in. by 5½ in. The type No. is H.1161 and the price is 3s. 9d.

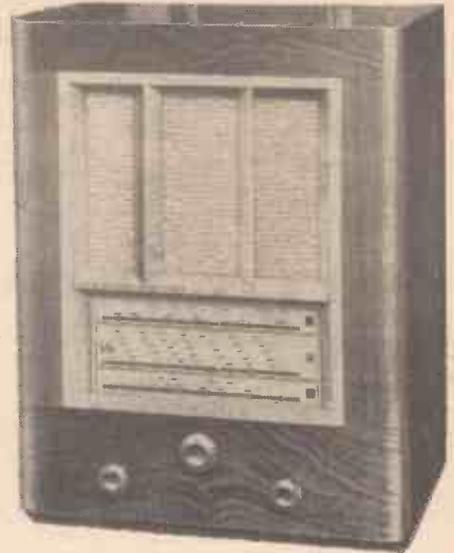
New G.E.C. Receivers

THE General Electric Company announce a further range of 5-valve receivers, consisting of an A.C., an A.C./D.C., and a battery model—to be known as the 4040 series. In each case the circuit is a two-band superhet with A.V.C. and large power output. The wave-ranges are 192 to 550 and 1,000 to 2,000 metres. Tuning is by push-button as well as manual. There are six buttons which may be adjusted for selecting any six stations on the long or medium bands. Immediately the button is depressed the required station is brought into tune, whilst the "thermometer" indicator on the tuning dial rises or falls to the name of the selected station. Tone control and volume controls are provided in addition to the wavechange and tuning controls. The A.C. and A.C./D.C. models are rated to deliver 4 watts output. All three receivers are housed in a similar moulded cabinet measuring 19½ in. by 11½ in.

by 9½ in., this being adequate, in the case of the battery model, to accommodate the standard 120 volt H.T. battery and a 60 aH accumulator. The A.C. model costs 8½ guineas, the A.C./D.C. model, 9 guineas, and the battery model, £7 19s. 6d.—less batteries.

Pilot New Model

PILOT RADIO announce the first of the new season's models—a 4-valve battery all-wave superhet. This has been designed to give to owners of homes without electricity a selection of stations equal to those provided for the mains user. It incorporates a new economic range of Mazda battery valves which, due to their low consumption, increase the life of the H.T. and L.T. batteries by approximately 50 per cent. Special precautions have been taken to ensure that the receiver will give an adequate performance even when the battery has run as low as 40 volts. Three wavebands are covered—16.5 to 51, 190 to 580, and 850 to 2,100 metres. The circuit incorporates a frequency-changer, I.F. stage, second detector and A.V.C. by means of a double-diode-triode and an output power pentode. Provision has been made for an extension speaker and an internal speaker silencing switch is fitted. The speaker is an 8 in. permanent-magnet



The new Pilot Model B-34.

moving-coil model, and the tuning scale is calibrated with station names and wavelengths. The overall size is 17 in. by 14 in. by 9 in. and there is ample battery space. No grid bias battery is required as the circuit incorporates an auto-bias arrangement. The H.T. consumption is rated at less than 10 mA and the accumulator consumption at .5 amps. The price, exclusive of batteries, is 9 guineas and hire purchase terms are, of course, available.

A.V.C. ELABORATIONS

(Continued from page 414.)

through resistance R11 and produces in it a voltage drop, which in turn increases the negative bias on the second valve. The resistance R10 serves as a grid-leak resistance, whilst R12 supplies the normal grid bias of the second valve.

When the signal on the diode detector is weak, the negative bias of the double-diode-triode is low, and consequently the anode current of this valve is high. As a result, there is a large voltage drop in R11 and the anode current of the EF6 becomes blocked—the loudspeaker being therefore silent. When the signal has risen to a certain value, the anode current of the double-diode-triode is zero, and there is

no longer a voltage-drop in R11. The EF6 then gives normal amplification and the receiver reproduces the signal. In this circuit the automatic volume control is effected by means of the diode D1. As the cathode of the double-diode-triode receives a positive voltage from the potential divider R6-R7, the A.V.C. does not come into action until the peak value of the signal on the diode exceeds the voltage at the tapping point.

The values to be selected for resistances R6 and R7 will naturally depend upon the delay voltage required. As a rule the delay voltage and the resistance R11 are given such values that quiescence is put out of action the moment the A.V.C. begins to operate, otherwise the signal on D2 would not rise with the rapidity necessary for sudden elimination of quiescence.

REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

A. C. B. (Glasgow). The idea is not novel and we have published articles on the subject in previous issues. We regret, therefore, that we should not be interested in further details of this type of receiver.

E. S. (Birmingham). The amplifier is one which amplifies at low-frequency, that is, after rectification. Signals are, of course, sent out at radio or high frequency. Full details concerning the licence may be obtained from the Engineer in Chief, Radio Section, G.P.O., Armour House, E.C.1.

C. A. B. (S.E.18). Our "Wireless Constructor's Encyclopaedia" is exactly the book you need. The price is 5s. or 5s. 6d. by post from these offices.

B. D. (Anglesey). We regret that we are unable to recommend any firm for the type of apparatus mentioned. It does not appear to be marketed in this country.

A. R. (Blackheath). Write to the Westinghouse Brake and Signal Co., Ltd., at 82, York Way, King's Cross, London, N.1.

F. C. (W.4). The unit may be defective, or you may be over running it. Write to the makers or suppliers giving full details of your installation.

N. L. (Co. Tyrone). We regret that we are unable to supply a wiring diagram or any other details of the receiver in question.

E. J. F. (Co. Wexford). The new valve may have totally different characteristics. You give no type numbers and therefore we cannot give definite advice.

R. B. (Belfast). The issue in question would not help you. The tuning indicator should be fed from the A.V.C. circuit, that is, from one of the diodes of the double-diode valve fitted to your set. The valve is joined to H.T. in the usual way and the grid fed from the A.V.C. line. The makers' instructional sheet will give appropriate coupling and decoupling values.

F. B. (Beckenham). We can only suggest that owing to an oversight your letter has been overlooked. Write to the firm again and give full particulars. The holiday period may have resulted in short staff which has caused the omission.

C. H. S. (Brentwood). It should be quite possible to add the record player, but we have no details of your set and therefore suggest you write to the makers for confirmation.

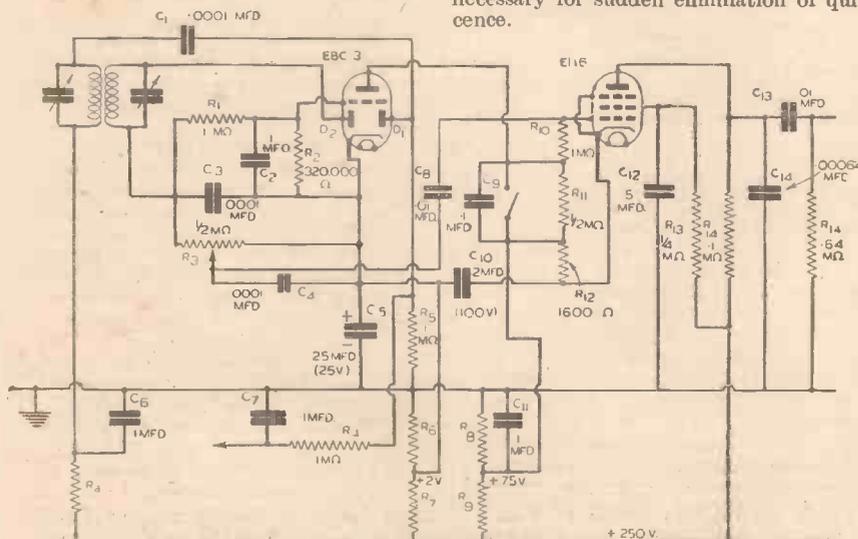


Fig. 5.—An elaborate A.V.C. circuit built round Mullard Type E valves.

Radio Clubs and Societies

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

SLOUGH AND DISTRICT SHORT-WAVE CLUB

Headquarters: 35, High Street, Slough, Bucks.
Secretary: K. A. Sly, 16, Buckland Avenue, Slough, Bucks.

Meetings: Alternate Thursdays at 7.30 p.m.

At the last meeting, held on June 22nd, the chief item was an extended period of morse practice, during which the more experienced members, among them G6PR and G3XH, went slowly for the benefit of the members who are beginning their study of the code. Progress has been marked among these newcomers to morse and many are developing into expert senders. Following this a discussion on conditions took place, during which G6PR gave an account of the DX which he had been working during the past fortnight. It was decided that a regular feature at our meetings should be a period devoted to members' difficulties. It was also decided to purchase a call-book for the use of members.

The agenda for the next meeting includes a talk by Mr. J. Paine (G6PB) on "Arranging and operating a portable station for National Field-day." A discussion will also take place on plans for a club field-day. The usual items, such as morse practice (slow and fast), and discussion on conditions, will also take place.

New members are always welcome to any of our meetings, and they will have a good opportunity of learning morse, or, if they already know it, to improve their speed.

EASTBOURNE AND DISTRICT RADIO SOCIETY

Hon. Secretary: T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

At the society's meeting, held last Tuesday, Mr. S. M. Thorpe, A.M.I.R.E., gave a demonstration on valve characteristics. Valve curves were plotted, and some of the very early types of valves gave some unusual curves. The kink in the screened grid valve was also demonstrated.

Full information for joining the society can be had from the hon. secretary.

INTERNATIONAL SHORT-WAVE CLUB (LONDON)

European and Colonial Representative: Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

MEMBERS of the International Short-wave Club (London Chapter) who attended at the R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8, on the evening of Friday, June 30th, listened with great interest to the lecture on "H.F. Insulators," which was delivered by Mr. N. Westcombe. Mr. Westcombe illustrated his lecture with lantern slides and cathode-ray oscillograph experiments. He explained in great detail the remarkable developments that had been made in insulating materials in recent years and also described the special ceramic materials Tempa S, Calit, Conda F, Conda C, and Conda N, which are used as dielectrics. The most comprehensive display of insulators, condensers and kindred components were on view. The members agreed that this was one of the best "shows" ever staged at a meeting of the I.S.W.C.

BRITISH SOUND RECORDING ASSOCIATION

Hon. General Sec.: F. J. Chinn, 14, Firlmont Road, South Croydon.

ON Tuesday evening, June 20th, a party of members visited the new H.M.V. personal recording studio at 363, Oxford Street, W.1. They were received by the recordist, Mr. E. G. Huntley, whose friendly and charming manner soon put the party in a receptive mood to appreciate the high standard of quality which this service achieves.

After inspecting the studio, which has a claimed reverberation period of one second and which contains two microphones of the RCA inductor (dynamic) type, a grand piano and an H.M.V. reproducer, the members adjourned to the recording room, with the exception of Mr. W. Corderoy, an accomplished singer, who remained to supply the necessary material for recording. "Where'er You Walk" was well rendered and recorded with fidelity by the compact equipment. Surprise was expressed by several members that the swart thread from the E.M.I. cellulose-acetate blanks could be successfully removed by means of a suction pipe. The ingenious lay-out of the recording room enables the recordist to see both the actual performance and the volume level indicator (dB. calibrated), whilst he is attending to the cutting.

SALE AND DISTRICT RADIO SOCIETY

Headquarters: St. Mary's Schools, Barkers Lane, Sale, near Manchester.

Secretary: S. C. O. Allen (2FCQ), 31, Ennerdale Drive, Sale.

Meetings: Held weekly at 7.30 p.m.

THE question of providing extended morse practice facilities was discussed at some length by members of the society, on Thursday, June 29th. Eventually it was decided to split the present practice period into two parts. One class, for beginners in morse, will be from 7.30 p.m. to 8 p.m. each Thursday; from 8 p.m. until the business meeting commences at 8.30 p.m. the code will be sent out at a higher speed for more advanced members. Tentative arrangements were made to give morse practice by radio from station G5UP on Wednesday evenings at 9 p.m. The frequency is 1,915 kilocycles. A telephony announcement will precede the morse practice.

ASHTON AND DISTRICT AMATEUR RADIO SOCIETY

New Clubroom: 17a, Oldham Road (nr. Free Library).
Secretary: K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

MEMBERS are very busy getting the new club-room at the above address ready for the coming session and gear is being installed. G6DV has been scouting around and obtained chairs, benches, and a stove at less than bargain prices! The next job is to erect an antenna for the club receiver which is now being built. The annual general meeting was held on the 28th ult., when the following officials were elected to hold office for the next 12 months: President, J. Partington (G5PX); Chairman, W. P. Green; Secretary, K. Gooding (G3PM); Assistant Secretary, S. Wild (2BBV); Treasurer, J. Cropper (G3BY); Librarian, H. Battersley; Morse Instructor, F. Bottom (G3FF).

In future meetings will be held every Wednesday, with business meetings once a month.

TRANSMITTING TOPICS

(Continued from page 424)

be found necessary to re-tune the P.A. tank circuit when the load is applied and every time any adjustment is made as regards its degree of coupling, and in this direction an artificial aerial which embodies a small lamp will be most useful to determine conditions to produce maximum power output.

Neutralising

We have seen that instability is likely to be produced in a P.A. stage when a triode or poorly-screened multi-electrode valve is used, owing to the feed-back introduced by the inter-electrode capacity of the valve and the fact that the anode and grid circuits are tuned to the same frequency. Fortunately, there is a very easy way of nullifying the source of feed-back though, unfortunately, the actual operation is not always so easy as the method.

The simplest way of understanding the cure for the trouble is to have some idea of its cause; therefore, the following brief description will, it is hoped, not appear superfluous. Radio-frequency potentials exist on the grid and anode electrodes of the valve under consideration. If some of the R.F. voltages are fed back from the anode to the grid, excitation will take place and the valve will simply act as a self-excited oscillator.

Once these oscillations start, they will continue until some means are adopted to reduce or counteract the feed-back causing the trouble. If the circuit shown in Fig. 3 is examined, it will be seen that the anode tank coil receives its H.T. supply through a centre-tapping point. This circuit, inci-

BRADFORD SHORT-WAVE CLUB

Headquarters: 1, Ferniehurst Buildings, Baildon Road, Baildon.

Secretary: G. Walker, 33, Napier Road, Thornbury, Bradford, Yorks.

Meetings: Every Friday 9 p.m. Sundays 11 a.m.

THE above club has now established itself at the new headquarters, and transmissions have been carried out with success. The place is ideally situated for the erection of antenna, and experiments have been carried out with one or two types, of different dimensions.

One or two nights during the week, the club is open although these are not regular. Wednesday being the most used as there is a morse class that attends for practice on this particular night.

The club is open to anyone interested in short-wave and amateur radio, and the secretary will be only too pleased to furnish any particulars of the club and its activities.

RADIO, PHYSICAL AND TELEVISION SOCIETY

Hon. Sec.: C. W. Edmans, 15, Cambridge Road, North Harrow, Middlesex.

DURING the past two months the society has not been particularly active. Several more members have now obtained artificial-aerial transmitting licences, whilst others have been promoted from the artificial-aerial to the full-licence category. (One member has been fortunate enough to have been granted a full licence without having to serve a probationary period with an artificial-aerial.)

Field days have in the past proved extremely popular. This year the society's field day will be held towards the end of August, in the Dorking district, as in the past. Two meetings will be held before the appointed date to make arrangements and for the testing and adjusting of apparatus. It may be possible for a few non-members to partake in this field day. Readers interested but who are not members of the society should make application to the hon. secretary as early as possible. Members will, of course, receive notification by post.

PINNER AND DISTRICT RADIO AND TELEVISION SOCIETY

THE above society has just been formed with headquarters at 410, Station Parade, Rayners Lane, Pinner. Members number 13, and although 12 are licensed transmitters, membership is open to anyone interested in short-wave radio or television. Subscriptions 2s. 6d. per year. The committee, consisting of G2MC, G3QK, G3NO, G3SM and G2KA, met on June 30th and have in hand plans for a successful first meeting to be held shortly. Particulars from sec., J. F. A. Lavender, G2KA, 53, Ivy Close, South Harrow.

dently, is only one method of obtaining neutralisation, and it is the small variable condenser marked N which interests us at the moment.

When the valve is in operation, fluctuating voltages appear across the tank tuning condenser and, by virtue of the fact that they are of a high-frequency alternating nature, the two sections of the condenser are alternately positive and negative. When "a" is positive "b" will be negative and so on *ad lib*. We have agreed that the feed-back is due to the capacity between anode and grid which, in turn, is provided by the capacity caused by the electrodes in the valve itself. Taking this a step farther and examining Fig. 3, it will be obvious that through employing the small variable condenser N, each end of the tank coil is virtually connected to the grid. At first glance it might be thought that the provision of a second path for the transference of energy from anode to grid would make matters very much worse. It would do, if it were not for the fact mentioned above about the plates of the condenser T.C. being at opposite potentials at any given instant. Through this, the grid receives an impulse via the inter-electrode capacity having, shall we say, a positive potential *but* at the same instant it also receives one from N having an opposite potential, namely, negative, therefore, if the two supplies are equal in strength but opposite in nature, then they will cancel out and the grid will no longer be affected. The balance is obtained by using a variable condenser for N, the actual capacity of which is, of course, very small, and not usually larger than the inter-electrode capacity of the valve.

Criticism, Chat and Comment

The Promenade Concerts, 1939

Our Music Critic Reviews the General Scenes and Performances of London's Great Musical Show

WHILST you and I are wending our ways seaward and contemplating our annual absence from the toils of the office and the crowded platform waiting for the 8.45, the powers at Broadcasting House which feed us with our musical nourishment go on a sort of half-time. Beethoven and Bach give way to the beach and the brine, and the sporting commentaries—when the rain is not falling—are considered more reasonable fare than symphonies or quartets.

All very rational, sensible and summerish. But one man at least will see to it that those to whom the Eroica and the Jupiter Symphonies are essential items on the Bill of fare, wherever they may be, shall not go hungry. For the 45th season of Promenade Concerts will be commencing shortly under the direction of Sir Henry Wood, who must be surely music's "chef en chef." For many years one of the most famous and familiar figures in London life, Sir Henry, whether now at home or away, is thinking of those packed and sultry nights in Queen's Hall which he will shortly be called upon to face again, and we can be certain that he, at any rate, is not wholly idle or unmindful of our appetites.

Looking Back

In order to appreciate best what a really amazing service of concerts these "Proms" have been one would do best to cast one's mind back to the first year of their existence. We should have seen hansom cabs and "growlers" driving up to Queen's Hall, from which would emerge quaintly dressed ladies wearing puffed sleeves and showing dresses which could only be swelled out by voluminous petticoats, accompanied by gentlemen with "mutton chop" whiskers and "bowlers" like split peas on top of their heads.

A motor-car had recently been driven down the Brighton Road at twelve miles an hour, but it was one of the eccentricities of the age and no such freak was to be seen in Regent Street.

When the people arrived inside the Hall and opened their programmes, they found that Mr. Grieg's "Peer Gynt" suite or Tchaikowsky's "Casse Noisette" was being given its first performance, together with works by Sullivan, German, Saint-Saëns, Balfe or Wallace, etc., etc.

My! How the scene has changed! No less than the character of the concerts. To-day we get double, triple and quadruple concertos of Bach as the centre-piece of two hours of his music. All the Beethoven and Brahms symphonies and concertos, whole acts from Wagner's music dramas, as well as the most abstruse works of Elgar and Delius, Hindemith and Honneger, Bax and Bartok.

The Bach, Beethoven, Brahms and Wagner nights are invariably "sold out" and the queues for the Promenade begin to form up in Riding House Street shortly after tea. Whilst on the night they perform the "Ninth Symphony" the crowds in the street cause a dislocation of traffic which the unthinking fail to associate with such an "exclusive," "la-di-da" thing as music.

The "boon and blessing" that these

concerts are to the vast music-loving public, to whom the "symphony concert" is inaccessible alike through its hour and its prices, is indeed beyond the power of most pens to adequately record. They are literally nectar and ambrosia to practically all who attend them.



Mr. Maurice Reeve, our Music Critic.

Broadcasting's Aid

At first it was thought that Broadcasting would "kill" them and it was a long time before the managers of the day would agree to the relay of any part of a Promenade Concert. The "last season of Promenade Concerts" was, indeed, actually announced. But, happily, the reverse of this has been the case and broadcasting has acted as a stimulant rather than an antidote.

Not only are they attended by as big and as enthusiastic crowds as ever but multitudes all over the country hear what would otherwise have been a closed book to them.

The personal element in the music is as much wanted as ever, and no doubt the trim beard and red carnation of Paul Klenowsky is chiefly responsible for this. Attending the Promenade Concerts is a task which should not be undertaken lightly. It is quite herculean in reality and not for the weak or the faint-hearted. On a hot August night, for a Beethoven or Wagner programme, the promenaders form a packed mass from stage to back wall. A friend six paces away is as unapproachable as the skies. A thirsty mortal "called to the bar" finds his return to the body of the Hall impossible and the remainder of the programme lost behind closed doors.

On such a night more than once can a subdued shuffling sound be heard at the back underneath the Grand Circle. The novice at these concerts begins to "shush" and look round indignantly for the boorish heathen who does not worship yet at the shrine. But the experienced promenade knows the reason well enough: it is a

fainting case being skilfully passed over the heads of the crowd by the St. John Ambulance attendants, several of whom are present every evening. But the atmosphere of the "Proms" is more than half their charm; as with everything else that has become established in our affection as well as in our lives. They have a very exciting and exhilarating one, and nobody but the most hard-boiled can fail to be swept into their whirl. Gentlemen, do not hesitate to take off your coats if you feel you have mistakenly strayed into a Turkish bath instead of a concert hall.

Ladies, if you care to arrive early enough there is one row of chairs (which cost twelve shillings each and are designated stalls in the afternoons) round the back of the hall and under the platform towards which you can make a rush as soon as you are admitted to the promenade.

High Quality Standards

Playing such huge programmes every night for six or eight weeks, in addition to rehearsals and much other work, would be thought sufficient for the stoutest heart to flinch at just occasionally.

But neither Sir Henry nor any of his colleagues have yet been known to "slack" or to fall short of their best for one moment. They are "at it" all the time and their achievement is amazing. 45 years is a long time, and the more so when we remember that Sir Henry is still on the right side of seventy. Few people do not know that he has been in continuous charge of the Concerts from the very beginning, and that their evolution, from a more or less light musical entertainment to symphony concerts of the very highest standard is due to him more than to any one man. No wonder that he and the "Proms" are an institution and are now looked upon as part of the Londoner's World with the Tower and the Abbey. Anything affecting their welfare and their continued health and prosperity would be deemed as important as the safe keeping of those other landmarks.

Having entered their fifth decade they may correctly be termed an inheritance.

To those of my readers who have not met Sir Henry on the rostrum at the Proms I would beg them to do so at the earliest possible moment. A personal visit should be arranged, wherever possible. But as they are accessible to all of us without having to stir from our chairs it would seem rather inexcusable to delay the introduction much longer.

The programmes are arranged with the utmost skill so that one man's meat is entirely separated from another's poison.

If Bach and Brahms on Wednesdays are too much for Jack and Jill, Saturdays are bound to offer them the delights of Tchaikowsky, Dvorak, Rossini or the latest novelties in modern music.

Furthermore, all the finest instrumental concertos are done, as well as the choicest operatic arias and scenes, by the leading instrumentalists and singers.

Let us conclude by raising a glass to the Proms, Sir Henry, and all that they stand for in the musical life of the country and of London in particular.



LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

A Helping Hand

SIR,—Since snobbery appears to be the prevalent fashion among some present-day radio amateurs, beginners in wireless often find themselves severely handicapped in their efforts through not having anyone to help them with their problems.

I should therefore be very pleased to give help and advice to anybody who cares to write or call on me; local SWL's will be especially welcome.

Incidentally, it may interest you to know that I have made many radio-minded friends through the medium of letters appearing in PRACTICAL AND AMATEUR WIRELESS.—PATRICK WHITTLE, G-2AOW, 32, Burling Gardens, Southgate, London, N.14.

Short-wave Difficulties

SIR,—With regard to the "10 and 20 metre receiver" described in your last issue, I should like to make one or two remarks, which, while not intended to underestimate the excellence of the design, might be of help to constructors who experience difficulty with the receiver.

Firstly, a common trouble with short-wave receivers is inability to obtain oscillation. On this particular receiver it would be quite probable that, if the brackets connecting the coil to the condenser were removed, oscillation might be obtained as the size of these pieces of metal might affect the ease with which the valve oscillates.

Secondly, the use of transformer coupling with an H.F. pentode type valve very often leads to loss of volume. Unless a special transformer is used a high-impedance choke or high-resistance capacity method should be used. I have found a doubling of volume by using a high-inductance choke to match up to the high impedance of the S.G. valve.

Thirdly and lastly, I have found that a battery valve is exceedingly difficult to get going in an electron-coupled detector circuit due to the necessity of efficient filament choking. You stated in your article that a battery receiver could be built up on exactly similar lines.

I trust that this letter will be regarded as a piece of constructive criticism and not as an attempt to heap scorn on the heads of your no doubt highly efficient engineers.—GERALD R. W. LEWIS (Cheltenham).

Reception from "Mauretania"

SIR,—On reading my PRACTICAL AND AMATEUR WIRELESS this week, dated July 1st, 1939, I failed to see any report from short-wave listeners regarding reception from the *Mauretania*. I therefore enclose my log for June 18th, 1939.

At 9.45 p.m. B.S.T. I logged Rugby, my reading being 34.3 metres. This station was in communication with the *Mauretania*, testing transmission, the announcement being, "Hello, *Mauretania*, Hello, GCTF." At 10.00 p.m. Rugby instructed *Mauretania*

to "go ahead." I then tuned lower down to 33.6 (my reading) and the "Maure" came on. This was a broadcast to America. The following people spoke. Sir Percy Bates, Capt. Brown, Dr. Bryan and the commentator was an American. Reception was very good, coming in at about R8. Only slight fading was experienced and reception was very clear. There was nothing of any real radio interest in this broadcast, i.e., any comments heard regarding reception between the Rugby operator and the wireless operator on board the "Maure." Reception was on loudspeaker and broadcast finished at approx. 10.25 p.m. B.S.T. My receiver is a late 1937 Ferranti 3-valve All-Wave Superhet, with an output of from 3-4 watts. My aerial is an inverted L type, 45ft. long and 30ft. high.—C. C. Ibbotson (Liverpool 9).

"English Hours"

SIR,—I would be extremely grateful if you would bring this programme recorded by the National Broadcasting Company to the notice of your readers.

It is called the "English Hours" and is radiated daily at 5 p.m. to 7 p.m., B.S.T., on the following wavelengths and frequencies.

CUT THIS OUT EACH WEEK

Do you know

—THAT the 14 to 20 metre band is the most suitable for listening at all times at this part of the year.

—THAT the resistances used for supplying the S.G. voltage of some valves should be selected to pass a much greater current than the valve itself.

—THAT some modern multi-electrode valves may be used in unorthodox circuits with quite good results.

—THAT a typical instance of the above is a standard Class B valve used in a reflex circuit.

—THAT thermal-delay switches are not normally required when an indirectly-heated rectifying valve is employed.

—THAT in many cases an earth connection is undesirable for short-wave reception, although a lot depends upon the circuit design.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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W3XL, New York N.Y.—17,780 kc/s, 16.87 metres.

W8XK, Pittsburgh, Pa.—15,210 kc/s, 19.72 metres.

Comments on these programmes will be gratefully acknowledged and reception reports verified by: Richard A. Thomas, The English Hours, National Broadcasting Co., R.C.A. Building, Radio City, New York, N.Y.—JAMES T. BLACKWOOD, Radio G3TG (S.E.24).

Correspondents and Card Exchanges

SIR,—As a regular reader of PRACTICAL AND AMATEUR WIRELESS I would be very pleased to hear from readers in all parts of the world who would like to correspond with me. I promise to answer every letter. Wishing PRACTICAL AND AMATEUR WIRELESS every success.—PETER F. LIFFE, 22, Firfield Avenue, Birstall, Leicester.

SIR,—I have noticed recently several letters offering exchange of QSL cards, published in your paper.

I should be greatly obliged if you would publish this letter saying that I will willingly exchange QSL cards with any S.W. enthusiast at home or abroad.—R. M. OWEN, G5RB, 14, Watermead Road, Bromley Road, Catford, S.E.6.

SIR,—I have been a reader of your excellent journal for some years, and have found it of great assistance.

I wonder if you could put me in touch with any "AA" or "full ticket" fans in Leicester, as I shall be moving to that town on Sunday, July 1st.

My address will be 6, Normanton Road, Leicester, and any communications should be addressed to me there.

I am 17 years of age, and have held an AA ticket since May, '38.—L. SMEE (2DVT).

SIR,—If any of your overseas readers, or any other readers, would care to exchange QSL cards I would be very much obliged.

I am very pleased to see more "Transmitting Topics" in your pages as the series in 1938 was very very interesting, and most helpful.—JOHN R. TYZACK, 197, South Eldon Street, South Shields, Co. Durham.

A 20-metre Log

SIR,—I have been a reader of PRACTICAL AND AMATEUR WIRELESS for three months now, and I find that it gives much help to a novice like myself. I have been "tinkering about" with crystal sets for the past two years, but only took radio up seriously two months ago.

I take much interest in other readers' logs and here are some 20m. stations logged in the last week.

F3WT, 3BO, 3PB; FAQD; PK4GW; LX1AJ; E17M; CK1AF; IISG; SM6F, 7MU, 5NM, 6J5, 5KB; FM4JG, MG; LY1S; SJM4; KA1CS; GK2AGJ; W2XAY; ZE1JZ, B2B, SIT; VS72A; OZ5Q; LA5A; FA2P; HA9CZ; F8VZ; WI1KY; FURAF; HA8Q; BS7OA; SVICE; FV1CA; W4DXY; CT1OR; W1BLO; IISM, RI; FQ5BO; ZCRB; and FU2 (Cairo), also 24 G stations.

The set is a 5-valve superhet, with an antenna 75ft. long, 25ft. high, running S.E.-N.W. All listening done round about 6 p.m.

I would like to correspond with a reader of about my own age (thirteen years) interested in short-wave experimenting etc.—LEWIS J. MAY 38, Eastwood Road, Cannon Hill, Birmingham, 12.

"On With the Show"

The Popular Seasonal Production which is Presented at the North Pier, Blackpool, and from which Extracts will be given During the Summer in the Radio Programme

LAST year, when a fire wrecked the 14th and most lavish edition of "On With the Show," at the North Pier Pavilion, Blackpool, the master showman-songsmith happened to pass a fortune-teller's.

"You've suffered a big reverse," she told Lawrence Wright, "but you're big enough to rise above it. The trial will make you stronger, more determined. Next year will be the most successful year of your life."

And 1939 does indeed find L. W. on top of the world. His famous song-publishing business thrives on a host of big hits—many of which are incorporated in this year's Blackpool show—and the 15th edition of "On With the Show," rising Phoenix-like from the ashes, is the biggest production ever.

This year, with the B.B.C. relaying fifty-six seaside shows, there has been hot competition for all-star bills, and Lawrence Wright romps past the post with a terrific radio bill starring Tessa Deane, Sutherland Felce, Bram Martin, Lance Fairfax, Wheeler and Wilson, Frank Randle, Anita Martell, the Marquis Trio, Barbara Wood, 17 Terry's Juveniles, and The Chorus of Health and Beauty Girls—as big a line-up as you'll find at any No. 1 Music-hall!

Lawrence Wright—alias Horatio Nichols—works on the principle that nothing is too good for Blackpool. Blackpool is the North, and the North is the synonym of entertainment. He personally hand-picks the artistes, and this year the shrewd showman (who launched his first show while in the R.N.A.S. during the War, in partnership with his barracks bed-neighbour Sydney Howard!) surpasses all his expansive gifts to showland.

How this showman goes talent-spotting is displayed in the signing of Wheeler and Wilson.

Wright went to meet a friend in Birmingham last Christmas. While there, with time to kill, he visited the panto starring George Robey. In it he saw Wheeler and Wilson. He nearly "rolled in the aisles" at their antics. Forgetting all about his friend, he spent the rest of the night signing

Wheeler and Wilson for three Blackpool seasons!

Incidentally, Wheeler and Wilson made such a hit in their first B.B.C. music-hall, John Sharman signed them to broadcast on the following Saturday, a unique honour. They are father and son. Jimmy Wheeler was studying to be a scientist, but quitted the laboratory to join his father, Ernie Wilson, veteran variety trouper, in a double-act.

Lawrence Wright has invested this year's show with the essence of Youth.

"Youth Takes a Bow"

One of the sensations of the 1939 "On With the Show" is a 15-year-old girl, only just left school, who forms the feminine part of the entirely original adagio-act, The Marquis Trio, fresh from triumphs at the Grosvenor, Dorchester, Mayfair, and other London night-spots.

Barbara Wood, the show's all-round girl, is a "prodigy." As a child her doctor ordered her to take up dancing for her health. At 11, she won the 50-guinea Blackpool Trophy and 19 medals for singing and dancing. At 13, she broadcast from St. George's Hall. At 15, she was Britain's youngest principal-girl in Leeds panto. Ere quitting the 'teens, she was a Midland Regional radio star, and performed before Queen Mary, Queen Maud of Norway, and other Royal personages.

Topical in these days of Keep Fit and lithe girlhood are the Health and Beauty Girls, personally picked by Lawrence Wright from the pupils of London's leading terpsichorean expert Euphan Maclaren.

Then, if you—Sir or Madam—on your (of course!) annual jaunt to Blackpool—care to see the Jessie Matthews or Evelyn Laye of to-morrow, you'll see such stars in the embryo stage among the 17 specially-chosen Terry's Juveniles. Try the Carroll Levis game, pick your own Discoveries from the kids—ten years ahead!

Now a British tradition, this show of Lawrie Wright's will magnetise a great many radio-fans this season to Blackpool. In previous seasons, L. W. has brought to Blackpool such people as Norman Long, Revnell and West, Bertini, Hal Swain, Peggy Desmond, Horace Kenny, Tessie O'Shea, Robert Naylor, Jan Ralfini, Syd Seymour, Sylvia Cecil—but never has L. W. gathered so much star talent in one bill.

Tessa Deane, radio's queen of song, will be seen playing the piano as well as singing. Tessa studied the piano at the Royal College of Music, won a scholarship and gold medal at 16. Turning to the stage, she played leading London roles, including "Rose" in A. P. Herbert's "Derby Day," which role she took in the radio version. She starred in the B.B.C.'s "Songs from the Shows" and "Music Halls" from their inception. She is a great traveller, speaks and sings in four languages, and comes to Blackpool direct from "Rose Marie."

Incomparable compère "Sutty" Felce is one of the brightest stars of television, was the first artist to perform magic before the television cameras. When he was a youth his father died, leaving "Sutty" a legacy which was only enough to carry him on till he got a job.

Fair, wavy-haired, six-footer Lance Fairfax, opera and musical-comedy star, was born in Wellington, New Zealand, and at Wellington College excelled in all athletics. He starred in musical films at Elstree as England's "Nelson Eddy," has appeared in big West End musical plays, and comes to Blackpool from the London Palladium.

Brilliant character-comedian Frank Randle, of "Old Hiker" and "Any More for a Sail" fame, needs no introduction to Blackpool fans.

One of the most consistent bandsmen on the air, smiling, immaculate Bram Martin, began his career as a 'cellist, playing for Bruno Walter, and accompanying Anna Pavlova.

Bram has been busily preparing to get every ounce out of the swell line-up of song-hits Lawrence Wright picked for this year's show, and destined to get the nation laughing, humming and dancing is the successor to "The Lambeth Walk"—"Boomps-a-Daisy!"—a great new composition by Annette Mills.

Another great number, which will delight the hearts of Lancashire particularly, is "My Shawl," the subject of a lovely scene presenting all the shawls of the world—the Spanish shawl, the shawls of Japan, Mexico, Egypt—and, of course, the world-famed Lancashire shawl!



On the left is Bram Martin, who is appearing with his orchestra in "On with the Show." Above are the comedians, Wheeler and Wilson, who are also in the show, and on the right is Barbara Wood, the delightful soubrette who is also featured.



QUERIES and ENQUIRIES

many cases adjustment of one circuit will give reading modifications in two or more circuits.

Black Crackle Paint

"Could you please give me the address of a firm which sells that black crackle paint mentioned in 'Notes from the Test Bench' a short while ago? I have tried to get it here, but have not succeeded. Can you give details for making a small L.F. oscillator?"—A. G. S. (Edinburgh).

THE firm in question is Hamrad, Ltd., of 32, St. Lawrence Terrace, London, W.10, and the paint is sold in tins at 2s., 3s. 6d. and 4s. 6d. An oscillator which might be suitable for your purpose was described in our issue dated May 20th last. If, however, you need a test device for L.F. response, etc., you should build a unit on the lines of that described in our Service Manual.

Meter Design

"Could you please tell me the difference between a volt and ammeter, and whether one can be converted into the other? Also, can you recommend a book on learning morse code?"—W. S. (Cambridge).

A VOLTmeter is used for measuring voltage, and accordingly must be joined across a circuit or supply. In other words, it measures the difference of potential across the two points. An ammeter, on the other hand, measures the current which is flowing in a circuit and accordingly is joined in series. Some voltmeters may be used to measure current simply by connecting them in series with the circuit, but the scale will have to be drawn up to suit the particular instrument, if it is not already calibrated for use as an ammeter or milliammeter. We refer you to the article on learning morse in our issue dated May 20th last.

All-purpose Meter

"I am considering the building of a transmitter, but a point which I am worrying about is the installation of meters. I appreciate that meters are important in every part of the complete circuit, but owing to the widely-differing currents, several meters would appear to be called for. Is there no way of making one meter serve for every circuit without complicated switching or other devices?"—J. L. (W.1).

A SINGLE meter with a maximum scale reading of 1 mA may be used for the purpose. A closed-circuit jack should be included in each anode and/or screen-grid lead, and across the jack contacts a suitable shunt resistance should be connected. This should be selected so that it will multiply the meter scale by a definite factor (5, 10, etc.) and thereby bring the needle to about the centre of the scale. If the meter is then mounted on a small bracket provided with a plug it may be inserted in any required jack and the appropriate reading obtained. Each jack should be clearly marked with the multiplication factor provided by the shunt resistance. It is obviously preferable to have several meters permanently in circuit, however, as in

Oscillator Fault

"I have built a signal tester on the lines indicated in a recent article for practising morse. I am using an old valve which I am assured is in order, a 16-volt G.B. battery and all parts as recommended. In order to get all in a small space I have used a flash-lamp battery with series resistance for the filaments. I cannot get any oscillation with the unit, merely a click when the key is depressed. Do you think this is due to the filament supply, or is there any other thing likely to be wrong with the unit?"—L. D. E. (Cambridge).

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

THE valve will only oscillate when a good current is flowing and suitable coupling exists between anode and grid. Accordingly if the transformer is unsuitable and does not provide sufficient coupling, or if the filament supply is insufficient you will be unable to obtain results. In the

PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM

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latter connection you should remember that the dry battery will deliver sufficient voltage but probably not sufficient current to maintain oscillation and an accumulator is definitely to be preferred for ordinary types of 2-volt valve.

Coupling Winding

"I have made some coils of the 6-pin type, but one or two do not appear to be working properly. I have adjusted the size of the primary and reaction winding, but signals are very poor on the bands covered by these particular coils. Can you offer any suggestion as to the cause of the trouble, as I am sure the size and windings of the coils are in order? I have wound the coils from data in your Coil Booklet."—L. S. W. (Bermondsey).

A PART from the size and disposition of the windings an important point is the relation between them—that is, the direction of the windings. For maximum results it is important that the primary should be wound so that it provides coupling with the secondary, and if wound in opposition you would obtain poor results. We would refer you in this connection to the article in our issue dated April 1st last.

Screening

"In building a modern multi-valve set, is it essential to include elaborate screening between stages such as you used in one of your receivers last year? I have wondered about this point, as some modern commercial receivers which I have looked at do not employ this method of construction, and I am not anxious to waste money unnecessarily."—T. R. (Whetstone).

NORMALLY, the introduction of screening between stages is to prevent interaction between wiring and components and this ensures stability. It is possible to obtain this desirable result by careful disposition of wiring, but the types of receiver you have examined will, we think, have incorporated screens over each valve, which amounts almost to the same thing. At your address, however, you would probably find that the local station would be picked up on inter-circuit wiring, and therefore elaborate screening would be desirable in a powerful multi-valver if you wish to make long-distance reception during broadcast hours. It may even be necessary to enclose the receiver in a metal cabinet, effectively earthed.

Aerial Design

"I understand that the aerial design, height and other factors are of the greatest importance in controlling the efficiency of a receiver, as well as of a transmitter. As I am setting out to improve my present results I wonder if you can recommend any book on aeriels which will explain the various features and give alternative designs."—V. E. (Mill Hill).

A VERY good book on the subject is the Radio Antenna Handbook. This is obtainable from the R.S.G.B. Sales Department, 53, Victoria Street, London, S.W.1, price 3s. 9d., post free. In order to obtain maximum results on all wavebands, and from all parts of the world, it is often desirable to erect several aeriels, and use particular units for special purposes, but it is possible to erect a rotatable aerial of the di-pole type which will give good results under most normal conditions and which, with a reflector, will cover any desired part of the globe.

The coupon on page iii of cover must be attached to every query

Practical and Amateur Wireless BLUEPRINT SERVICE

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Genet Midget (D, 2 LF Trans)	June '35	PM1
Cameo Midget Three (D, 2 LF Trans)	—	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	—	PW53
Battery All-Wave Three (D, 2 LF RC)	—	PW55
The Monitor (HF Pen, D, Pen)	—	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, D)	14.8.37	PW64
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.30	PW69
The "Colt" All-Wave Three (D, 2 LF RC & Trans)	18.2.39	PW72
The "Rapid" Straight 3 (D, 2 LF RC & Trans)	4.12.37	PW82
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	28.8.37	PW78
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW84
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.38	PW87
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38	PW89
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.9.33	PW92
Four-valve : Blueprints, 1s. each.		
Sonotone Four (SG, D, LF, P)	1.5.37	PW4
Fury Four (2 SG, D, Pen)	8.5.37	PW11
Beta Universal Four (SG, D, LF, Cl, B)	—	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl, B)	—	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW40
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All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79
"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl, B)	12.2.33	PW83
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A.C. Three (SG, D, Pen)	—	PW20
A.C. Leader (HF Pen, D, Pow)	7.1.39	PW35C
D.C. Premier (HF Pen, D, Pen)	—	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	—	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (RC))	—	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	—	PW56
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70
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A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47
A.C. All-Wave Corona Four	6.11.37	PW81

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A.C. £5 Superhet (Three-valve)	—	PW43
D.C. £5 Superhet (Three-valve)	1.12.34	PW42
Universal £5 Superhet (Three-valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	31.7.37	PW59
F. J. Camm's Universal £4 Superhet 4	—	PW60
"Qualitone" Universal Four	16.1.37	PW73
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Push-Button 4, A.C. Mains Model	22.10.38	PW95
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Two-valve : Blueprints, 1s. each.		
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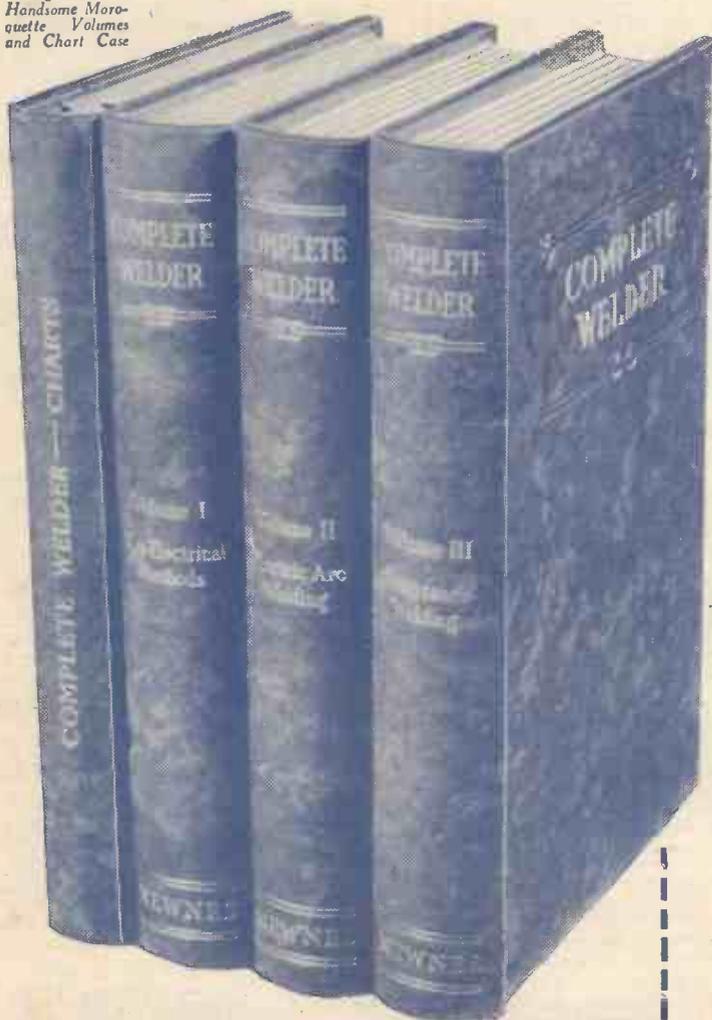
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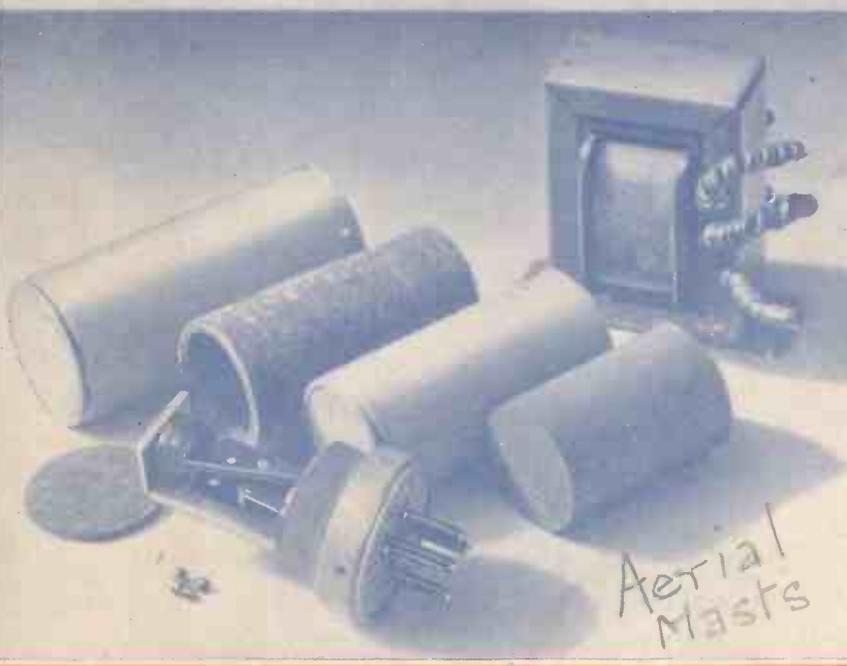
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AERIAL MAST DESIGN

See Page
437.



Practical and Amateur Wireless

Edited by F. J. C. AMM

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh.Sch.,
B.Sc., A.M.I.E.E., Frank Preston.

Vol. XIV. No. 357. July 22nd, 1939.

ROUND *the* WORLD of WIRELESS

Vibrators

THE H.T. battery has always been the main bugbear to the listener who cannot employ mains supplies for his receiver, and many ideas have been suggested from time to time to enable this battery to be dispensed with. Special valves have been designed, gas-operated units have been put on the market, and novel generators capable of operating from small cells have been suggested so that a high voltage may be obtained. The main purpose of the H.T. battery is to deliver a fairly high voltage with a small current, and therefore it does not seem that there should be any difficulty in the way of designing a suitable substitute. One of the most satisfactory schemes is the small vibratory rectifier which is now a part of practically every car-radio receiver. This is fed from a 6-volt or 12-volt accumulator, which is used in every car, and it delivers an output of 100 volts or more at a current suitable for operating either battery or mains-type receivers. We have previously described in these pages a mains unit built round a commercial vibrator, and in this issue we give further details of the method of operation of this type of generator, together with instructions for making different types. For car radio purposes, or for those who live in the country where H.T. batteries are not readily obtainable, these details should prove of value.

Police Radio

THE Marconi Company of Canada have supplied the Police Department of the City of Sherbrooke, Quebec, with a modern type of two-way police radio outfit, to assist in traffic control. The apparatus was used for the first time during the visit of Their Majesties on the recent tour.

days of the silent film. To-day he is recognised as the man whose back is more familiar than that of any other band leader, so much so that "Jack's Back" is Hylton's own slogan.

Sailing at Edgbaston

ONE of the contests of the Midland Sailing Club at Edgbaston Reservoir, Birmingham, will be the subject of a running commentary by Peter Scott (July 29th), who has represented England in small boat sailing contests on the Continent. The first part of the broadcast will describe the preparations for the race, and then Mr. Scott will go out in a boat with a portable transmitter to describe the race itself. The Midland Sailing Club holds a meeting at the Reservoir every Saturday during the summer season, and some of its members may also be seen there during the winter. For the broadcast it is hoped to have what is called a menagerie race, in which all kinds of small craft compete on a handicap basis. Mr. Scott is the son of the famous Antarctic explorer and is himself noted for his paintings of birds.

ON OTHER PAGES	
	Page
A Two-pentode Receiver ..	435
Aerial Mast Design ..	437
On Your Wavelength ..	439
Seeing is Believing ..	441
Readers' Wrinkles ..	443
Vibrators: Principles and Construction ..	444
Short-wave Section ..	446
Practical Television ..	448
Readers' Letters ..	452
Queries and Enquiries ..	455

From Lawrence Wright's "On With the Show"

HALF AN HOUR of good fun and good music is promised in the excerpt from Lawrence Wright's "On With the Show," which will be on the North Regional air on Friday, July 21st. Stars of this show, which is at Blackpool North Pier, include Tessa Deane, Frank Randle, Lance Fairfax, and Bram Martin and his band.

An SOS for Humour

THE Vienna (Germany) radio studio, in its effort to brighten its programmes, has initiated a new weekly prize competition. Listeners are being asked to contribute wise-cracks, the best of which, in the opinion of the organisers, will be awarded every Saturday a book bearing a dedication personally signed by the station director!

"Birthday Party"

WHEN listeners hear the familiar strains of "Oh, Listen to the Band," there is no doubt in their minds as to who it is. Jack Hylton is on the air. He, with Noel Gay, Dorothy Dickson and Norah Swinburne, will be the guests who, as their birthdays fall within the month of July, will qualify to appear in "Birthday Party," which will be broadcast on the National wavelength on July 24th. The guests will again be welcomed by Christopher Stone.

Jack Hylton is a Lancashire lad, having been born in Bolton, the son of a cotton spinner. He had no tuition at all, but long before he was in his teens had won fame as a child prodigy, singing and playing the piano. He gradually worked his way up to fame via pierrot troupes and playing the piano in cinemas during the

The Bath Road

ANTHONY GITTINS has prepared a programme about the journey from London to Bath in the year 1820, which will be produced by Francis Dillon on July 25th. The greatest speed of the coach was eleven miles an hour, and the journey from London to Bath took twelve hours, starting from outside the General Post Office in Lombard Street, or the White Horse in Holborn. It is difficult to say which were more romantic, the members of high society who travelled in the coaches, or the highwaymen. Mention will also be made of the old inns where travellers halted, and where the horses were changed.

Song Recitals by Isobel Baillie and Mark Raphael

SONGS by Purcell, Schumann, Franz, Joseph Marx, Sir Arnold Bax, Ivor Gurney, Holst and Armstrong Gibbs will be sung by Isobel Baillie on July 28th, and Mark Raphael will sing "Les Nuits d'Été" (Summer Nights) by Berlioz, in the same programme. This song cycle is a setting of poems by Théophile Gautier and was composed in 1834.

ROUND the WORLD of WIRELESS (Continued)

The Trial of Mary Blandy

JOHN GOUGH, B.B.C. features producer in Scotland, has made something of a "corner" in trials, and many listeners will find it hard to forget his dramatic treatment of such cases as those of Madeleine Smith and Katharine Nairn. He is coming to London on July 21st to produce for National listeners a dramatisation of "The Trial of Mary Blandy."

Living in Henley-on-Thames in the middle of the eighteenth century, the "fair paricide," as she later became known, was very popular with all the local young gentlemen, more for her reputed dowry



Tessa Deane, Radio's "Queen of Song," who is appearing in Lawrence Wright's famous "On With the Show" at the North Pier, Blackpool.

than for her person. She appears, however, to have been, if not beautiful, cultured and agreeable, and the local *jeunesse dorée* must have been surprised and horrified when it was learnt that she had apparently been engaged for a long period in adding arsenic to the water gruel she prepared for her dotting father. She at once became the central figure in a *cause célèbre*, and John Gough's account of the proceedings against her should delight all amateurs of crime.

New German 100-kilowatt Station

AT Oldenburg (Germany), close to the Netherlands frontier, the German *Reich* is installing a 100-kilowatt broadcasting transmitter. It is expected to be brought into operation in October next. The wavelength to be adopted is the one at present used by Munich, 405.4 m. (740 kc/s), this station eventually moving to 382.2 m. (785 kc/s), hitherto monopolised by Leipzig. In its turn, the latter station will take over the wavelength of Graz, namely, 338.6 m. (886 kc/s).

Addition to Czech Network

THE new transmitter now in course of erection at Dobrochov will shortly be ready for its initial tests; it will broadcast programmes in the Czech language for the Moravian districts.

In the South Sea Islands

IN the third of his talks in the "Seeing Life" series, on the Midland (July 24 h), Alan Burgess, a young Birmingham

INTERESTING and TOPICAL NEWS and NOTES

writer who travelled round the world, will tell how he spent a year in the South Seas, seeing Fiji, Samoa, and the Society Islands. He considers Tahiti to be "the best place this side of Paradise."

Sir Hamilton Harty Conducts B.B.C. Orchestra

SIR HAMILTON HARTY will come to a B.B.C. studio on July 27th to conduct a section of the B.B.C. Orchestra in a programme devoted to Mozart, which will include Symphony No. 40 in G Minor.

WLW Announcer Buys an Aeroplane

MICHAEL HINN, who handles the 8.15 a.m. newscasts on WLW (Cincinnati) has at last realised his ambition. Recently he bought a monoplane, and is now talking about travelling in terms of minutes. He holds a private licence.

Mantovani from Skegness

MANTOVANI and his Orchestra are to broadcast in the Northern programme early on Thursday evening, July 27th, from Butlin's Holiday Camp at Skegness, Lincolnshire. Stella Roberts and Jack Plant are the singers with the Orchestra.

Cinema Organ and Dance Band

LIGHT musical entertainment on the Northern wavelength early on Friday evening, July 28th, includes a broadcast by Reginald Liversidge at the organ of the

Lido Cinema, Bolton, and, immediately following this, another "Dancing Here and There" programme in which listeners will hear Cliff Bateson and his New Imperials, and Billy Butler and his Band.

Northern Cabaret

DEVISED and produced by Muriel Levy and Joyce Lustgarten, another Cabaret entertainment, "Change of Air," will be broadcast from the Manchester studios in the Northern programme on July 26th. Noel Norris, well known to listeners to the North Regional Children's Hour and to patrons of the Manchester Repertory theatre, will be the compère, and the artists are Jessie Driver, Taylor Frame, Doris Gambell, Muriel Levy and Wilfred Pickles. Maurice Arnold and Doris Kenna will be at the pianos.

Sunday Afternoon Television

THE B.B.C. inform us that, from July 16th to September 17th, inclusive, no Sunday afternoon television programmes



Twelve of Scotland Yard's accident squad recently inaugurated a six months' traffic experiment. They patrolled on foot the busiest thoroughfares in South London, offering advice to all road users, including pedestrians. Each officer will have a hand megaphone, amplified by electricity, and a loudspeaker mounted on a tripod. The idea is to cut down the number of accidents. Our illustration shows a "courtesy cop" on foot instructing passers-by with the aid of his hand megaphone, at the Elephant and Castle, London, S.E.

will be transmitted. Pressure on the limited staff during the holiday season makes some reduction of programme hours essential, and it is believed that this arrangement will cause the minimum inconvenience to viewers.

Concert from Sweden

A CONCERT to be relayed from Sweden on July 24th will be given by the Stockholm Broadcasting Orchestra under the direction of Tor Mann. The programme will include a Concerto for saxophone and orchestra, by Lars-Erik Larsson, played by Sigurd Rascher.

SOLVE THIS!

PROBLEM No. 357

MA RTIN had a home-made four-valve set—H.F. Detector, L.F. and power valve combination. Results were not too good on the short waves and he decided that change in the detector grid leak value might be an advantage. As he had a 2-megohm variable potentiometer spare which was in good order he decided to use this to see the effects of changes in value. He therefore removed the fixed leak and connected the variable component between earth and one side of his grid condenser. When tried out, however, it not only failed to make any change as it was adjusted, but signals were conspicuous by their absence. What had he done wrong? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 357 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, July 24th, 1939.

Solution to Problem No. 356

The resistance which Rogers used for the grid leak in his resistance-capacity unit was open-circuited, and thus the grid became choked after a few seconds. The following three readers successfully solved Problem No. 356, and books have accordingly been forwarded to them:
W. Sanderson, 23, Leeholme Avenue, Leeholme, Bishopton Auckland, Co. Durham; J. D. Morrice, 55, Jasmine Terrace, Aberdeen; J. Holden, 9, Grant Street, Oldham, Lancs.

Making a Double-pentode Receiver

Details of a Simple Type of Two-valve Receiver with Fair Range and Selectivity and Capable of Working a Loudspeaker at Modest Volume. Home-made Tuning coils can be Used if Desired.
By FRANK PRESTON

WHEN it is decided to build a two-valver, a Det.-L.F. circuit is generally adopted without studying whether or not a better arrangement is possible. For many purposes there is a more satisfactory circuit, a form of which is shown in Fig. 1. It will be seen that two pentodes are used; the first, an H.F. pentode, as H.F. amplifier, and the second, a small power pentode, as regenerative detector.

What advantages does this circuit offer over the more conventional one mentioned above? In the first place, it has a more effective range due to the use of an efficient stage of high-frequency amplification. This is very useful when the constructor is anxious to receive a wide variety of European stations, and when an efficient aerial-earth system cannot be employed. There is, of course, the further important advantage that a fairly high degree of selectivity can be obtained if the set is operated with reasonable skill.

Range and Volume

Most constructors discarded a circuit of this general type (although probably of more primitive form) a few years ago when carphones were replaced almost exclusively by a loudspeaker. But by using a pentode as detector, loudspeaker reception is by no means impossible, especially if one is content to have only sufficient volume for a small room or "den." Moderate speaker reception is possible with a single-valve pentode arrangement if the set is carefully designed, and although in theory an H.F. stage does not give any volume increase this is not always true in practice. This is because the permissible input to an L.F. pentode is comparatively high, and the maximum input can more nearly be reached if an H.F. stage is included between the aerial and the detector circuit.

I am not going to give complete and precise instructions for building a set around the circuit shown in Fig. 1, since many readers will probably wish to employ components that are on hand. In any case, the actual components and layout are not extremely important and satisfactory results can be obtained with most generally-used types. However, a suggested form of construction is shown in Fig. 2, where the use of a metallised or aluminium chassis is assumed. It will be seen from this that a two-gang condenser and seven-pin valveholders are shown; these are not essential, and two separate .0005-mfd. tuning condensers could be employed if these were more readily available, whilst the valveholders would be to suit valves that were on hand.

The Coils

Another point that requires explanation is that the unshielded coils shown are similar to those I described in the issue

of PRACTICAL AND AMATEUR WIRELESS dated January 7th of this year in the series of articles entitled "Making Your Own Components." The terminal-number connections given in Fig. 1 are also for these coils. It should be stressed, however, that if home-made coils are employed a good deal of care will be necessary in matching them unless separate tuning condensers, or a two-gang condenser with external trimmer control, are used. The home-made coils could easily be mounted by means of small metal angle brackets, or by screwing two large corks to the chassis on which the coils would grip. Ready-made coils could be used instead if preferred, and these may be either screened or unshielded. The reason for this is that the coils are not only at right angles, but are placed one above and one below the "deck" of the chassis so that there is little fear of interaction

transformer. A three-point shorting switch can be used for wave-changing, passing the lead from terminal 5 of the aerial tuner through the chassis directly above the switch, so that it is screened from the corresponding lead from the inter-valve coil. The anode of the H.F. valve is decoupled by means of a 10,000-ohm resistor and .1-mfd. tubular condenser, while both auxiliary grids are fed from a common H.T. tapping and are by-passed by separate .1-mfd. tubular condensers placed close to the valveholders.

There is a straightforward leaky-grid arrangement for the detector and the reaction circuit is conventional except for the inclusion of a 200-ohm resistor which serves to smooth out reaction control. The anodes of both valves are fed from the same (maximum) H.T. tapping, which can supply a voltage up to about 120. It

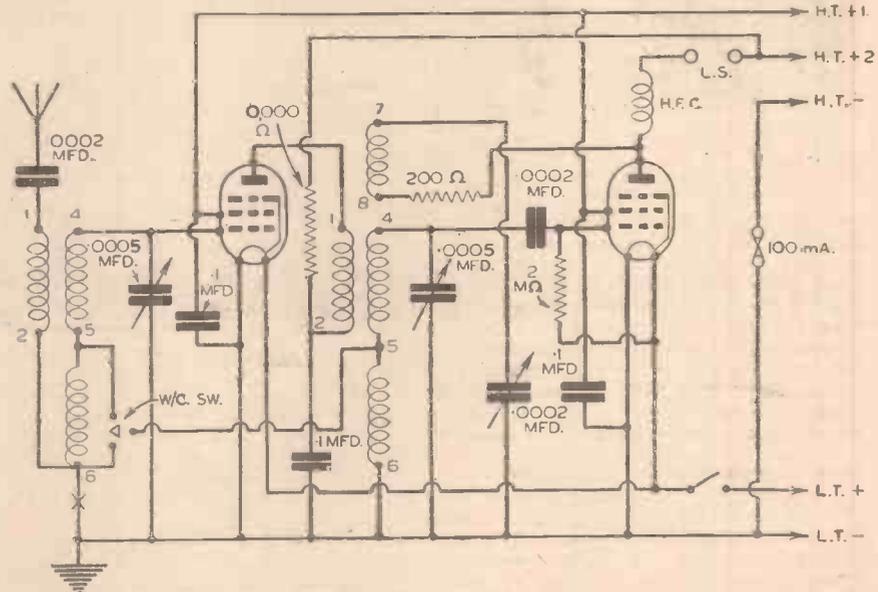


Fig. 1.—Circuit arrangement of the two-pentode receiver described.

between them. If any reader should prefer to use baseboard construction the coils should be screened. Again, they could be ready-made or the home-constructed ones previously referred to, and for which instructions for screening were given in the descriptive article. The H.F. choke may be of almost any fairly good type, and could be made as described in the issue dated January 14th of this year.

Circuit Details

Now let us return to the circuit and run through it. The first coil is used as a simple aerial tuner with aperiodic coupling, while the second acts as a tuned H.F.

might appear that the consumption of high-tension current would be excessive when using such an anode voltage, but it should be remembered that the current is controlled to a greater extent by the auxiliary-grid voltage than by the anode voltage. Tapping H.T.+1 can receive from 36 to 72 volts.

Coil Modifications

It was mentioned above that the coils may be similar to those described in the January 7th issue. Some readers might remember that the coils referred to had a tapped primary winding, and that provision was made for short-circuiting the lower

(Continued on next page)

MAKING A DOUBLE-PENTODE RECEIVER.

(Continued from previous page)

portion of this, as well as the long-wave section of the grid winding, by means of the wave-change switch. To simplify the switching arrangement it is better to use a three-point switch as indicated. For this to be fully satisfactory it is better to reduce the number of primary turns to a total of 70, of which 30 will be over the grid winding and 40 adjacent to the long-wave section. Of course, those who prefer to do so may use two double-pole on/off switches, or a gang unit; this is slightly more efficient, but the difference will not be very marked.

Layout and Wiring

If the form of construction shown in Fig. 2 is adopted there is little more which need be said concerning the layout and wiring. As usual, all leads should be kept as short and direct as possible, whilst connections passing through the chassis from the coils should be kept on the same side as the coils to which they are attached to points immediately above or below the other component to which they are joined. Fixed resistors and condensers can be suspended in the wiring on the under-side of the chassis, and terminal-socket strips for aerial and earth and loudspeaker may be mounted on the back of the chassis, using flexible leads for battery connections.

For preference, the H.F. pentode should not be of the variable- μ type. If it is, it would be desirable to apply a small bias which might be derived from a tapped 4½-volt battery shunted by a .1-mfd. condenser and inserted between terminal 6 on the first coil and earth, at the point marked with a cross. Of course, a variable- μ potentiometer control could be added if preferred, but that is a refinement which the average constructor will probably not require.

Operation

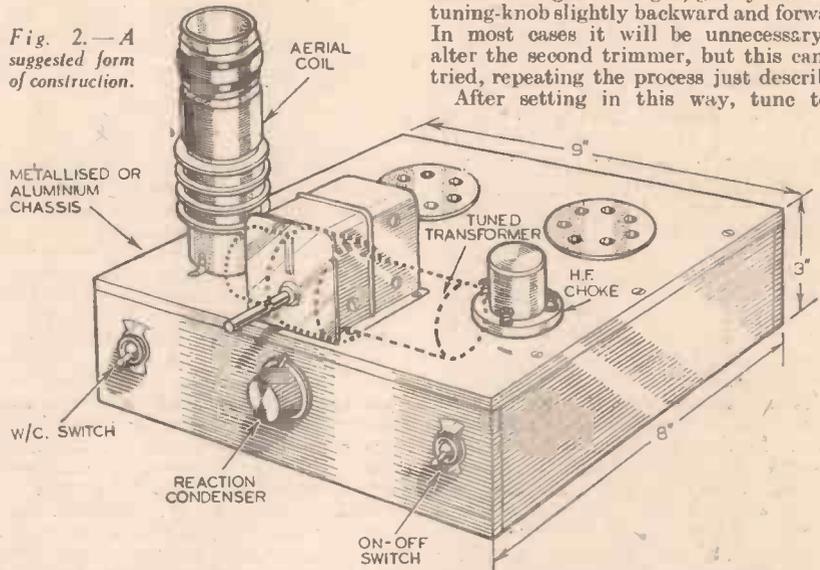
The method of operation is practically the same as for any receiver with an H.F.

stage, but it will pay to experiment with the most suitable H.T. voltages. Remember to switch off before moving the wander plugs, in order to avoid voltage surges to which pentodes are very sensitive. It will generally be found that oscillation can be obtained very easily, and if reaction control is found to be unduly sensitive (this will depend to a certain extent upon the particular valve used in the detector socket) a small fixed condenser, up to .0003-mfd.,

this assumes that the coils are fairly well matched in the first place. For the benefit of new readers, the method of trimming might be of interest. First, set both trimmers to about their midway positions and then tune in a station near the bottom of the medium waveband. Have reaction adjusted as "loosely" as possible, and then carefully alter the setting of the trimmer on the first section of the condenser, which tunes the aerial coil. As this is adjusted for maximum signal strength, gently move the tuning-knob slightly backward and forward. In most cases it will be unnecessary to alter the second trimmer, but this can be tried, repeating the process just described.

After setting in this way, tune to a

Fig. 2.—A suggested form of construction.



may be connected between the anode of the detector and the earth line.

Do not expect to "raise the roof" with the speaker; if you do you will be disappointed, for the volume will not be great. Nevertheless, given a sensitive speaker it will be adequate for experimental work. If earphones are used it will be found that ample volume can be obtained on the majority of stations. Once the gang condenser, if used, is properly trimmed, selectivity should be fairly good, although

station toward the top of the band and re-check, if necessary slightly re-adjusting. It is worth while turning back to the lower setting and again testing the adjustment, for the best possible reception can be obtained only if the two circuits are ganged accurately. Besides, the degree of selectivity is increased as the alignment is made more accurate. As many readers will be well aware, tuning is sharpened by careful adjustment of the reaction condenser and also by biasing the H.F. valve.

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
 Wednesday, July 19th.—Up With the Curtain, a variety entertainment.
 Thursday, July 20th.—A choral recital.
 Friday, July 21st.—The Trial of Mary Blandy, adapted by John Goff.
 Saturday, July 22nd.—Sing Song.

REGIONAL (342.1 m.)
 Wednesday, July 19th.—Going Up, a radio version of the Gaiety musical comedy, from Midland.
 Thursday, July 20th.—The Growth of a Beard, a play by Denis Constanduros.
 Friday, July 21st.—Concert Party programme from the Pier, Boscombe.
 Saturday, July 22nd.—Sedgemoor, a radio dramatic reconstruction of Monmouth's Rebellion.

MIDLAND (296.2 m.)
 Wednesday, July 19th.—Going Up, a radio version of the Gaiety musical comedy.
 Thursday, July 20th.—Tewkesbury Festival: part of the pageant play, The Tower.
 Friday, July 21st.—Concert party programme.
 Saturday, July 22nd.—The Schools Inter-

County Athletic Championships at Loughborough—an eye-witness account.

WEST OF ENGLAND (285.7 m.)
 Wednesday, July 19th.—Light orchestral programme, from the Continental Restaurant, Boirncmouth.
 Thursday, July 20th.—Variety in Miniature.
 Friday, July 21st.—Concert party programme from the Pier, Boscombe.
 Saturday, July 22nd.—Sedgemoor, a radio dramatic reconstruction of Monmouth's Rebellion.

WELSH (373.1 m.)
 Wednesday, July 19th.—Rhyd Night, a parade of seaside entertainment.
 Thursday, July 20th.—A Glimpse of the B.B.C. Week at Harlech.
 Friday, July 21st.—Owen Owen, a talk.
 Saturday, July 22nd.—Boy Scouts' Jamboree, at Gwerych Castle, Abergelle, Denbighshire.

NORTHERN (449.1 m.)
 Wednesday, July 19th.—Burbleton Rush-bearing.
 Thursday, July 20th.—Brighter Bridlington Cameos.

Friday, July 21st.—Commemoration Week Concert from the Wallasey Grammar School.

Saturday, July 22nd.—Orchestral programme from the Spa, Scarborough.

SCOTTISH (391.1 m.)
 Wednesday, July 19th.—Find the Flaws, a radio diversion.

Thursday, July 20th.—Camp Fire Scout Moot, from Monzie Castle, Scotland.

Friday, July 21st.—Under Canvas: an impression of the various Camp activities recorded at Aberdour.

Saturday, July 22nd.—Scottish Dance Music.

NORTHERN IRELAND (301.1 m.)
 Wednesday, July 19th.—Golf: An eye-witness account of the Irish Open Golf Championships at Newcastle, County Down.

Thursday, July 20th.—The Half Door, a play in one act by F. K. Fahy.

Friday, July 21st.—The Third Concert of Ulster Festival Prizewinners.

Saturday, July 22nd.—Sedgemoor, a radio dramatic reconstruction of Monmouth's Rebellion, from West.

AERIAL MAST DESIGN

WHEN one travels by rail and passes along the back gardens of certain suburban areas, one of the most noticeable items is the disorderly array of so-called "wireless masts" which flank the railway. Scaffold poles, odd lengths of quartering, and thin, wriggly gas-piping are very common, and it is seldom that one sees a properly-made or substantially-guyed mast. When the question of expense is considered the mast is not a very large item in the complete radio station equipment. Yet it has to support the main collector of energy, and most amateurs now know that a swaying aerial can give rise to signal strength variations, and a badly supported mast can accentuate aerial movement. We have already described in these pages a lattice type mast which is not only business-like in appearance, but which is capable

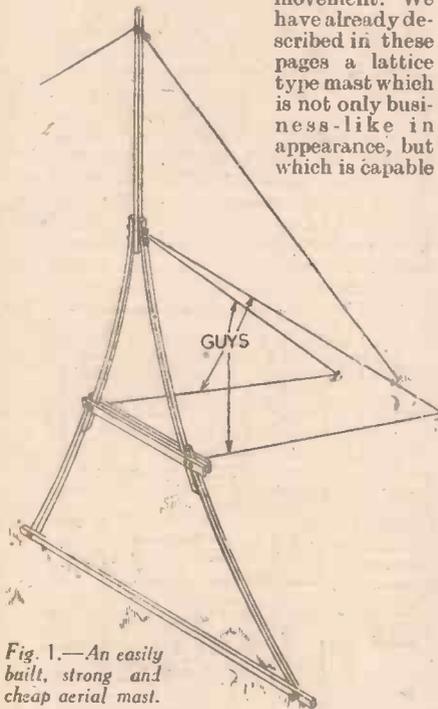


Fig. 1.—An easily built, strong and cheap aerial mast.

of being erected to a height of 40ft. with perfect rigidity. Unfortunately, the amount of timber needed and the work involved in construction make it a rather luxury item for most listeners and simpler types of mast have to be considered.

Single Masts

If a single type of mast or pole is decided upon, some substantial material must be used, even if a number of guys are employed. Ordinary two-by-two quartering as supplied by the average timber yard, is composed of ordinary deal, and this will not withstand the average English climatic conditions without twisting or bending. Even if guyed at several points, it will be found that a bad bend will eventually develop at some part, and if a large knot happens to be present there is every possibility of a fracture-taking place at that point during a strong wind. Therefore, a length of fir or a good flag-staff should be considered in preference to the simpler type of single pole. Good scaffold poles are not, unfortunately, cheap to purchase, but if there is a builder's yard in your district it may be possible to pick up cheaply a scaffold pole which has been used for some time

A Good Aerial Mast is Not Necessarily an Expensive Article, but It May Make a Great Improvement in the Results Obtained with Any Type of Receiver.

By W. J. DELANEY

and which the builder does not feel sufficiently good for further use as a support for building work. Well dosed with weather-proofing paint or other medium, such a pole may be found a very good aerial support, but do not omit guys at least two points above the centre.

Welded bands with rings already attached are obtainable from ship's supply stores, which are found in most big cities, and these are obtainable in many sizes, so that they may be slipped down the mast to the desired level and then attached rigidly for supporting guys.

Guy Supports

These should be of good steel wire, preferably stranded, and with two or more strong insulators inserted to break the continuity of the wire. Three guys can be made to suffice, but four are obviously preferable. In most gardens the pole will have to be placed back near the fence in order to accommodate sufficient length of aerial wire, and this will mean that rear guys will not be possible without going over into a neighbour's garden. In some cases this difficulty may be overcome by making the mast a "communal" affair, the neighbour sharing the expense, and the guys then being divided between the two gardens. Aerials may then be attached to each side at the top and one mast will support them both. Alternatively, the three wire supports will enable two guys to be placed close up to the fence and in line, with a single guy in the front.

Semi-lattice Masts

A type of mast which is finding increasing favour in restricted gardens, and which is

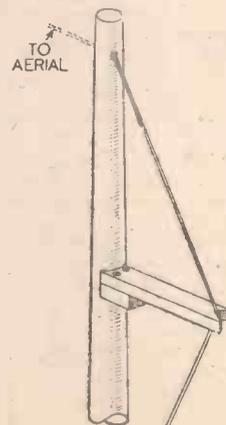


Fig. 3.—Strength may be imparted to the mast top by a back-guy as shown here.

much cheaper to build than a full lattice mast, but which is almost as strong and is certainly preferable to a single wooden pole, is illustrated at Fig. 1. This may be built from good quartering—about 2in. by 2in., but do not use ordinary deal. Pine is not very much dearer but will stand weather much better, and may be creosoted or otherwise treated to avoid moisture penetration. It may be built in three or in two sections, a two-section array of this type

being described in this paper in 1933, and shown in Fig. 2. Greater rigidity will be obtained, and the cost somewhat reduced by shorter lengths of the material and building the mast in three sections, as shown in Fig. 1. This type of mast offers very little wind resistance, may be placed right close against a rear garden fence, and should any portion eventually become damaged or warped due to weather conditions, that portion alone may be replaced at low cost. Standard coach bolts may be used for fixing the various parts together, and guys may be used in the standard manner, or a front prop used as shown in Fig. 2. In the latter case

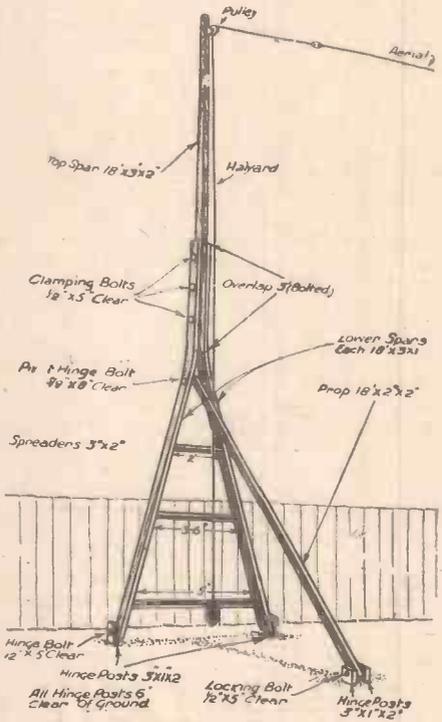


Fig. 2.—A more elaborate form of the type of mast depicted in Fig. 1.

it would be preferable to place a rear guy to take the top strain from the aerial, using the standard ship's mast idea with rear support, as shown in Fig. 3. Remember, when using guys or straining supports, to use turnbuckles with which suitable tension may be obtained after the ropes or wires are attached. Again, suitable wire ropes, manilla or hemp rope, and metal-cored ropes may be obtained from ship's accessories supply stores.

Metal Masts

Although many listeners use ordinary thin gas-piping with satisfactory results, it is not possible to erect a really high mast with this material owing to its general weakness unless extra heavy gauges are employed. These are fairly expensive, and the only satisfactory mast of this type will be made up from several lengths of varying size, each being joined to its neighbour by a proper reducing nipple or joint. The thinness of the final mast at the upper end will introduce difficulty in the attachment of guys, unless the piping is drilled through,

(Continued on page 452)

A Simplified Tuning Indicator

In this Article Details are Given of a Tuning Indicator Circuit Incorporating an Indicator Valve of the Electron Beam Type

THE most common form of tuning indicator used in present-day receivers is of the cathode-ray tube type, an example of which is the well-known RCA6E5 "Magic Eye." This valve has a cathode and a control electrode interposed between the cathode and the target to cast a shadow on the target with an increasingly wider angle as the control electrode becomes less positive with respect to the cathode. The valve also includes a triode amplifier, the anode of which is connected to the control electrode of the C.R. tube and serves in conjunction with a suitable load resistor to control the shadow on the screen.

The amplifier portion of the valve is necessary in order to permit it to be coupled to a source of biasing potential responsive to signal strength such as the output of a second detector. The presence of the amplifier within the tuning indicator tube tends to make the tube relatively large and not readily adapted to smaller radio receivers, such, for example, as car radio receivers, and requires that it be connected to the second detector or other source of variable D-C bias responsive to signal strength variations, which is often not convenient or desirable.

The Radio Corporation of America have developed an improved tuning indicator circuit involving an indicator valve in which the electron beam or cathode-ray type in which the amplifier within the valve has been eliminated, thus permitting a tube of smaller size to be employed, and further eliminating the necessity for any external amplifier for the tuning indicator tube.

Referring to the figure which shows a schematic circuit diagram of the arrangement 5 is an intermediate frequency amplifier valve of the screen-grid type having a control grid 6, a screen grid 7, a cathode 8, an output anode 9, and a suppressor grid 10.

Intermediate frequency signals from a preceding amplifier or first detector (not shown) are applied to the control grid 6 through a tuned interstage coupling transformer 11, the secondary 12 of which is connected through its high potential terminal 13 to the control grid 6. The low potential terminal 14 of the secondary 12 is connected with an A.V.C. supply lead 15 for the receiving system, which receives a controlling A.V.C. potential from the second detector indicated at 16, across the output resistor 17 thereof, through a filter resistor 18. The detector is coupled to the amplifier 5 through an interstage coupling transformer 19, and is of the diode rectifier type having a cathode 20 connected to earth as indicated at 21, whereby the bias supply circuit from the resistor 17 is completed to the cathode 8, and other amplifier cathodes (not shown), directly through a ground connection 22 for the said cathode.

For the tuning indicator system under consideration, this type of control is preferable in that it permits all of the cathodes of the controlled valves to be connected to earth, and the controlled grids to be connected with the common A.V.C. supply lead, 15.

Amplifier Valve
In modern radio receiving systems, the amplifier valve such as the valve 5, is

subjected to a relatively wide range of A.V.C. potentials extending in some cases from 0 to -40 volts. It has been found that with this range of control a more gradual cut off, and consequently lower distortion in the receiver, may be realized, and a source of controlling potential for the indicator may be obtained if a relatively high resistance indicated at 23, is inserted in series with the screen-grid 7 between it and the positive H.T. supply lead indicated at 24, so that, with no signals, the screen current is sufficient to drop the voltage at the screen to substantially 90 volts with a voltage of 250 at the lead 24. This may require a coupling resistor 23 of 100,000 ohms resistance. The range of control potential variation available across the said resistor is sufficient without amplification, to operate the control electrode of an electron beam indicator valve, such as a valve indicated at 25. This valve is greatly simplified with respect to the well-known electron beam valve including the amplifier, such as the RCA6E5, since it may include only a target electrode 26, a cathode 27 extending through the

target, and a control electrode 28, together with the heater 29 for the cathode. One suitable valve for this purpose is the RCA type 6AF6G.

Control

Electrode

The control electrode 28 extends through the target and casts a shadow in the electron beam which extends radially from the cathode to the target 26. The control electrode is connected to the screen-grid end 30 of the screen-grid series resistor 23, through a connection lead indicated at 31. The target electrode 26 is connected directly to the positive H.T. supply lead 24 through a lead 32, and the cathode is connected through a biasing resistor 33 to the negative H.T. supply or chassis ground indicated at 34.

While the amplifier valve 5 is preferably an intermediate frequency amplifier tube, it may be any screen-grid valve in a receiving system which is subjected to automatic volume control bias, and whose screen-grid current decreases with increased negative bias on its control grid.

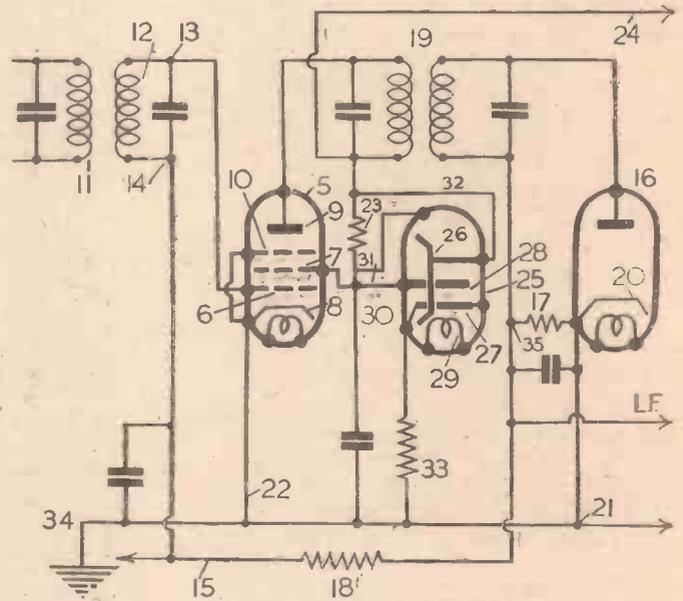
As the signal strength increases, an increasing negative bias from the negative terminal 35 of the output resistor 17 is applied between the cathode 8 and the control grid 6 causing the screen current to the screen 7 to decrease, thereby causing a decrease in the potential drop through the

resistor 23, therefore causing the potential of the control electrode 28 to approach that of the target 26. In the presence of strong signals, the screen current may be reduced to such a value that the screen-grid is substantially at anode potential, whereby the difference in potential between the control electrode 28 and the target 26 is substantially zero and the width of the shadow may become relatively small.

Circuit Resonance

As the signal strength decreases, the potential drop across the resistor 23 increases accordingly, causing the electrode 28 to become more negative with respect to the target 26 and, therefore, to deflect more widely the electron beam on the target 26. This causes the shadow angle to increase proportionately. The tuning indicator indicates resonance in this circuit when adjusted to minimum shadow angle.

It has been found that the range of increase and decrease of the shadow angle may be materially increased through the use of a series cathode or bias resistor 33



Circuit of the tuning indicator arrangement described here.

in circuit with the tuning indicator tube, and this may be of such a resistance value that the cathode 27 becomes more positive, or above ground by substantially 50 volts. The bias resistor 33 may have a resistance value of 50,000 ohms, and has been found to approximately double the shadow angle range on the type of tuning indicator indicated in the drawing.

 READ
"THE CYCLIST"
 2d. Every Wednesday

ON YOUR WAVELENGTH



By *Thermion*

Let's All Go To the Radio Show

THERE is not the slightest doubt that this year's Radiolympia is going to be the most momentous, and the most interesting, in the whole series of shows. Not only is the layout of the exhibition entirely different, for it has been architect designed, but manufacturers have been planning, are planning, and will continue to plan until the show opens in a more intensive manner than ever before, to make the show a thumping success from the point of view of the public. You will not go to the exhibition this year and see only an ornate collection of cabinet work. The manufacturers want you to go to the show to be interested, and I am determined to do my best to persuade every reader of this journal to come to the exhibition too. Many motorists have a little label on the back of their cars which contains the message: "If you can read this, you are too — close!" Under modern traffic conditions, unfortunately, we are all compelled to read those notices. Manufacturers have not been slow to observe that this would be a useful media for advertising the show, and they have produced a very neat little label bearing the inscription, "Let's All Go To the Radio Show." The label is printed in yellow and red and contains also the date of the exhibition. Now I know that a large proportion of my readers run motor-cars, and I want them all to be good chaps by applying to me for one of these labels to stick in the back window of their cars, or even on the windscreen. If they will send a postcard indicating their interest I shall be glad to post them a couple of labels or more if they can persuade some other friends to stick them on the windows of their cars, too.

Notwithstanding the fact that I am a radio journalist, or in spite of it, I can still manage (just about!) to run a car, and I have these labels affixed to the windscreen and rear window of my car. I hope to see many of my readers similarly exhibiting them, and if I challenge anyone in a traffic stop with the cabalistic challenge, "Thermion," and he responds, I'll buy him a drink, maybe two.

Let's All Meet At the Radio Show

I MADE a suggestion in a recent issue that members of the B.L.D.L.C. should band together and come to the exhibition as a party. If a sufficient number agree to do this, I shall be glad to arrange either lunch or dinner for a very nominal fee, and to arrange for speakers. After the function I shall be glad to take readers round the exhibition.

And this offer does not extend only to members of the B.L.D.L.C. I am prepared to run a number of these luncheons and/or dinners so that ordinary readers can come and meet the staff of the journal, the personnel of the Radio Manufacturers Association, and the managers of wireless firms. I must know soon, because the arrangements must be put in hand well before the show. If, therefore, you are prepared to come to the show under this arrangement, will you please drop me a postcard giving your name and address so that I can assess how many to arrange for, and will you please do it now?

Lady Readers

I HAD the temerity, the effrontery, or the impudence to question whether any readers of PRACTICAL AND AMATEUR WIRELESS were of the fair sex. By asking that question I doubted whether ladies were interested in the technique of radio. My deeds upon my head! I have asked for what has been meted out to me. Several lady readers have written to say, and they have said it quite indignantly, that they know as much about radio as many of the males. I will let Miss M. C. N. of Lee-on-Solent, represent the lady

readers who have written to me on the subject. This is what she says:

"I SEE that in this week's PRACTICAL AND AMATEUR WIRELESS you seem to be doubtful as to lady readers and S.W.L.s. I read your paper every week, as far as possible, and am particularly interested in the short-wave notes and in readers' logs. I would be glad to exchange S.W.L. cards with European and overseas readers.

"I have logged 63 different countries on the amateur bands (principally 14 and 28 mc/s) since the beginning of this year. Recent entries in my log include YV1AQ, CO8JK, CE1AS, OA4K, CX2AU, VP3CO, TG9BA, W5DNV, HK3CO, W5CXQ, W7DX, VK3BM, W5BUK, XE1GF, and VU2JG. On Monday, July 3rd, I made a special search for W6XBE, the station on Treasure Island, San Francisco, about which there has been quite a lot of discussion lately, and was successful in clearly receiving the programme, with call at 03.00 B.S.T."

Music of the Week

I SUPPOSE nearly every reader recalls the haunting, almost angelic music of Schubert, who was above all a writer of lyrics. Music was in his soul, even when food was not in his stomach. He died at the age of 31, having written 731 lyrics, several symphonies, one or two operas and operettas. The music of "Rosamunde," the famous Unfinished Symphony, and such lilting tunes as "Hark! Hark! the Lark," "The Trout," "Underneath the Lilac Bough," "The Linden Tree," "Impatience," "Who is Sylvia?" "March Militaire," etc., must live for all time, yet one of my readers, C. E. H., of Birmingham, apropos our music critic's remarks, writes:

"In 'Music of the Week' it is written: '... it is strange that Beethoven's life ... is not made into a play as successful as "Lilac Time."' I wonder what Schubert would say if he could return to life, and could see what has been done with his music? And now you suggest the same being done with Beethoven.

"I agree that 'Lilac Time' has been very popular—but what about

Schubert? If it is possible for people long since dead to turn in their graves poor old Schubert must have had a rather restless time. I sincerely hope that Beethoven will be allowed to rest in peace."

Well, I do not think that Schubert is going to turn in his grave. "Lilac Time" is a romantic musical comedy linking up some of Schubert's well-known songs. I do not think that Beethoven is likely to wince if his Rondo in G, "Für Elise," or some of his sonatas are dragged into a musical comedy. It will be far better than some of the muck which is composed to-day, and I think the public would appreciate it.

Let's Take Flo to the Radio Show

THAT is only my slogan, and by it I mean to suggest that as a special effort is being made to cater for the feminine interest at the show, every reader should take his sweetheart, wife or sister to it. I hope the dealers will help.

A Faux Pas

I HOPE the editor of the *Radio Times* will excuse me for correcting him on a small matter. In the issue of that journal for July 7th, in a paragraph dealing with the National programme for Saturday, July 15th, it said that listeners were to hear a commentary by Graham Walker, the motor-cyclist, on the 1,000 yards national sprint championship. I do not know why a motor-cyclist should be selected as a commentator for a cycling event, but the paragraph goes on to say that "Curiously enough" (my comment, "Why curious?") Graham Walker has ridden a motor-cycle on the Herne Hill Track. That was in 1930, when "everyone took to cover, and a motor-cycle has never been on the track since." With due respect to the *Radio Times* and for the information of Mr. Graham Walker, I would point out that motor-cycles have been seen on Herne Hill track for many years past in motor-paced events, and they have been seen and heard on the track many times since. I can assure the editor of the *Radio Times* that people did not take cover when Mr. Walker rode round the track, for motor-cycles have exceeded the speed at which he rode on Herne Hill track on almost every occasion on which there has been a motor-paced event.

For Militiamen

THOSE of our younger readers who have been called up under the Military Training Act and who are serving, or about to serve, in the

Notes from the Test Bench

Waverange Coverage

WHEN building a short-wave receiver most amateurs use standard coils and condensers, and as a result a fairly wide band is covered on each range. The amateur transmitter and others who are interested in amateur transmissions sometimes find difficulty in covering the amateur bands satisfactorily owing to the small portion of the dial which is used for the particular band—this depending, of course, on the size of coil and tuning condenser. A plan to be recommended in this case is to use either a special coil, wound so that only the amateur band is covered by the full compass of the tuning condenser, or, alternatively, to use much smaller band-spread condensers and thereby spread out the amateur band to the full dial reading. The latter scheme will not, however, enable each amateur band (that is, the 80, 40, 20, etc.) to be fully covered on the scale, and the special coils arrangement is the only satisfactory scheme whereby a full coverage may be obtained on each band.

Output-Filter Circuit

WHEN using an output-filter circuit one common cause of disappointment in the results is the use of an unsuitable L.F. choke. It should be remembered that the choke is in parallel with the speaker transformer; consequently it will have a marked effect on the loading value of the speaker, and, therefore, if any old choke is selected and the speaker matching is not attended to, the valve may be operated with an incorrect load value.

Earth Connections

WHEN making earth connections in a circuit it should be remembered that in some cases H.F. currents may be present in the earth lead and, therefore, care should be taken not to provide duplicate paths which might give rise to losses. Several cases have recently been noted in which leads to earth have run separately to a bolt on the chassis, and a "closed loop" has been formed by the duplicated leads and the chassis, and although no apparent losses were present, two or more bridging wires across the loop definitely gave improved results. A good plan to be followed is to take all "earth" points in each individual stage to one bolt or earthing point associated with that stage only. Although in some cases this may lead to rather long wires in certain circuits, it will probably be found that there is an advantage to be gained in the localising of the earth point. These details are, of course, applicable mainly to the modern multi-wave superhet type of receiver.

newly-formed Militia, probably find themselves confronted with a number of rather difficult problems. I am pleased to draw the attention of everyone interested to our contemporary, *Tit-Bits*, which is running a regular weekly National Service Page. This feature is of the very greatest help to everyone now serving in His Majesty's forces, and thousands of queries are dealt with each week by the special department organised by this famous paper.

Our Stand at the Exhibition

JUST jot the following down in your notebook if you would not mind: Radiolympia, Wednesday, August 23rd, to Saturday, September 2nd. PRACTICAL AND AMATEUR WIRELESS, Stand No. 9—same spot as previous years.

A.R.P. Equipment at Radiolympia

IT has been decided to stage an exhibition of A.R.P. equipment in the part of Olympia known as Portcullis Avenue—that is, the wide corridor between the Portcullis Entrance to the Grand Hall and the Hammersmith Road.

Wireless Den

THE same correspondent with the jaundiced outlook on Beethoven, has gone all goo-goo over the photographs of wireless dens I publish from time to time. He asks whether they are stalls at Radiolympia, show-room displays, or shop window dressing. Do the owners ever do any work in them? Are the floors lined with thick Turkey carpet? This correspondent tells me that he has a goodly space under the tiles.

Junk to the left of me,
Junk to the right of me,
Shavings all round me,
Surely I've blundered.

The photographs I publish are not stalls, show-room displays, or shop-window dressing. I do not believe that you should convert a room into a passable imitation of a marine store or an old clothes' shop in order to be considered a wireless ham. Only people with disorderly, unmethodical minds run wireless dens of this sort.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM.

From all Booksellers 5/- net, or by post 5/6 direct from the Publishers, George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, London, W.C.2.

SEEING IS BELIEVING

Too Much Trust is Placed in Judging Receiver Performance by Ear, and the Writer Shows How Far from Perfect this Method can be, and Stresses the Need for Meters for Test Purposes. By L. O. SPARKS

IT is really amazing, when one gives a little thought to the matter of circuit testing and adjusting, how few constructors make full use of some form of meter to guide them when modifying or testing a receiver or similar apparatus. Judging the performance of any sound-reproducing apparatus by ear alone is a very doubtful business. The ears of the average person are not capable of detecting small changes in volume and, what is even more important, no two ears possess the same sensitivity and frequency response.

What might appear to be perfect to, say, the tester or operator, could quite possibly represent a most distorted sound to a person blessed with ears so sensitive and perfectly balanced in a tonal sense that they could detect the slightest imperfection in a single tone or the resultant effect of several tones or instruments. A very common example of the widely-varying tastes of tone appreciation is that provided when several people are listening to the

Meters

Meters suitable for measurements of the currents and voltages usually associated with radio apparatus can cost anything from a few shillings to more pounds than the average constructor would care to spend on a single component. In spite of the widely-varying prices, they all achieve the same object although, of course, it will be readily appreciated that the more expensive instruments possess a very much higher degree of accuracy and, therefore, are in the long run the far better investment. Although there are various types of meters, each designed for some specific measurements, space does not permit dealing with individual types, so we will assume that we are only interested, in this article, with the measurement of direct current and voltage.

Instruments for these purposes can be divided into two classes, namely, those with a moving coil movement, and those having what is termed a moving iron action. The

reproduction of their receiver. Such symptoms might mean many things but one of the first tests which could be applied with advantage is that which would indicate if all valves are consuming their normal current. If a mA meter is to hand, this can be carried out quite easily by connecting the meter in series with the negative H.T. lead which would indicate the total current consumption of the apparatus, or by inserting it in series with each anode circuit in which case the current consumption of each valve would be checked under true operating conditions.

In addition to the above indications, such tests would also reveal if the rectifier, in the case of an A.C. receiver, was delivering its output or whether any faults existed in the smoothing equipment or in the grid bias voltages. The second method would also show if any breakdown was present in any of the anode components. The connections for these simple tests are shown in Fig. 1.

Output Distortion

To test for this form of trouble, the meter should be inserted in the anode circuit of the output valve and careful observations made of the reading obtained when the valve is fully loaded, i.e., reproducing a signal at its maximum rated output. If all operating conditions are correct, the needle or pointer of the meter will remain sensibly steady, indicating the correct anode current for the H.T. and bias supplied. This value can always be determined from the maker's leaflet.

If the pointer oscillates about a given setting, it will show that the valve is being

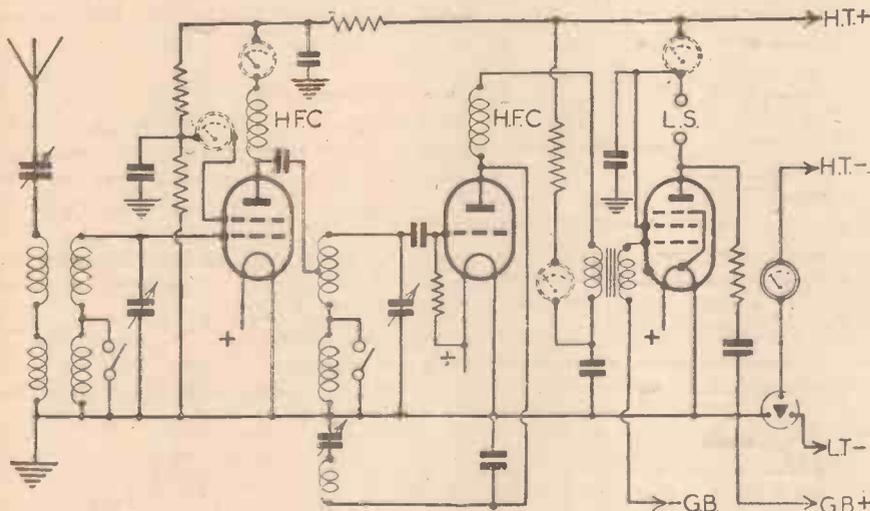


Fig. 1.—A standard 3-valve circuit showing where meters may be inserted to show various working characteristics.

same loudspeaker. One will think it is high pitched; another will think it is deep toned, while a third will be of the opinion that it is just right. The only person who is usually satisfied 100 per cent. is the owner of the apparatus.

From these remarks it is hoped that the reader will appreciate that aural tests alone are not satisfactory and that some means must be employed which will provide definite visual indication of what is happening. Such methods will give concrete proof which will not depend on or be governed by individual physical capabilities or defects. Apart from the question of obtaining accurate observations, there is another very good reason why meters should be used. For example, when carrying out even the most simple tests or modifications much time and patience can be saved by the intelligent use of a meter designed to measure current or voltage.

former are in many ways the superior type, but the latter have the advantages of being more robust, lower in cost and suitable for A.C. and D.C.

With normal radio apparatus, the currents and voltages to be measured cover quite a wide range and one has to face the problem of purchasing several meters or using what is known as a multi-range meter, which is naturally more expensive to buy, though not so very difficult to construct around a good milliammeter. For instance, past articles in these pages have explained how to add series resistances and shunts to a milliammeter having a scale reading of 0 to 1 mA. to enable it to be used as a milliammeter and voltmeter of several ranges.

Using Meters

Most constructors have experienced a falling off in signal strength or quality of

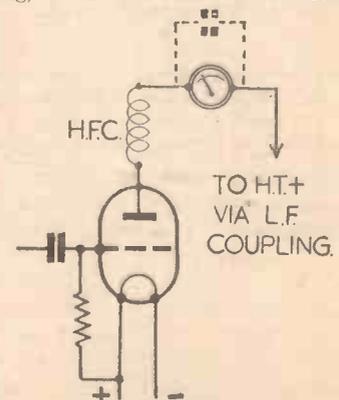


Fig. 2.—A meter in the detector anode circuit will indicate oscillation and other effects.

overloaded and the signal input should be reduced.

If, however, the pointer swings towards a higher setting during the handling of a signal, the grid bias voltage is too high for the applied anode voltage. Therefore, either the bias can be reduced or the H.T. increased, providing the maker's specified maximum value is not exceeded. If there is volume to spare, it is always advisable to decrease the bias voltage. In other instances, it will be noted that the meter needle swings downwards and this means that insufficient bias is being applied, so the

(Continued overleaf)

A Radio-controlled Alarm Circuit

Details are Here Given of an Easily-constructed Arrangement for Operating a Warning Alarm

THE circuit to be described is one for which no originality is claimed, since the same basic principles are employed in a device used for measuring small variations in length of metal bars. Nevertheless, it is highly efficient and relatively simple to construct.

The theory of operation is as follows: It is well known that the anode current of a valve oscillator will drop as the resonance point is approached, and will drop to a minimum at resonance, rising again as the circuit is tuned through resonance.

It is obvious, therefore, that if the circuit is tuned to resonance, and then the capacitance in, say, the grid circuit is added in order to bring it out of resonance, then a change of anode current will take place. This change of anode current may be made to produce a change of voltage drop across a load resistance, and this voltage drop may then be tapped off and applied as a bias to buck the steady bias on a thyatron, thus causing the latter to "flash."

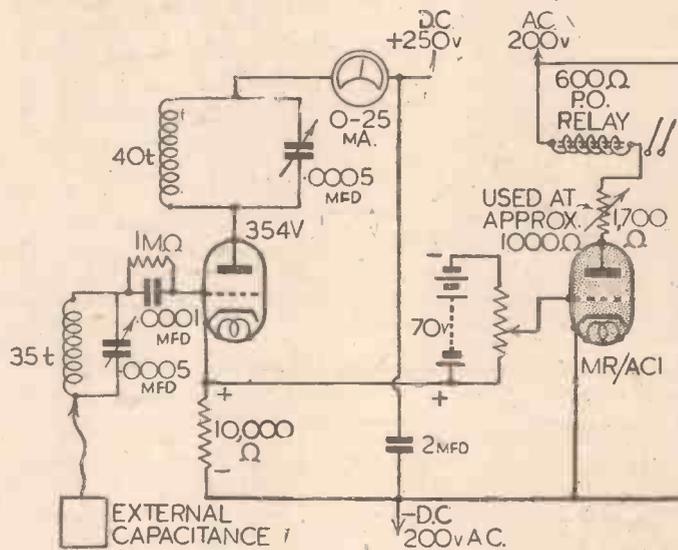
P.O. Relay

When the thyatron "flashes" it becomes conducting and passes current, and this flow of current may be arranged to energise the operating solenoid on a relay, such as a G.P.O. telephone relay. This relay in turn may directly operate a warning device such as a hooter, or if the current to be passed is too great for the contacts, then it may operate a larger contactor which in its turn operates the warning device.

The latter scheme had to be resorted to in the actual laboratory "hook up" used by

the writer. In this case the warning device consisted of a 12-volt electric motor horn.

The circuit diagram, with actual component values used in the laboratory "hook up," is given below.



A useful Radio-controlled Alarm Circuit.

It may be seen from this that the oscillatory circuit employed is a conventional tuned plate-tuned grid circuit, using a triode valve, Mullard 354V. The external additional capacitance,

which can take the form of a wire unobtrusively attached to a door latch or knob, is joined to what would be the earthy end of the grid tuning condenser.

The load resistance is placed for convenience in the cathode circuit of the 354V, and the voltage across this is tapped off and applied so as to buck the standing bias on the MR/AC1.

Adjustments

The adjustment of the circuit consists of adjusting the anode tuning condenser for minimum reading of the anode milliammeter, this will be about 2 mA, and a current change of, say, two or three milliamps is registered by touching the door knob. Then by adjustment of the MR/AC1 bias potentiometer, this current change may be made to flash the MR/AC1.

Quite possibly it may be found that instead of the relay contacts closing when the MR/AC1 becomes conductive, they may open instead and remain closed when the MR/AC1 is not conductive. In this case the obvious remedy is to use the other set of contacts on the relay.

The above arrangement operated successfully with a lead approximately 12 feet long when the door knob was touched either with the bare hand or with a heavily gloved hand.

In addition, an aluminium plate approximately 2ft. square was connected in place of the door knob; the alarm sounded as soon as anyone approached within about 1ft. of the plate.

SEEING IS BELIEVING

(Continued from previous page)

remedies are, of course, just the opposite to those given for the previous trouble.

While referring to output valves, it must be remembered that this test will not prove satisfactory with Class B or Q.P.P. systems, owing to the fact that when valves are operating under those conditions the bias is so adjusted or the characteristics of the valves are such that very wide fluctuations of anode current are produced when a signal is being handled, while an extremely low standing current is consumed whilst the valves are idle.

Coil Tests

When constructing your own coils, it is very desirable to be able to determine any increase in efficiency and selectivity produced by different windings or methods of construction. To do this by ear alone is far from satisfactory; therefore the simple arrangement shown in Fig. 2 should be adopted, as this will enable a visual indication to be obtained.

Assuming that the coil is in the circuit in the normal way, and that everything is ready for test. Tune in a reasonably powerful signal without applying reaction. If the meter is watched during the tuning procedure, it will be seen that the current reading decreases—that is if an ordinary

leaky-grid detector is being used—as the coil is brought in tune with the transmission. Note the total needle deflection produced and then make any alterations to the coil, such as tapping positions, number of turns, diameter of former or thickness of wire and then repeat the experiment. A fairly accurate idea of the efficiency of each coil can be gathered from the amount of deflection of the meter needle, so continue

with coil adjustments until the maximum deflection is produced.

This test alone, however, is not always satisfactory, unless one is lucky enough to live in an area free from the interference of other stations and where the maximum efficiency and quality is required. If a coil is adjusted for maximum output, it will be found that it is very unselective so the following test should be applied and a happy medium obtained.

Repeat the original experiment but, when the meter pointer has reached its lowest position, note the dial reading and then, very slowly, detune the circuit, say, two degrees at a time and note the current reading for each setting. The results, current against dial settings, should then be plotted on squared paper as shown in Fig. 3, when a curve similar to that indicated will be produced.

The readings must be taken each side of the maximum deflection and continued until the normal standing current of the valve is reached.

If the sides of the curve have a gentle slope, as indicated by the solid line in Fig. 3, it will show that the circuit is not too selective and that the signal will be accepted over a wide band of the tuning range of the coil. Such conditions will allow any other station operating on a nearby wavelength to cause interference.

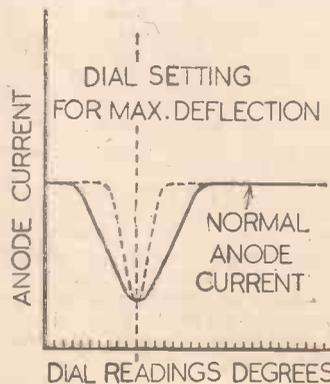


Fig. 3.—How the needle indications will show the performance of a tuning circuit.

A PAGE OF PRACTICAL HINTS

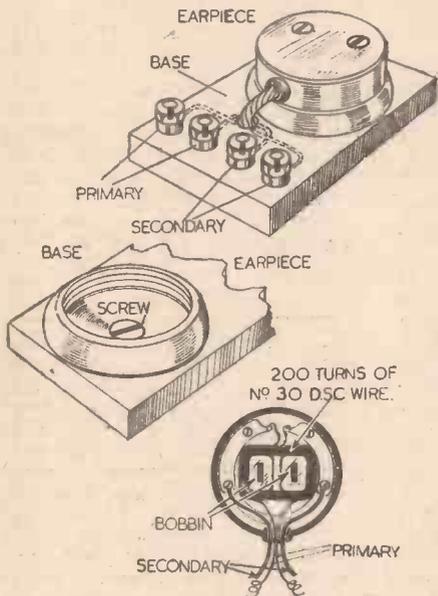
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Simple Microphone Transformer

AN easy method of constructing a transformer for a single-button microphone, is shown in the illustration. The high resistance windings of an old earpiece are used as the transformer's secondary circuit, and the primary winding consists of 200 turns of No. 30 gauge D.S.C. wire wound



An old earphone is utilised in this simple microphone transformer.

over the earpiece bobbins, and held in place with a little sealing wax.

A piece of wood, 4in. by 3in. by 1/2in., is then cut, and on it is mounted the earpiece cap, and four terminals. Connecting leads are attached to the primary and secondary windings, and the earpiece, diaphragm, and cap are screwed together again. To complete the transformer the leads are taken through a small hole drilled in the wooden base, and connected to the terminals as shown in the diagram.—D. SCARFF (Shildon).

Novel Reaction Control

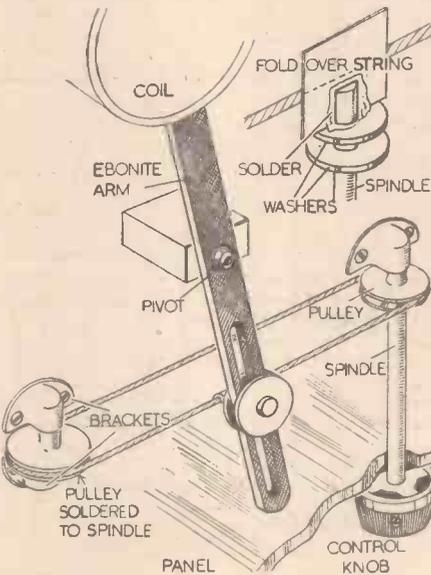
WHEN I made the S.S. one-valver, I thought that the method of controlling the reaction could be improved, so I fixed it up as in the sketch, which clearly shows the construction. I have not given any dimensions so that the constructor can suit his own requirements. The device forms a sort of pivot between the string and the ebonite arm. It consists of a suitable piece of tin soldered to a short axle, with a washer soldered on the other end. It is advisable to fit a second washer between the tin and the ebonite arm, and this need not be soldered. The space between the washers, must, of course, equal the thickness of the ebonite. A slot must be cut in the arm to allow for the circular movement. It is a good idea to pass the string once round the pulley connected to the knob to

THAT DODGE OF YOURS! Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. ... SPECIAL NOTICE All wrinkles in future must be accompanied by the coupon cut from page iii of cover.

prevent it slipping.—P. O'SHEA (N. Kensington).

A Rotary Switch

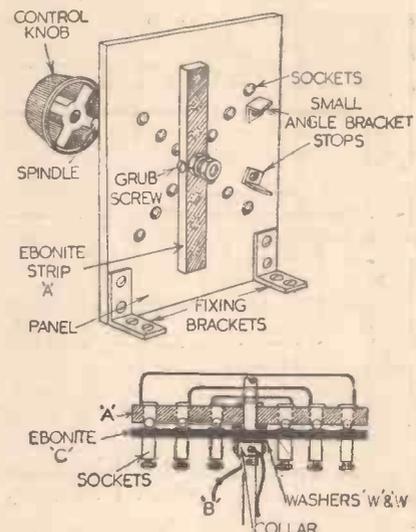
I REQUIRED a rotary switch a short time ago, and constructed one, as shown in the sketch. I procured half a dozen ball catches and several tube-type sockets with screw-terminals. A piece of



A novel reaction control for the S.S. one-valver.

ebonite, A, is drilled to receive the catches, the ebonite strip being secured to a rod, B, by two grub screws. Another piece of ebonite, C, is drilled to receive the rod B, and also the sockets. Two washers, W and W1, are fitted on the rod, one on each side of the ebonite panel C. The other end of rod B (behind the panel) is secured by means of a collar.

The wiring is shown in the second sketch. As the ebonite switch-arm is rotated, the spring-catches locate in the sockets. The switch assembly can be secured in position by means of the angle-



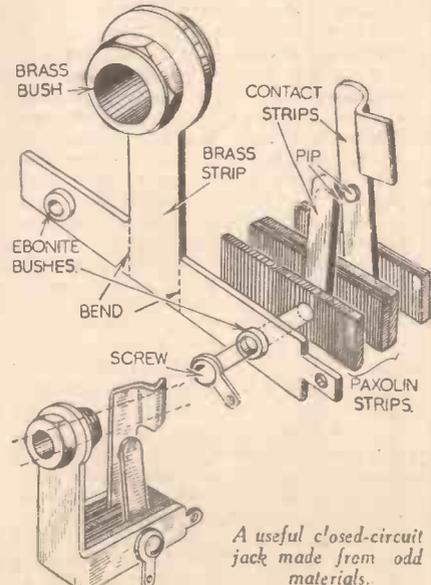
A simple rotary switch.

brackets, as indicated.—E. COLLINGWOOD (Darlington).

A Simple Jack

THE closed circuit jack illustrated was made quite easily from some odd materials found in the junk box.

A brass strip is cut to shape, and bent to hold together the paxolin strips necessary for holding the contact pieces, which are also shaped, and slightly bent inwards, so that when the jack plug is inserted the pips



A useful closed-circuit jack made from odd materials.

are parted and spring back into position when the plug is removed. A bush and nut from an old condenser is used for the plug entry.—G. WARWICK (Newcastle).

THE vibrator as a means of obtaining H.T. from a low-voltage battery has, during the last few years, made itself practically indispensable, especially in the field of car or boat radio. Some of the earlier car sets used a motor-generator principle, usually termed a converter, to obtain H.T., but the mechanical vibrator has almost entirely swept the car-radio field, and has made its appearance in one or two battery sets for the home.

The principle of a vibrator is extremely simple, and very similar to an electric bell, and to those with a little mechanical skill is a very interesting and useful article to make, the cost being very low.

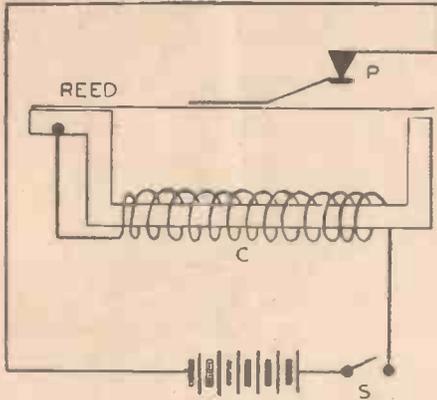


Fig. 1.—The essential features of the vibrator in theoretical form.

Designs for two vibrators are given later, both sound and practical and capable, with a suitable transformer, of giving 200 volts from a 6-volt car battery at sufficient current to operate a 5-valve battery set.

Before proceeding with the construction of the instruments it will be best to run briefly over the working of the vibrator.

The Principle of Working

If a transformer is taken, with a few turns of thick wire on the primary and many turns of finer wire on the secondary, and a low voltage D.C. applied to the primary, no voltage will be found at the secondary terminals, but if we rapidly interrupt the primary current we shall get a voltage at the secondary terminals depending upon the transformer ratio.

This is exactly what the vibrator does in its simplest form, just interrupts the primary current, thereby producing a form of A.C. which is stepped up by the transformer. A motor-car ignition coil, a spark coil, or the ordinary shocking coil all work on the same principle.

Mechanically, a vibrator consists of an armature or reed fixed at one end and free to move at the other end, its free end is just over the pole of an electro-magnet. The reed carries contacts which are fixed above it; Fig. 1 is a diagram of this. If switch "S" in the diagram is closed, current from the battery flows through the coil "C" which immediately attracts the reed. As soon as this moves it breaks the points "P" carrying current to the coil, with the result that the reed flies back, again making contact, and again being attracted, the cycle going on until switch "S" is opened.

If we put a transformer primary in series with the vibrator coil, the current through

VIBRATORS—Princip

Details of Working and these New H.T. Aids

the primary is restricted by the coil resistance, and reduces the output we can get from the secondary, so we have to adopt a different arrangement which is illustrated in Fig. 2.

With this arrangement I can easily get 200 volts with a 6-volt input.

How it is Made

A look at Fig. 3 shows the mechanical details of the vibrator used.

It consists of a frame "F" of soft iron bent as shown, at one end it has a coil "C" of 28 or 30 S.W.G. enamelled wire.

The pieces marked "I" are insulating material, bakelite or fibre to insulate armature "A" from the frame, and also to insulate bracket "B" from frame and armature.

This bracket is about 1 in. wide and has two points "P" riveted to it about 1/2 in. apart and in line with each other. Only one is shown, the other one is immediately behind this.

The only thing special about the job is the armature or reed which has to carry two points not electrically connected, the difficulty being got over by making it of two strips of tin about 1/2 in. wide, doubled over and soldered to make the free ends thicker, and joined at the free ends by a piece of thin bakelite secured by rivets. This separates the strips all the way along by about 1/2 in.

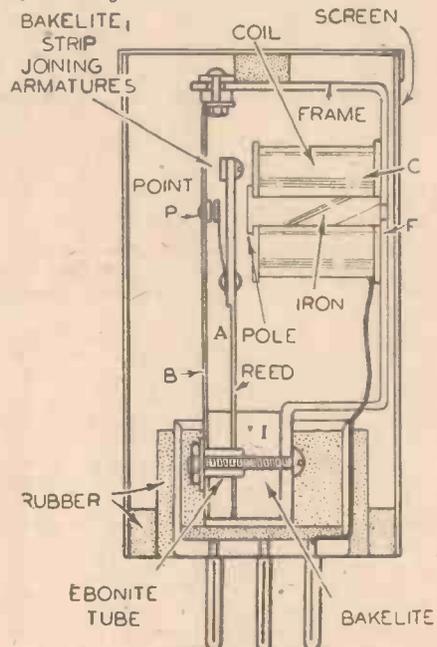


Fig. 3.—Constructional details of a vibratory unit as shown in Fig. 2.

Each strip carries a point on the end of a thin spring, one point can be from a good electric bell, but the other should be a motor car ignition point, the opposite one on the bracket "B" being a similar point.

The bracket must be brass or aluminium, not iron.

The actual mechanical construction of the vibrator is fairly simple, and practically everything is shown in the drawings, but it is advisable to mount it flexibly and it must be screened.

Mounting Device

Since we may need to remove it from the set, and because the points wear out in time, it is usual to mount a vibrator on a base, similar to a valve; Fig. 3 shows also how this is arranged.

An ordinary valve base, from a burnt-out valve is used, all the glass and cement being removed.

Three pins only are used, and a small hole is drilled in the side of the base near to the top end of each pin. The wires from the vibrator pass down outside the base, through the holes, down the hollow pin and are soldered at the tip.

In the bottom of the base is a rubber disc, the vibrator stands on this and is

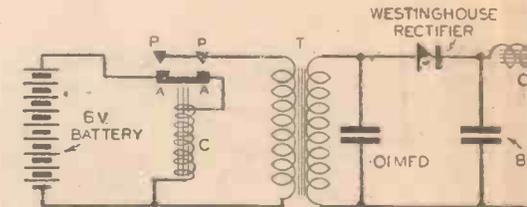


Fig. 2.—Modified arrangement called for when the transformer is connected to the input circuit.

packed in with rubber block, preferably sponge rubber, which prevents it touching the sides.

The screen is a simple metal tube, closed at one end; two pieces of rubber tube are slipped over the base and the screen pushed down over the base and the screen pushed down over the tube, right to the bottom of the valve base. If there is any risk of the vibrator touching the screen it is advisable to line the screen with felt, which will also help to deaden the noise.

A rubber block in the top of the screen also helps to steady the mechanism against shocks.

Connections

The connections are as follows; vibrator frame to one armature bar, one end of coil to frame, the other end of coil to one valve base pin, the other armature bar to another pin, and the bracket carrying the points to another pin.

If old electric bell contacts are used for one lot of points these should be the ones connected to the frame. It is immaterial which pins are used as long as the constructor remembers how he has wired them.

The full circuit for use with this is given in Fig. 2 and, no doubt, a few details will be useful.

The transformer was made from an old Mullard H.T. unit choke, rewound with 18 S.W.G. D.C.C. wire to fill the available space.

In order to test this, the remaining half of the original winding was connected to 220 volt A.C. mains and a low reading A.C. meter put across the new winding;

Plates and Construction

and Useful Instruction for By A. L. JACKSON

adjustment was made by removing turns until it read 6 volts. A 6-volt dial light bulb could be used to give an approximate idea, and is the simplest way to adjust the ratio.

It will be apparent that if 6 volts is applied to the new winding, A.C., of course, we shall get 220 volts from the original winding, now the secondary, which is exactly what we want, and joining up the transformer and vibrator with a 6-volt car battery, as illustrated in Fig. 2, we shall get 220 volts A.C. if the vibrator is properly adjusted.

Before we can use this it must be rectified and smoothed. The simplest way is to use a metal rectifier, mine cost 1s. 6d. from an advertiser in this journal. If a valve is preferred a 6-volt American rectifier can be used and avoids tapping the battery, but it must be indirectly heated.

The choke should have a high inductance and a low D.C. resistance; the smoothing condensers can be electrolytic 8 mfd. each.

It is also usual to shunt the transformer secondary with a .01 condenser, and as quite high peak voltages are generated a 1,000-volt test component is called for.

Nothing has been said about the adjustment of the vibrator because most readers can adjust an electric bell, but initially the armature should be about $\frac{1}{16}$ in. from the pole and, both sets of points just touching, adjustment is made by bending the brass springs carrying the points. Those on the armature bar joined to the frame are responsible for the vibrating, the others being only a simple make-and-break for the transformer current.

Mechanical Noise

Needless to say, the points should be clean and smooth and meet each other squarely.

A vibrator makes a certain amount of mechanical noise, depending to some extent on the adjustment, and it is not a bad idea to enclose the whole unit in a felt-lined metal box to reduce this noise, and with an ordinary battery set, to run the unit from a separate accumulator, otherwise the vibrator can cause interference through the filament leads with directly-heated valves.

A unit made up on these lines will be found to give perfectly satisfactory results if reasonable care is taken in manufacture, but remember also that the intermittent current taken from the battery can cause interference; keep the battery leads well away from the aerial.

Self-rectifying Vibrator

Commercial vibrators are usually of a different design from the one described

and use a centre-tapped transformer; the smaller ones are usually also self-rectifying, and the circuit used is shown in Fig. 4. It will be seen that six platinum points are used, hence the cost of a commercial instrument.

It is quite a practical proposition to make a vibrator of this type to operate efficiently, but a lot more care is needed in the adjustment, quite small alterations causing the voltage output to jump between 100 and 200 volts, and it must be rigid enough to keep the adjustment once it is set.

A glance at Fig. 3 will show that each side of the armature has a point fixed to it, and other points mounted above and below the armature, contact is made alternately with these points, sending a current through first one side, and then the other, of the centre-tapped transformer.

Dotted lines from the secondary of the

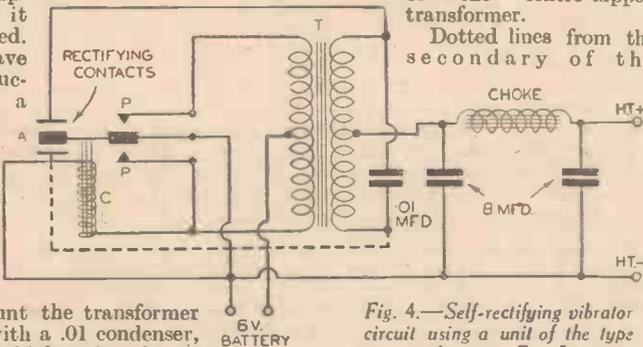


Fig. 4.—Self-rectifying vibrator circuit using a unit of the type shown in Fig. 5.

transformer to four other points similarly placed on the armature show the means employed to rectify the secondary A.C., this being done automatically by the moving armature. The rest of the circuit used is given in Fig. 4 as well.

The construction employed in my model is slightly different from the previous instrument, and the main part, i.e., the magnet and coil, was taken from an old electric bell.

The details of construction will be found in Fig. 5, the magnet carrying the coil is longer than before and has a round rod through the coil, one end has a pole piece fixed to it, and the other end a bracket to carry the armature.

If a separate rectifier is used this bracket need only be $\frac{1}{16}$ in. wide, but for a self-rectifying unit it should be $\frac{1}{8}$ in. wide, the armature in this case being double width to take the extra points alongside the others. Both sets of fixed points are mounted on fibre strips seen in the drawing, the points themselves are mounted on thin brass spring, and these springs are bent up or down for adjustment purposes.

On the bottom of the bracket carrying the armature is fastened a piece of tube, the lid of a very small tin would do, with a large washer soldered on the bottom, for the flexible mounting in the valve base. A strip of soft rubber is put round inside the base first, the vibrator with the washer laid upon it, then another piece of soft rubber forced in, this will be found to hold everything firmly but flexibly.

The connecting wires from the valve pins will be seen running between the bakelite and the rubber.

In fitting everything up, the armature is in electrical contact with the frame, the top piece of fibre has a distance-piece separating it from the armature.

The bottom piece of fibre is fixed in a different way, both the pole piece and the bottom bracket being slotted, and having a piece of metal forced in the slot and soldered; these form raised ridges right across the pole and bracket.

The fibre ends are then slotted with a

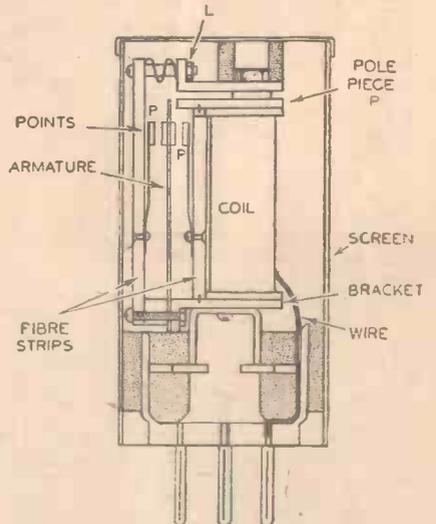


Fig. 5.—Constructional details of the vibratory rectifier.

hack-saw, and slid into place with shellac varnish as a cement. If a good fit is made the shellac is not necessary.

At the top of the vibrator will be seen another bracket on top of the pole piece. This is used to secure the top of the long fibre and to give a certain amount of adjustment to the fibre strip. Final adjustment should be made with this screw, which also has a spring under the fibre, seen in Fig. 5.

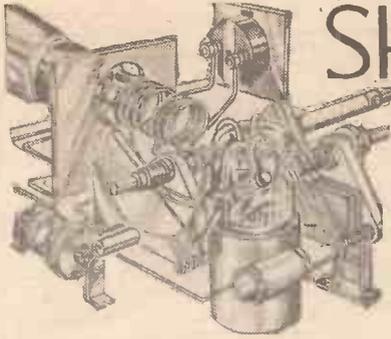
When all the parts are made and assembled the connections are soldered to the frame and the springs carrying the points. A non-rectifying instrument needs only three valve pins, but a rectifying one needs five pins.

Adjusting the Rectifier

Adjustment will be found a matter for patience, owing to the number of points, and final adjustment is best made with the complete unit in use and a voltmeter across the output. This gives a visual indication of what is happening. The whole thing is screened in exactly the same way as the first one described, but a piece of rubber tube will be better in the top of the screen, to fit over the nut.

Properly made and adjusted, this model will give excellent results, though having tried both, I personally prefer the first one, owing to its simplicity, and simplicity usually means greater reliability; in any case the adjustment is much easier.

It is impossible to give current consumptions from the battery because the efficiency varies considerably with the apparatus used, and the workmanship, but an average would be between 1 and 2 amps from a 6-volt battery, certainly not more.



SHORT-WAVE SECTION

THE STANDARD FOUR-VALVE SHORT-WAVER

Blueprint W.M. 383 describes a useful four-valver, but as the original issues are now out of print, the main details are reprinted here.

MANY constructors prefer the four-valve straight type of short-wave receiver, and the popularity of the Standard four-valver is evidenced by the large sale of blueprints. The issues of *Wireless Magazine* in which this was described are now out of print and, therefore, for the benefit of those constructors who may wish to build this receiver, the following are the main details of the circuit. It incorporates an aperiodic H.F. stage utilising an S.G. valve, followed by a triode reacting grid-leak detector. This is coupled to a small L.F. valve through a resistance-capacity coupling, and the output power valve is fed through a standard L.F. transformer. Decoupling components are included in the third stage, and the 'phones or loudspeaker are filter fed from the output stage. It will thus be seen that the receiver is more or less a straightforward job, but there are two interesting refinements in the detector stage.

Detector Refinements

Firstly, there is a small bandspread condenser connected in parallel with the main tuning condenser so that tuning may be more easily carried out. Secondly, the usual H.F. choke in the anode circuit has been dispensed with, and a resistance substituted. The output valve is fed from a volume control connected across the secondary of the L.F. transformer, and the output filter ensures that, with the wiring adopted for the panel components, and the removal of H.F. from the output stage, no hand-capacity effects will be experienced when tuning in.

The chassis is of Plymax, that is, ordinary plywood with a layer of aluminium foil on the upper surface. All earth points are taken to this surface, which also acts as a screen. Note carefully that the two leads from the tuning condenser are taken

directly to the coil—not via other components.

Home-made Choke

The H.F. choke is home-made and was wound on a length of 1/2 in. ebonite tube with 60 turns of No. 28 D.C.C. wire—close wound. The neutrodyne condenser used as the coupling unit between the H.F. and detector stages has to be adjusted to provide the necessary coupling to ensure smooth reaction all over the tuning range and, therefore, some time should be spent in obtaining the required adjustment. It may take some time to get this setting right, as the coils may cover a fairly wide range and the desirable setting will enable you to change coils for any desired wavelength without having to readjust the coupling condenser. The H.T. voltage to be used with the set should be between 120 and 150 volts at H.T.2 and at H.T.1, which feeds the screen, should be between 70 and 80 volts. The grid-bias should be adjusted in accordance with the valve-makers' instructions, and these will be about 1 1/2 volts

for the first L.F. stage and between 12 and 16 volts for the output valve.

The aerial should be as high and clear as possible, preferably not longer than 50ft. On wavelengths below 100 metres it may be found that results are better without an earth connection, but the receiver should definitely be tried out with this addition, and results compared with and without the lead. A great deal depends upon the efficiency of the actual earth and the particular wavelength being used, and no hard and fast rules can be laid down.

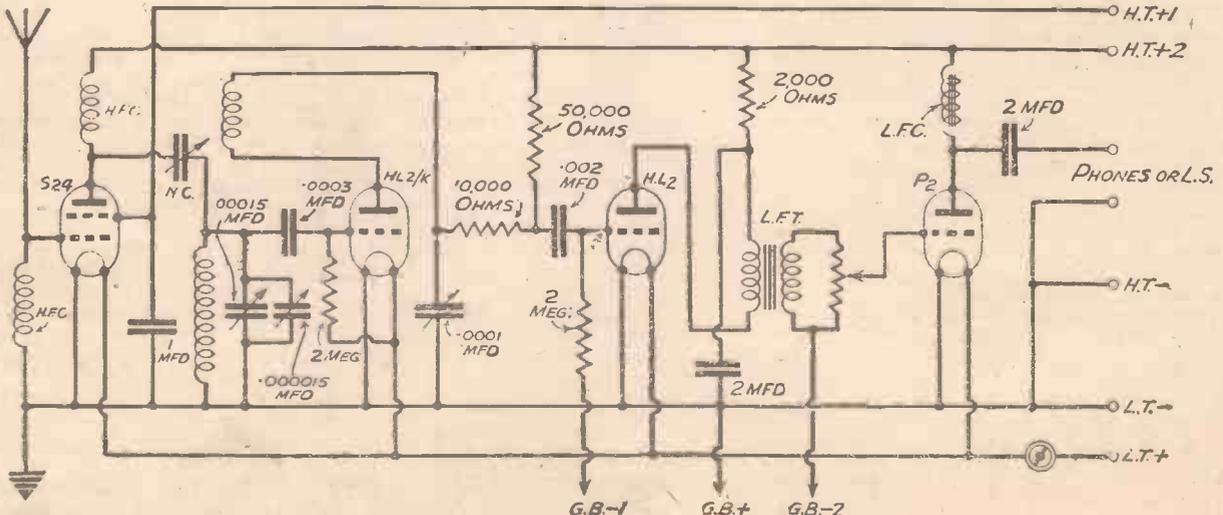
Wave-range Covered

The coils specified for this receiver are three in number and are designed to tune from roughly 13 to 26, 24 to 52 and 46 to 96 metres. This is, however, with a .00015 mfd. tuning condenser, and as will be seen from the theoretical diagram, the tuning condenser having this capacity has in parallel with it a further .000015 mfd. variable. This means that the total parallel tuning capacity is greater than that for which the coils were designed and accordingly the wave-range of the individual coils will be increased. On the first coil you will cover the 14, 16, 19 and 25-metre bands used by broadcast stations, as well as the 20-metre amateur band. On the next coil will be found the 25, 31 and 49-metre broadcast bands and the 40-metre amateur band. The largest coil starts off in the middle of the 49-metre broadcast band, which really spreads from 44 to 50 metres, and goes right up to the top of the range that the average short-wave amateur wishes to cover. The 80-metre amateur band is fairly near the top of the tuning scale. The three lowest broadcast bands and the 20-metre amateur band may be regarded as daylight waves.

LIST OF COMPONENTS

- Chassis: One Peto-Scott chassis to specification.
- Choke, H.F.: One home-made as described in the text.
- Coils: One set of B.T.S. short-wave.
- Condensers (Fixed): One T.C.C. .002 mfd. One T.C.C. .0003 mfd. Two T.C.C. 2 mfd. 250-volt working. One T.C.C. 1 mfd. 250-volt working.
- Condensers (Variable): One Polar short-wave .00015 mfd. slow-motion type C. One Polar short-wave .0001 mfd. slow-motion type C. One Eddystone .000015 mfd. short-wave condenser, type 900. One J.B. neutralising condenser. One Eddystone Vernier slow-motion drive.
- Valveholders: Five Clix 4-pin chassis type.
- Resistances (Fixed): One Erie 10,000-ohm 1-watt type. One Erie 2,000-ohm 1-watt type.

- One Erie 50,000-ohm 1-watt type. Two Erie 2 megohm 1-watt type.
- Resistance (Variable): One Erie 250,000-ohm potentiometer.
- Sundries: Tinned copper wire for connecting. Insulated sleeving. Three Clix wander plugs for G.B. connections.
- Switch: One Bulgin on-off single-pole toggle.
- Terminals: One Peto-Scott terminal strip complete with terminals to specification.
- Transformer (Low-frequency): One Ferranti AF8.
- Valves: One Marconi-Osram S24. One Marconi-Osram HL2K. One Marconi-Osram HL2. One Marconi-Osram P2.
- Loudspeaker: One Stentorian W.B. Standard Model.



Theoretical circuit of the Standard Short-wave Four.

Leaves from a Short-wave Log

Polish Short-wave Broadcasts

THE new schedule of transmissions has been established as under: SP31, 31.48 m. (9.525 mc/s) and SP48, 48.86 m. (6.14 mc/s), daily at B.S.T. 20.40 in the French language; at B.S.T. 19.50 in English (Fridays), Italian (Saturdays), and in French on Sundays at B.S.T. 20.40. SPW, 22 m. (13.635 mc/s), SPD, 26.01m. (11.535 mc/s), SP19, 19.84 m. (15.12 mc/s) and SP25, 25.55 m. (11.74 mc/s), broadcasts are carried out from midnight to 03.00 B.S.T. SPD gives out news in the Portuguese language at B.S.T. 00.35; SP19, a news bulletin in English at B.S.T. 02.00 and again from SP25 some five minutes later.

Belgian Congo on the Ether

A 250-WATT short-waver has been installed at Leopoldville (Belgian Congo); the call-sign is OQ2AA. It works daily from B.S.T. 11.25-13.00 on 19.78 m. (15.17 mc/s) and 31.5 m. (9.525 mc/s).

Radio Damascus Calling

IT is reported that the French authorities are testing out a station at Damascus (Syria). The wavelength is stated to be 24.4 m. (12.295 mc/s). Experimental broadcasts have been heard at B.S.T. 19.00.

Albania Again on the Air

ZAA, Tirane, the 3-kilowatt station on 49.31 m. (6.084 mc/s), which was taken over by the Italian authorities, has re-started its broadcasts. They are now made in both the Italian and Albanian languages.

Another Experimental Broadcaster

ALMOST daily towards B.S.T. 19.00 the Polytechnic School of the University of Bucarest (Rumania) carries out test broadcasts on 24.61 m. (12.19 mc/s).

An Alternative to Chungking

XPSA, Kweiyang, in the province of Kweichow (China) is on the ether

daily from B.S.T. 01.00-07.00 on 43.04 m. (6.97 mc/s), with a power of 10 kilowatts. This station has been erected in view of the recent air raids on Chungking, and will carry out the same programme as this latter station.

Radio Sofia

THE 1.5 kilowatt transmitter has been regularly working on 35.44 m. (8.465 mc/s), but on a recent date was heard broadcasting on 32.61 m. (9.2 mc/s). As this is not a portion of the waveband allowable to radio transmissions of an entertainment character the change may be only a temporary one.

Budapest Tries Out New Channels

RADIO LABOR, the Hungarian station (HHAQ2), which has been testing on 25.32 m. (11.85 mc/s) and on 41.5 m. (7.23 mc/s), has also been logged by listeners on 13.84 m. (21.68 mc/s), allotted to HAS6, and on 31.17 m. (9.625 mc/s), used by HAT5, Szekesfehervar (Budapest).

Altered Wavelength

HC2ET, the 300-watt transmitter owned and operated by the newspaper *Empreso el Telegrafo*, of Guayaquil (Ecuador), is stated to be working on 32.61 m. (9.2 mc/s).

La Voz De La Victor

TIPG, San José, Costa Rica, which was for some considerable time on 31.21 m. (9.612 mc/s), appears to have lowered its wavelength to 30.94 m. (9.695 mc/s) and is operating daily from G.M.T. 13.00-15.30; 18.00-20.00 and from 02.00 to 05.30, with an English news bulletin and broadcast entertainment between 03.30 05.15. The channel now adopted is immediately next to the one used by FZF6, Fort-de-France (Martinique). The address of TIPG is Casa Victor, Apartado Postal, 225, San José, Costa Rica.

The different types, their make-up and function, are clearly and adequately described and illustrated, and the final chapter deals with the various applications of electrolytic condensers. Mathematical material has been reduced to a minimum and the book may be clearly followed by everyone. Every radio expert and amateur should make a point of reading it, in view of the very wide use of this type of condenser in modern radio and associated apparatus.

THE 1939 ALL-WAVE SUPERHET.

IN our issue dated July 8th last we described a 7-valve all-wave receiver in which a J.B. Linacore Tuner was employed. On page 401 of that issue an advertisement by Messrs. Peto-Scott quoted the price of this tuner at 65s. instead of 55s. As a result of this error in price the quotation for the "A" Kit for this receiver should also be reduced by 10s. The Kit "A" therefore costs £8 13s., or a deposit and 12 monthly payments of 15s.

PATENTS AND TRADE MARKS

Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this paper.

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BOOKS RECEIVED

THEORY AND DESIGN OF VALVE OSCILLATORS FOR RADIO AND OTHER FREQUENCIES. By H. A. Thomas, D.Sc., M.I.E.E. 270 pp. 103 illus. Price 18s. Published by Messrs. Chapman and Hall.

THIS is one of the Monographs on Electrical Engineering, which, as pointed out by Mr. E. V. Appleton in the foreword, is written by an acknowledged authority in this field of work. It deals first with the fundamental principles of oscillation generation and then passes to the various types of oscillator and conditions for maintaining oscillation. It covers every phase of the subject including frequency changes due to temperature effects and frequency stabilisation in various types of apparatus in which valve oscillators are employed. For those students who are anxious to understand more about the valve oscillator, or for those who wish to use this type of apparatus for any purpose, the book will be found of the utmost value.

ELECTROLYTIC CONDENSERS. THEIR PROPERTIES, DESIGN AND PRACTICAL USES. By Philip R. Coursey, B.Sc., M.I.E.E., F.Inst.P., etc. 190 pp. 112 illus. Price 10s. 6d. Published by Messrs. Chapman and Hall.

THERE is probably nobody in this country who knows more about electrolytic condensers than Mr. Coursey, and in this Second Edition of his book he has taken the opportunity of correcting a few errors which crept into the first edition and at the same time has adopted a number of suggestions that have been put forward in order to clarify certain points. The book explains fully the general nature of condensers and electrolytics in particular and then passes on to the origin and development of this particular component.



Practical Television

July 22nd, 1939. Vol. 4. No. 161.

Is There An O.B. Menace?

AS one critic rather aptly put it, our old friend "the menace" is creeping in once more in an effort to reduce the number of outside television broadcasts which can be featured by the B.B.C. One of the latest was in connection with the Eclipse Stakes, a horse-race at Sandown Park which has a very popular appeal. After giving permission for the B.B.C. to televise it and allowing engineers to carry out tests and find satisfactory camera positions, the authorities reversed their decision and banned the broadcast. Surely this free advertisement of horse-racing as associated with the Sandown Park meeting was sufficient to offset the imaginary reduction in gate, which no doubt the authorities felt would be real. Television in no way constitutes a menace to these outside events where sport, physical fitness or spectacular events are featured. On the other hand, it must help them by bringing them to the notice of a wider circle of the public who otherwise would in no way be familiar with their characteristics. Once these are made known through the medium of television, the interest stimulated will create a desire in the minds of many viewers to participate in the actuality on the next occasion. Past history has proved over and over again that the so-called menaces in one form or another which have arisen in connection with divers industries have been mythical, and when co-operation has taken the place of obstruction the benefits to all have become apparent and all sections of the community have benefited.

An Ounce of Practice

A CAREFUL study of the many and varied reports of American television and reception makes very interesting reading and brings to light many of the points which occurred in the early days of the B.B.C. service but which have now become so commonplace as to be disregarded in this country. First of all, every writer comments on the excellent sound reproduction due to the use of a wide frequency band on the ultra-short waves. Too often is this negated in the case of British sets by an apparent casual attention to the design of the sound receiver and the use of loud-speakers which are cheap and of inferior quality. This is to be regretted as it deprives the salesman of a good talking point when dealing with the advantageous features associated with the sound and vision service. Then, again, it is normal practice in the United States to radiate a test pattern between items, and this has been designed with commendable care to enable the set user to see straight away the degree of line resolution obtainable with his receiver. Whether this practice is politically sound is open to question, but the engineer, as distinct from the non-technical member of the public, can see at a glance whether the set controls have been adjusted properly. There seems to be a tendency to run the cathode-ray tubes at too high a brightness level, with the result that the vertical detail in the picture is reduced to almost half that

associated with normal performance. It is truly remarkable how the average person who uses a television set does not yet fully appreciate the intrinsic value of a correct balance between the contrast and brightness controls which are provided. An excess of one or the other destroys the half tones of the picture and robs it of its true pictorial value. On the other hand, it is quite apparent that the fault does not lie wholly at the receiving end. The B.B.C., for reasons which are not disclosed, persist in using cameras of varying sensitivity, with the result that when the user has adjusted his controls to suit one camera picture, as soon as a fade-over is made to a second camera, the levels are all wrong. Where three or four cameras are to be used on any single transmission, every effort should be made to see that their performance characteristics are almost identical. This, of course, does not absolve the viewer from his share of responsibility, but until he can be satisfied that the radiated picture is above suspicion, there is a tendency



George Western watching the pathologist testing their blood for grouping at the Royal Northern Hospital.

Transmitter Control

THERE is no doubt that as far as America is concerned there is a general hesitancy to commit the television industry to any one particular set of picture standards. The R.M.A. of that country have made certain recommendations in this connection, and it is interesting to note that so far every manufacturer has accepted these findings and built either transmitting or receiving apparatus to conform to them. Lurking in the background all the time, however, is the fact that the Federal Communication Commission have in no way committed themselves on the matter, and many responsible industrialists feel that while 441 lines may be acceptable at the start of the service, the peculiar form of control which exists in America may bring about a demand for a higher standard

before the industry has had an opportunity really to establish itself. The engineer is giving serious consideration to the design of receiving equipment which will anticipate any fundamental changes and so remove the fear of obsolescence in the American market. If only the whole of the control of the picture definition, frame frequency, picture frequency and other vital matters could be vested in the transmitting end, then many of the economical difficulties would vanish. It is for this reason that the Du Mont system of television is being studied carefully, for the inherent characteristic of the scheme employed is that the deflecting pulses for the receiver cathode ray tube are radiated together with the vision and sound signals. Time base generator equipment is, therefore, unnecessary in the receiver proper, for the sweep wave forms after amplification are applied directly to the C.R. tube electrodes. The receiver is, therefore, irrevocably locked to the transmitter and any changes which occur at the latter, either accidental or introduced deliberately, must manifest themselves in the receiver automatically. The whole matter is one of great importance and merits a careful study, especially in a country like America, where mass production has been reduced to such a fine art, and a new industry, once started, can produce sets at a price which will ensure widespread popularity with the public.

Improving the Standard of Sport

IT has not become generally realised that the B.B.C., through the medium of its television service, is capable of improving to a very high degree the standard of play

That famous comedy team the Western Brothers were amongst the first to register and be tested for Blood Transfusion at one of the seventy empanelling centres which are now open all over the country. They went to the Royal Northern Hospital, Holloway Road, London, N., the nearest centre to their homes. This life-giving service is painless and has no ill effects. In war or similar emergency, it would be as necessary as bandages. Our illustration shows Kenneth (left) and

in various forms of outdoor summer sports. One very striking example is tennis, which has now such a very wide public appeal. Famous professionals have on several occasions appeared before the camera in the studio and given useful hints on strokes and ball control based on their experience, and it is known that many viewers have taken advantage of this free coaching and applied the knowledge given to their own individual efforts. In support of these lessons, however, the transmissions from the centre court at Wimbledon have been of an excellent character. Due to improved camera positions the pictures radiated have been of good quality and this has enabled both singles and doubles matches to be watched by those enthusiasts who are unable to make the necessary journey to view the All-England Championships direct. By studying the strokes of first-class players in this manner under actual tournament conditions, tennis enthusiasts have derived considerable benefit.



Impressions on the Wax

A REVIEW OF THE LATEST GRAMOPHONE RECORDS

A NEW novelty record this month by Ambrose and his Orchestra contains a number that has created a remarkable stir in America. It is called "The Penguin" and is composed by a young American musician named Raymond Scott, who specialises in oddly-titled tone poems for dance orchestra. On the other side is another of Scott's compositions. This is called the "War Dance of the Wooden Indians"—*Decca F 7089*.

Charlie Kunz plays yet another of his piano solos of popular tunes on *Decca F 7099*. He includes in his medley the hits of the moment, "Deep Purple" and "The Masquerade is Over."

A record that I can recommend for swing fans is *The Quintet of the Hot Club of France's* version of "I Wonder Where my Baby is Tonight," coupled with "Time on my Hands" on *Decca F 7100*.

The Street Singer chooses "South of the Border" and "The Masquerade is Over" for his latest record—*Decca F 7094*, whilst the famous "Blackbirds" star sings, with organ and drums accompaniment, "A New Moon and an Old Serenade" and "Our Love" on *Decca F 7095*.

Brunswick

ALREADY firmly established as a hit song is the adventurous story of the "Three Little Fishes." It is played by Guy Lombardo and his Royal Canadians on *Brunswick 02767*. The coupling is "Deep Purple."

Don't pass by a new record by Count Basie because someone has told you he is a swing pianist. His playing of "How Long Blues" on *Brunswick 02762* is unusual and compelling.

Latest word to be added to the transatlantic dictionary is "Vocadance," which means a vocal record of a popular dance tune. An example is Bing Crosby singing "I'm Building a Sailboat of Dreams" and "It's the Dreamer in Me" on *Brunswick 02768*.

By the way, I hear that the Decca Company have produced something new in the needle line. It is called the Decca Perma-point, costing 5s., and will give perfect reproduction for over 2,000 sides without being changed. Also, next time you visit your record dealer ask him for a copy of "Swing Music News," a free leaflet which, I learn, is every month, containing all the lowdown on new swing records issued by Decca, Brunswick and Vocalion.

A leading article on this leaflet explains that a new policy allows for the release of only the most authentic examples of swing. Future issues will include many records of Negro "Race" music of a kind never before issued in this country. A prize of three free records is being offered by "Swing Music News" for the best letter commenting on this bold policy.

Rex

HAVING got that off my chest, let me introduce you to a new dance. C. L. Hermann, the director of Mecca Dance Halls, has evolved this new dance in conjunction with Miss Adele England, and they call it "The Handsome Territorial."

On a new Rex record Miss England tells you how to set about learning this topical dance. While not exactly in line with an army drill manual, there are several phrases that strike a familiar note. For example, at one moment Miss England says "On the word 'Boo' bend the knees..." and dancers are told to "swing the arms smartly in marching military style." On the reverse side of the record there is Ivor Kirchin and his Band to play the music for you to practice the dance.

Parlophone

NO Parlophone list is complete without a new record by Richard Tauber, and this month he sings two arias from his Covent Garden success "Don Giovanni" on *Parlophone R 20444*.

Millicent Phillips, the young girl soprano, has recorded "One Night of Love" and "Ciribiribin" on *Parlophone R 2679*, whilst Herbert E. Groh, the famous tenor, sings "Song of my Heart" and "My Heart Belongs to you Alone" on *Parlophone R 2678*.

Leslie A. Hutchinson (Hutch) has made three new records this month of six typical "Hutch" songs. First we have "We've Come a Long Way Together" and "A New Moon and an Old Serenade"—*Parlophone F 1463*, secondly "Sing My Heart" coupled with "Our Love"—*Parlophone F 1464*, and finally "Don't Worry 'Bout Me" and "Life is Nothing Without Music"—*Parlophone F 1476*.

Harry Roy and his Orchestra have a couple of records, one of which features the new hit song "Three Little Fishes"—*Parlophone F 1454*. The coupling is "And the Angels Sing." On the other record—*Parlophone F 1455*—they give their version of "We've Come a Long Way Together" and "A New Moon and an Old Serenade."

PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM,

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ELECTRADIX RADIOS

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Criticism, Chat and Comment

Programmes and Listening

Our Music Critic, Mr. Maurice Reeve, Discusses the Ideal Concert Programme from the Listeners' Point of View

THE Promenade Concerts will soon be with us again, and, before their season closes, the full autumn rush will be upon us.

At the height of the season there is so much music going on, so many masterpieces are repeated over and over again, and the new works which claim our attention seem to grow in number with the passing years, that the trouble is no longer what shall we hear but "how can we possibly fit in this or that?" The Promenade Concerts are a unique institution in more ways than one. Starting, as they do, during the close season, and running until they just overlap the start of the season proper, they place pretty nearly the whole world of music before us as in a huge tray of *hors-d'oeuvre* from which we can sharpen our appetites. Although everything performed there will be repeated again and again during the following six or eight months, they enable us to see, as in a collection, music's choicest numbers. Many is the time that a person has seen such and such a work down to be played by Herr this or Monsieur that at one of the "classy" symphony concerts during the winter months, when a memory has been struck up in their mind: "Of course," they say to themselves, "that's that marvellous thing I heard at the Proms." They then, most likely, go and hear it from the comfort and luxury of the stalls and with all the freedom, ease, and expense, of which the Proms. do not permit.

Which brings me to the question of programmes.

What is the ideal programme for a symphony concert?

Of course, the Proms. are not exactly orthodox symphony concerts, although their first parts, falling before the interval and the news bulletin, usually includes a symphony.

A symphony concert must be highbrow! Nothing whatever that is not in the highest traditions, or, as one might put it, born in the purple, musically speaking, could be permitted at the symphony concert where the stalls are at least twelve shillings each, the programmes one shilling and a withering look from our neighbour if we turn it over during the performance of an item thrown in.

Part two of the Prom. programme is so essentially popular in character, including solos and songs, that they would not, classically speaking, be considered eligible for that awe-inspiring title. But to the sincere music lover in the street, if not on the street, we are quite entitled to style them symphony concerts. After all, we "dine" at the Corner House, soup or no soup, tails or no tails, so why shouldn't we "symphony concertise" at the Proms.?

They are in Queen's Hall after all is said and done.

Ideal Programme

Apart from its being the law, the ideal programme must contain a symphony. The symphony is the form in which music is presented to us not only at its most regal and magnificent, but in its most infinite variety.

The great symphonies contain something of everything, a claim which no other work except an opera can make. An overture would also seem to be a necessity. Being composed in "first movement" form, it might be called a symphony in miniature.

There is something very stirring and pulse-quickening about a first-class overture. Not too long, and its tunes and rhythms easily assimilated, it forms the ideal curtain raiser for the pageant.

Then there is the tone poem, of which class such works as Debussy's "Après midi d'une faune" or Wagner's "Siegfried Idyll" are perfect specimens, are ideally calculated to afford contrast and relief from the mental strain of the bigger works. The pictures which they conjure up for us, in distinction to the "absolute" nature of the symphony, are a delight to the imagination as well as to the ear.

Concertos

And lastly come the concertos for a solo instrument, and the vocal excerpts from the operas, both with orchestral accompaniment. With the solo parts in adequate hands, few works in the whole repertory are

PROMENADE CONCERTS, 1939

IN issuing its Prospectus of the season of Promenade Concerts, to be conducted by Sir Henry J. Wood in the Queen's Hall between August 12th and October 7th, the B.B.C. announces that arrangements have been made to broadcast not less than an hour's music from each concert, beginning every night throughout the season at 8 p.m. In addition, at least two first halves, and an average of one second half per week, will be broadcast complete on either the National or the Regional wavelength.

calculated to give greater satisfaction. What is lovelier than a Mozart aria beautifully sung, or a Mozart or Beethoven concerto performed by a master of his instrument, piano or violin, as the case may be?

As an alternative to this, what more thrilling or exciting than a set of variations written round a beautiful theme, such as Elgar's immortal "Enigma" set?

Not to mention the symphonic poem, like Tchaikovsky's or Richard Strauss, telling the story in music of Romeo and Juliet or Don Juan, dramatic and pulsating, tender and luscious, by turns?

Although everything cannot be included in a programme which tradition limits to about two hours' duration, these are the dishes which comprise music's banquet. They cover the whole gamut of human emotion and no mood is left undrawn.

How to Listen

There is a very great art in listening to such a "feast," or welter, of sound, and the success or otherwise of the concert, both on the audience collectively and each one individually, will certainly depend on the frame of mind we are in when we

enter the hall and on our reactions to each event as it passes in front of us. When a performance goes wrong it is not an uncommon observation that the reason was that the artist had had a quarrel with his wife, or that she had given him something for his dinner which displeased him. Have you ever wondered at what went wrong when you listened and things did not come up to expectation? The almost invariable reason given is that the music itself was at fault. "It was too highbrow." "No one can be expected to understand such stuff." And "the chap must have been drunk when he wrote it," are the commonest expressions, made when we hear something we do not like. The reasons are twofold. Firstly, we sit down to listen in the wrong frame of mind. Probably we should never have gone to a concert at that particular time at all. When listening in we frequently realise, before the particular programme commences, that favourable conditions for doing it justice cannot last until it is over, even if they should be present when it began. It is obvious, for instance, that we can allow more latitude when variety and certain types of light music are coming over than during the transmission of classical music. They require less concentration and the "thread" of what is going on is much easier to pick up each time one is compelled to drop it; consequently one can much more easily "forgive" intrusions and interruptions either at the telephone or the front door bell than one can when Beethoven is absorbing our attention. If our attention to a symphony, or any piece of music for that matter, has to be abandoned halfway or badly cut into during the performance, then the portion we do hear of it is worse than useless.

Programmes might be studied, too, with much greater care. Good music should never be "turned on." Without claiming any superiority over rival forms of entertainment, it just cannot stand that treatment.

Another Reason

The second reason why classical music is sometimes apt to pass over our heads is that we do not know quite what to look for in it. This, of course, is a very big subject and can only be mentioned here. The form of the work and the ability to follow the thread of its story is obviously of the first importance. Also in an understanding of its rhythms. But to get familiar with it so as to know when its great movements are coming before they actually do, is, perhaps, the finest way of assuring ourselves of the fullest possible pleasure.

And that is why Promenade audiences always get their full money's worth. It is an education to watch their faces: the pleasurable anticipation that precedes the high lights of the music followed by a look of unutterable satisfaction after they have gone.

Get to know it and the language it is written in, just as you know the language of the other entertainments you listen to and enjoy. If you do this good music will never let you down.

RADIO CLUBS & SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

Special Notice: Will club secretaries please send in reports in the form in which they appear on this page.

DOLLIS HILL RADIO COMMUNICATION SOCIETY
Hon. Sec.: E. Eldridge, 79, Oxgate Gardens, Cricke-wood, N.W.2.

STIBLING Corner, on the Barnet by-pass, is the location for the field-day on July 23rd. The actual site is at the rear of the "Inn" or "Hotel" on the corner. If any trouble is experienced in finding the site inquiries can be made at Hendon Park Farm, which is nearby. The transmitter, G6SKP, will operate on 14,024 and 14,266 kc/s, and reports by any who hear the transmissions would be very welcome at any distance, and all reports will, of course, be acknowledged. It is suggested that reports should include full details of type and direction of aerial used for reception, and, where possible, note on interfering stations.

We invite any reader to visit the station, especially those who can manipulate a morse-key, using the international code.

GOLDERS GREEN AND HENDON RADIO SCIENTIFIC SOCIETY

All communications to be addressed to: H. Ashley Scarlet, 60, Pattison Road, Hampstead, N.W.2.

THE annual direction-finding competitions open to all interested in this work will be continued during July and September on wavelengths of 80 to 5 metres. All secretaries of radio societies have been notified, and there is every indication of a record attendance.

During the past and present anxious situations it has been most encouraging to note the value set on our work of the past ten years by the Army and Air Forces. Unquestionably the continued interest has been largely stimulated and encouraged by the generous support of the Radio Industry.

The first competition was held on May 21st, in the country about Watford—Berkhamstead—Dunstable—Hitchin—Hertford.

RADIO, PHYSICAL AND TELEVISION SOCIETY
Headquarters: 72A, North End Road, West Kensington, W.14.

Hon. Sec.: C. W. Edmans, 15, Cambridge Road, North Harrow, Middlesex.

Meetings: Friday evenings at 8.15 p.m.

At a recent meeting of the society, Mr. C. W. Edmans (G4KL), lectured on "Alternating Current Bridge Measurements with Home-made Apparatus." The lecturer dealt with A.C. bridge measurements of inductance, capacity, and effective resistance at audio-frequencies, in a manner suited to the needs of the advanced student of electrical engineering. Every effort was made to make clear the practical side of the subject, and the lecturer brought with him a great deal of apparatus.

Preparations are already being made for the society's field-day which is to be held in the Dorking district of Surrey towards the end of August. New members are welcome, and further particulars may be obtained from the hon. secretary at the society's headquarters.

SLOUGH AND DISTRICT SHORT-WAVE CLUB
Headquarters: 35, High Street, Slough, Bucks.

Secretary: K. A. Sly (G4MR), 10, Buckland Avenue, Slough.

Meetings: Alternate Thursdays at 7.30 p.m.

At the last meeting held on July 6th, the chief item of interest was a talk given by Mr. Houclim (G3GZ) on transmitters of 25 years ago. This talk was voted a great success by all members. The secretary was congratulated on obtaining his full call of G4MR. A discussion on conditions took place, and it was decided that on the whole DX conditions had been bad during the past fortnight. The research group held a preliminary discussion on the course of experiment to be adopted, and plans have now been made for regular listening schedules to be kept by its members. A very popular feature was inaugurated at the last meeting, viz., a query corner, a period set apart for members to submit their difficulties to the meeting at large. Quite a few troubles were cleared up by members who had experienced the same difficulty, and found a cure for it.

On the agenda for the next meeting we have a talk to be given by Mr. Paine (G6PR) on "Arranging and operating a portable station for National Field-day." This talk was postponed from the last meeting owing to lack of time. Also on the agenda are the ever-popular morse classes (slow and fast), the discussion on conditions, more work by the research group, and the query corner.

The subscription is 2s. 6d. per annum, with an extra 3d. payable at each meeting to cover the cost of the club-room.

SALE AND DISTRICT RADIO SOCIETY

Headquarters: St. Mary's Schools, Barkers Lane, Sale, near Manchester.

Secretary: Mr. S. C. O. Allen (2FCQ), 31, Ennerdale Drive, Sale.

Meetings: Weekly, on Thursday evenings, at 7.30 p.m.

Mr. A. T. GAFNER, who is an operator in the Royal Army Signals Corps, was welcomed as a member of the society at the meeting on July 6th. The society now has a good deal of equipment, and it is proposed to apply for an amateur transmitting licence in the near future. Several members hold A.A. or full transmitting licences. Slow morse transmissions on the 1.7 mc. band, proved very successful; further practice periods are planned for the next few weeks. It was decided to communicate with shipping companies to see if arrangements could be made to visit the radio room of a steamer at Salford Docks.

Application is to be made for affiliation to the Radio Society of Great Britain.

Readers of this magazine who are interested in

amateur radio will be welcomed as members of the society. The subscription is sixpence per week, and the entrance fee one shilling.

THE SURREY RADIO CONTACT CLUB

Headquarters: 79, George Street, Croydon, Surrey.
Hon. Sec.: S. A. Morley, 22, Old Farleigh Road, Selsdon, Surrey.

THE July meeting of the above club included a very interesting and instructive talk, and also a demonstration given by Mr. B. Wardman (G5GQ) entitled "Construction, Calibration and the Use of Frequency Measuring Apparatus."

Mr. Wardman described in full the construction and operation of the frequency meter which he had built. With the aid of G3IG's superhet receiver he then demonstrated how the meter worked, and when checked up, it was found to be perfectly accurate.

Will prospective members please note that there will be no club meeting held during August; the next one to be held will be in September.

TELEVISION FEATURES

TELEVISION AT ROEHAMPTON

SUMMER sports and a fashion display are to be televised from the Roehampton Club during a four days' visit by one of the B.B.C. mobile units from July 26 to 29.

On July 26 viewers will see a demonstration of bicycle polo. The rules are very similar to those of ordinary polo, with four players a side and the same size of field.

Roehampton is the home of croquet, so the following afternoon will be devoted to a demonstration of the game, which should disprove any lingering ideas that croquet is not exciting. E. G. Heathcote will demonstrate some of the thousand and one different strokes which are possible in croquet and a commentary will be given by H. F. Crowther Smith.

On Friday afternoon, July 28, a parade of beachwear fashions will be televised from the Roehampton Swimming Pool with commentaries by Betty Cameron Smail and Jasmine Bligh, the television announcer.

Two separate transmissions will come from Roehampton on Saturday afternoon, July 29. First a display of trick diving will be given by Frank Foster and Tony Zukas. Tony Zukas is an American swimmer who has won more than sixty medals. On leaving the University of Iowa, Zukas became a professional swimmer and has been swimming instructor at Miami and Bermuda. In 1937 he swam a distance of two hundred and seventy feet under water. Frank Foster comes from Springfield, Massachusetts. He is a professional water comedian who specialises in "belly floppers" from great heights. He appears to strike the water flat. Another trick is to escape from a bag thrown in the water. He also swims tandem fashion under water with Tony Zukas to distances up to one hundred and fifty feet.

Kayak rolling will be the subject of the final transmission. The kayak is a form of Eskimo canoe, and kayak rolling is the hazardous

business of turning a side somersault to starboard and coming up smiling on the port side, and vice versa.

THE PARNELL COMMISSION

A PARNELL programme dealing, not with the great Irish statesman's much publicised love affair, but with one of the great political triumphs of his career, was televised in the evening programme on July 18, and will be repeated in the evening programme on July 28.

"The Parnell Commission" will give a dramatic but authentic record in sound and vision of Parnell's vindication by a Royal Commission, which investigated certain letters that were published by "The Times" implicating him in the Phoenix Park murders. These murders took place in 1882 and were denounced by Parnell and the Irish Party. Soon afterwards, "The Times" published in facsimile certain letters bearing Parnell's supposed signature, which made it clear that in secret he was assisting and sympathising with the murderers.

The investigation is an interesting example of the tracing back of these documents to their original source and the breaking down in the witness box of the forger by a masterly cross-examination by Lord Russell of Killowen. It is a classic example of the trapping of a forger by means of a spelling mistake, and it ended in a great political triumph for Parnell at the zenith of his career.

The programme will require two television studios and will include shots of the Phoenix Park murders and the House of Commons in addition to the sittings of the Commission itself. Denis Johnston, who is producing "The Parnell Commission" for television, has probed the thirteen volumes of the Commissioner's Report for the authentic facts.

Mrs. O'Shea appears in only one scene, but it is believed that the characterisation will be more accurate than the popular notion of Parnell's mistress.

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LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

A Four-valver: Station Call Signs

SIR,—In the issue dated Feb. 11th, 1939, you published under "Letters from Readers" a "four-valve Hartley circuit" as used by a Mr. Rumble. Thanks for your assistance in putting me in touch with this gentleman, for with his kind helpful hints I have constructed this set and it is a most useful "job."

While my "short-wave" interest in the past has mainly been concerned with the Yankee transmissions from W2XE, W3XAL and W8XK, this set has given a great impetus to listening to the "amateur bands," and up to date I have logged about 120 to 200 of these on 20 m., including all continents excepting Australia, and this brings me to my main point in writing.

Would not an article dealing with the peculiar S.W. expressions be of interest to many readers: a description of the meaning of letters used and a list of the index letters of various countries?

Recently I have heard SPIRG, CX2CO, LX1CJ, CT1QN, PA?WT, LGG3I, CO8AR and numerous others, but only in a few cases can I find the country of origin.

I seem to recall an article of this nature, which was published a few years ago.—FRANK R. HORSEFALL (Leeds).

[You will find the particulars you require, and other useful information on the subject in our handbook, "Wireless Transmission for Amateurs," price 2s. 6d. or 2s. 9d. by post from our Book Dept.—ED.]

Station W1ASK

SIR,—I would be very grateful if any short-wave listener who has heard W1ASK on 20 metres 'phone would communicate with me, giving full particulars.—GEORGE A. BEASLEY, "Ash-ridge," Sketchley Hill, Rugby Road, Hinckley, Leics.

A Good 14 Mc/s Log

SIR,—I read with interest the many excellent logs submitted by your readers. Before I submit my own, here is a description of my somewhat unusual aerial.

I live in a flat, and have had great difficulties in erecting an aerial, having experimented with various types of indoor aerials with no great success. I tried the following arrangement, which works admirably. A short inverted L, about 20ft. long, and slung between two chimneys, was led in through the hall window. As the receiver is in the living-room, a long lead of screened flex is brought round on the picture-rail.

Another screened lead is brought to the receiver from a small "brush" type aerial on the top of the building through the living-room window to the receiver. The two leads, therefore, are from opposite directions and are joined together at the receiver. For short-wave listening only,

the screening is earthed by means of a short length of flex from the earth-wire, which is attached by means of a clip; I found that though the earthing of the screening makes a marked improvement on the short waves, it has a damping effect on medium and long waves.

Here is my log of 14 mc/s amateurs for the first six months of this year; the receiver is an all-wave five, all reception on loudspeaker:

W1(66), W2(73), W3(56), W4(47), W5(14), W6(25), W7(6), W8(63), W9(25); VE(18), PY(19), LU(6), VP(63), CO(7), TI(4), XE2FC; HK(3), HI3N, VP3CO, HC1FG, HP1A, HR5C, K4(6), YV(7), HH2B, OA4(3), TG5JG, 9BA; CX(3), CE(4), KA1FH, HS—, VU2FA; PK4DO, 1AD; VK2OJ, 3HG, 3BM, 4JP; CT2(3), YM4AR, OK1SZ, ES(4), OH(2), ON4(6), F(30); ZB1LE; SV1(4), PAO(3), YR5PB, AA; YL2CG; EA7BA; CT1(21), II(19); HB9(9), YU7(4), LX1AY, AP; SP1(4), SP2(3), HA(21), LY(6), SM(19), OZ(8), LA(8), FA8CF, 3HC; CT3AT, SU(9), CN8(12), FB8AH.

Wishing every success to your excellent journal.—K. I. BROWNE (Peckham Rye).

CUT THIS OUT EACH WEEK

Do you know

—THAT metal gearing or other metallic moving parts can cause noises in some short-wave apparatus.

—THAT a metal chassis or baseboard can introduce losses if the layout is not suitably arranged.

—THAT special battery valves have now been produced to enable the accumulator to be dispensed with in portable apparatus.

—THAT an indoor aerial may be found very inefficient in some buildings, due to the screening effect of the building.

—THAT some highly-efficient short-wave receivers have an H.F. stage which is switched out of circuit on the shorter wavelengths.

—THAT special transformers have been produced for plate-modulation in transmitting apparatus.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Neumes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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AERIAL MAST DESIGN

(Continued from page 437)

and this again will weaken the entire structure. A much better material is standard large diameter electric conduit, steam piping, or hot-water circulating system piping. The local builder may also be able to come to your assistance in this connection as the hot-water pipes are often removed from a house which is being demolished, or in which replacement is being effected due to the pipes having furred up. The internal furring will not matter for a wireless mast, and will, in fact, give additional "body" to the structure. Reducing joints are also available for this material, and by using a fairly large number of separate pieces, with suitable reducers, the mast may be tapered to reduce top weight without undue weakening. Paint

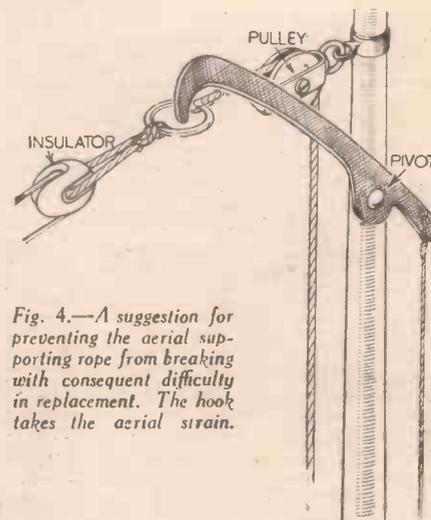


Fig. 4.—A suggestion for preventing the aerial supporting rope from breaking with consequent difficulty in replacement. The hook takes the aerial strain.

will afford protection from rust, but the electrical conduit is obtainable in a galvanised finish which will avoid the need for painting. A point to be borne in mind with regard to metal masts is that they will act as collectors of static electricity and, therefore, they should be efficiently earthed to avoid the risk of discharge. From this point of view they will obviously also tend to weaken signals picked up on the aerial unless the supporting rope is sufficiently long to enable the end of the aerial to be clear of the mast.

Pulley Safeguards

Finally, with all these masts, it must be remembered that in the event of the supporting rope breaking it will be necessary to lower the mast to replace the aerial. Therefore, some safeguard should be provided to enable the aerial to be re-attached or a new supporting rope passed through the pulley. Many various schemes of this type have been described from time to time in our Wrinkles columns, but undoubtedly one of the most satisfactory schemes is to provide an alternative support at the top of the mast so that when the aerial is pulled up into position this can take the strain of the aerial and the original rope freed. One scheme which has been suggested is shown in Fig. 4, where a metal hook is hinged at the top of the mast and provided with a wire or rope by means of which it may be raised to engage in a ring attached to the end of the aerial support. It will then hold the aerial, and the normal rope may be tied back until it is desired to lower the aerial when a pull will draw it back sufficient to enable the hook to fall clear and the aerial is then free again.

NOTES FROM THE TRADE

Marconiphone Olympia Programme

THE Marconiphone Company have announced their Radiolympia programme in which some exceptionally interesting designs will be featured. Of these the new Marconi "Auto-Drive" self-operating tuning device is particularly interesting. A motor-driven tuning condenser is fitted and a "cruiser" disc is provided for use in conjunction with the manual control. Operation of a push-button which has been set to a given station brings into operation the motor which drives the condenser and the receiver is automatically tuned to that station. A separate small motor is also fitted to operate a wave-change switch and thus should a button be pressed for a station on a waveband different from that previously in use, the second motor is automatically brought into circuit and the waveband is changed. When using manual control operation of a control will set the "cruiser" disc working and the direction of condenser movement may be set by this control. As the pointer travels along it may be arrested and accurate tuning carried out by the manual control. Although apparently a lazy-man's device, this automatic tuning selector will be found of great advantage in a powerful receiver when one wishes to find a station transmitting a programme which fits the need of the moment—and detailed programmes of all worthwhile stations are not always readily obtainable.

The receivers fitted with these motor-operated devices are at present two in number, Model 880, a table grand, which is illustrated on this page, and a radiogram version, Model 881. The radio chassis are identical and incorporate a seven-valve three-waveband unit covering the 16.5 to 51, 195 to 560 and 750 to 2,000 metre bands. Automatic frequency control is, of course, fitted to ensure accurate tuning with the motor-operated condenser, and a special R.F. stage is provided. The rated output is 10.5 watts and among the many refinements fitted are electronic visual tuning device; external speaker socket-switch device; record player or pick-up sockets, and the usual tone control. The table model is 19½ guineas and the radiogram 44 guineas, but it should be noted that these models will not be released until August 11th.

A wide range of other models will also be released at this time, and these include a six-valve three-waveband push-button radiogram with A.F.C.; a five-valve three-waveband push-button superhet radiogram at 20 guineas; a five-valve three-waveband superhet console for A.C. at 14 guineas; a five-valve three-waveband push-button superhet for A.C./D.C. mains at 14 guineas; a five-valve three-waveband push-button superhet for A.C. mains at 10½ guineas and a five-valve three-waveband superhet table grand for A.C. mains at 9 guineas.

New G.E.C. 20-watt Amplifier

THE range of G.E.C. Sound Reproduction Equipment has been expanded by several new items, the most interesting

of which is a 20-watt amplifier for A.C. mains embodying automatic microphone gain control and bass-treble "uplift" tone controls. The automatic microphone-gain control, which employs two separate valves on the chassis, provides a constant volume level over a wide variation in sound inputs to the microphone. By this means, it is claimed that all the difficulties associated with speakers who are constantly changing their distance and direction from the microphone is overcome and an approximate level is ensured even when the microphone is being shared by two or more speakers or vocalists at varying distances. A further merit is that it allows the volume control to be further advanced without entailing the risk of acoustic feed-back. The tone controls for treble and bass are independent on this amplifier, and serve to increase the response at either end of the



The new Marconiphone Model 880—incorporating the novel "Auto-Drive" self-operating tuner mentioned on this page.

scale to the extent of 10 d.b.; thus amazing brilliance in the upper register can be combined with heavily emphasised bass reproduction.

The amplifier employs a 4-stage circuit using two KT.66 power tetrodes in class A push-pull in the output stage. Input channels are provided for microphone, gramophone and radio circuits, and the output is linear between ± 2 d.b. up to 10,000 cycles. A microphone-input transformer is incorporated, and also a multi-ratio output transformer.

The G.E.C. De Luxe 20-watt Amplifier is available in chassis form, with protective metal cover, at a list price of £28 10s.; as a rack-mounting panel assembly at £31, or in an automatic record-changing gramophone assembly, playing mixed batches of eight 10in. and 12in. records, at £46.

To operate with this amplifier, and with all other amplifiers in the G.E.C. "De Luxe" Range, there is also being introduced a new G.E.C. moving-coil microphone. This model has been specially developed for public-address work, and has a carefully regulated frequency response designed to minimise feed-back and boom, without loss of bass, and with a total

absence of harmonic generation and inter-modulation. Measured across the secondary of a 50:1 step-up transformer its sensitivity is minus 50 d.b. at 1,000 cycles, which allows it to be used with a medium-gain amplifier, while its frequency response is substantially linear between 50 and 6,000 cycles, and effective up to 16,000 cycles.

The microphone is finished in matt black with a contrasting bright nickel-plated front ring, and an extremely interesting feature is the method of mounting that is employed. A recessed rubber-mounted socket with bayonet fitting is provided in the base of the microphone, giving immediate positive connection to the two specially-designed microphone stands that are available. One is a table stand, the other a floor stand. Both are black and chromium and fitted with a spring-loaded self-locking bayonet type mounting device connecting with the resilient socket in the microphone base.

Once placed in position the microphone head is firmly and securely held proof against shocks and cannot be accidentally dislodged, although it can be removed in a second by releasing the spring grip. This mounting device also allows the microphone head to be tilted backward or forward so that it may be adjusted at a suitable angle without being raised to a height that would obscure any part of the speaker's face. Both stands are adjustable in height with an easily-secured locking device, and the necessary connecting lead is taken internally down the tube through a cable entry that does not allow the cable to get lost inside.

The list price of the BCS. 2280 G.E.C. Moving-Coil Microphone is £6 5s., while the BCS. 2247 Table Stand is listed at £2 10s., and the BCS. 2248 Floor Stand at £3 15s.

G.E.C. Fit Television Suppressors

THE General Electric Co., Ltd., has arranged for television suppressor equipment to be fitted on all G.E.C. vehicles operating within the television area. Not only are all vans and lorries, as well as the fleet of sales cars, being so equipped, but the same procedure has been made available, free of charge, to all private cars belonging to members of the staff.

PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM

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TELEVIEWS

C.R. Tube Deflection

AN immense amount of work is being directed towards the whole question of cathode-ray tube beam deflection for providing the requisite scanning field essential for the reproduction of satisfactory television pictures. Changes in tube design, especially in so far as the overall length and shape of the glass bulb is concerned, bring in their train new problems for the designer of the time-base generator equipment and the deflection apparatus. In many cases the scanning voltages required to produce full deflection within the mask area reach uneconomical limits, and various schemes are resorted to in order to produce the effect desired without unduly adding to the costs involved. One method which was disclosed recently for enlarging the scanning dimensions in either of the line or frame directions or both, if desired, used permanent magnets positioned between the front fluorescent screen and the deflecting plates of an electrostatically operated tube. It was stated that the magnetic field provided in this way increased the degree of deflection of the cathode-ray beam without adding to the amplitude of the deflecting voltages. This was said to give greater accuracy in the formation of the saw tooth deflection voltages and reduced the risk of non-linearity by keeping the working stroke within the correct charging limits.

An American Delay

IN spite of every effort it is now learned that the television transmissions of the Columbia system of America which were scheduled to commence with the opening of the World's Fair at New York, will not start until a few weeks later. At the present moment, Mr. Gilbert Seldes, the director of television programmes to that company, is on a visit to this country. Naturally, much of his time has been spent at Alexandra Palace, and he has been loud in his praise of what he has seen, and admitted that the truth is that but little is known of television except what is being done in England. Apparently, one of the biggest difficulties which confronted the Columbia engineers was the installation of the transmitter in the Chrysler Building. The actual radio transmitter equipment is accommodated on the 73rd and 74th floors of the building, and over six tons of cable for electrical power had to be brought from the ground level to furnish the necessary supplies. Added to that was the fact that the aerial itself had to be anchored to somewhat flimsy steel plates which form a decoration to the dome of the tower, and yet it has to withstand a wind velocity of over 150 miles per hour. These are the main contributory causes of the delay, but it is hoped that once started the television transmissions will be satisfactory.

French Progress

THE recent action of the French Chamber's Finance Committee in approving a proposal to vote another £50,000 for television foreshadows further interesting developments in the service of that country. This sum of money is to be diverted from another section of the Post Office budget, but the important point is that progress is being made, whereas this country is still marking time with its developments. The actual programmes which are now radiated from the Eiffel Tower transmitter in Paris have taken on a very varied character, and total 1½ hours daily. Items

of interest and amusement for Parisians have improved the entertainment level to a large degree, while the French still have the satisfaction of knowing they possess the most powerful ultra-short-wave television transmitter in the world. The full rating of aerial power for peak white in the signal is 45 kW, although it is run normally at two-thirds rating for the present service.



Van Straten, the popular band leader from Quaglino's restaurant, who is often heard over the radio with his band.

Focusing Compensation

WHEN the beam of electrons in a cathode-ray tube is focused either by electrostatic or electro-magnetic means, the original diverging stream emerging from the anode orifice is made to converge so that in the plane of the fluorescent screen it is a minute, sharply-defined area of

brilliant intensity. If a cross-section of the beam was taken in the plane of the main tube axis, the parameters of the beam would be very similar to that of light, and beyond the plane of the screen the beam would start to diverge once more. Over a short axial length in the neighbourhood of focus, however, it will be found that the beam is substantially parallel. The higher the magnitude of the final accelerating anode volts, the greater is the axial length of the beam where the uniform cross-section is maintained, and this acts as a form of compensation when the screen distance from the focusing coil is not radially the same. In addition, when cases arise where the screen is obliquely mounted to the axis of the electrode system, this compensation allows the beam to remain in focus over the whole area of the screen without the necessity for electrical devices to maintain focus. At the high anode voltages used in projection tubes where this oblique scanning is resorted to, this natural focus maintenance means that the only correction which has to be employed is that for keystone distortion. This is a relatively simple matter and requires a progressive reduction in line scan width from the top to the bottom of the screen.

Americans Urged to Foster Television

ONE of the members of the American Federal Communications Commission, when addressing the R.M.A. recently in Chicago, urged both the radio manufacturers and the broadcasting authorities to foster the development of television, otherwise they will not be in a position to urge for protection when someone else undertakes the work. This may have been a hint at the English interests who are known to be making praiseworthy efforts to prove that British equipment for either big screen working or home reception is capable of giving good results in that country. Following up his opening remarks, the speaker went on to point out that it would be unwise for the industry to lead the public into the belief that television has reached a stable service on a national or even a regional scale. The year 1939 is only witnessing the early stages of practical technical development, and it would be several years hence before they reach the standpoint of stabilised operation of a satisfactory service on anything approaching a nation-wide scale.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office. The Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription, £2 10s.).

Latest Patent Applications

- 18429.—Ashton, H.—Antenna for radio broadcasts. June 24.
- 18788.—Baird Television, Ltd., and Willans, P. W.—Electron discharge devices for use in television, etc., systems. June 27.
- 18801.—Belling and Lee, Ltd., and Hodby, A. L.—Dipole aerials. June 28.
- 18701.—Burndep, Ltd., and Holmes, R. G. D.—Radio-receivers. June 27.
- 18333.—Carter, T. M., and Englay, G. V.—Superheterodyne radio-receivers. June 23.
- 18349.—Hazeltime Corporation.—Automatic control system for television receivers. June 23.

18192.—McDonald, E. F.—Loop antenna. June 22.

Specifications Published

- 507839.—General Electric Co., Ltd., Bligh, N. R., and Bloch, A.—Wireless receiving apparatus.
- 507840.—Nicoll, F. H.—Cathode-ray tubes.
- 508065.—Scophony, Ltd., Sieger, J., and Okolicsanyi, F.—Supersonic wave light modulating devices.
- 507667.—General Electric Co., Ltd., and Espley, D. C.—Apparatus for transmitting television and the like.
- 507668.—Howe, A. B., and Macnamara, T. C.—Television.
- 508076.—Leonard, J.—Television scanning.
- 508048.—Marconi's Wireless Telegraph Co., Ltd., and Bohm, O.—Aerial systems.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.



QUERIES and ENQUIRIES

Signal Strength Meter

"I am very interested in your recent article on signal measurements, but I am not certain what is the best way to include such a meter in my home-made superhet. The combination is R.F., F.C., I.F., followed by second detector and L.F. circuits. Would a standard 1 mA do in this case, and what do you recommend as the best circuit for it? I believe it is possible to use a special valve for the meter in some cases, but this was not explained in the article."—L. F. E. (Newcastle-on-Tyne).

YOU do not state whether your second detector is of the D.D.T. type providing at the same time A.V.C. If there is no A.V.C. a signal meter is not a simple proposition, if really reliable indications are to be given. If there is A.V.C. then, as explained in the article, the change in anode current of a controlled valve is the most satisfactory signal strength indication, and therefore the meter should be joined in the I.F. circuit where the signal strength is obviously strongest. Either the anode or screen-grid forms a suitable feed to the meter, arranged in a bridge circuit as already described—in such a circuit we would prefer the S.G. feed. A valve can be fed from this stage to give increased current readings, but this refinement is not generally called for with a simple type of receiver such as you describe.

Simplified Tuning

"I have built a reasonably good T.R.F. short-wave receiver, but am up against a difficulty which I see you often speak about, namely, tuning. On the 20 and 30-metre band, for instance, there are dozens of stations, but all so close together that I find it very hard to separate them out. I borrowed a very expensive slow-motion drive from a radio friend, but with this it took such a long time to go from one end of the scale to the other that I could not consider using this in the set. Can you give any idea of a suitable idea which you may perhaps have given in your Wrinkles pages at some time?"—C. V. (Bexhill).

THE difficulty is certainly one which is not easily overcome, although the band-spread idea is a very good compromise. Undoubtedly one of the most satisfactory ideas is to build your own drive and scale, making the latter the full length of the panel in a horizontal form. With a vertical pointer travelling on a cord, and with the aid of the small pulleys used in a well-known constructional toy, you can obtain very high-ratio gearing to give you the desired critical adjustment. Then, to overcome the difficulty of turning from one end of the scale to the other we suggest that you make flywheels to mount on the main spindles. These are easily made by taking a 2d. blacking tin, putting the desired spindle through the centre of the tin, and filling it with lead. Stand it on a gas ring till the lead runs freely and afterwards punch at one or two points round the

periphery to prevent movement. The weight so afforded will enable the dial to be "spun" and it will then quickly traverse the scale and is easily stopped at the approximate position required.

S.W. Coil Spacers

"I am trying to make up some air-spaced short-wave coils, but for the purpose I have in view I must have adequate insulation and air spacing. Most ideas I have seen include some insulating material as a support, and I am afraid that this might not be good enough for the particular coils I have in mind. Is there any special idea you could recommend, such, for instance, as might be adopted in transmitting coils, which would give me the desired results?"—L. W. T. (Harrow).

WITHOUT knowing your exact requirements we cannot give definite advice, but we would suggest that you use a fairly small diameter former made from paxolin

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporary papers.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender. Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

or ebonite, and then wind your coil with thick wire, obtaining the necessary support and spacing by means of beads, such as are employed in high-voltage electrical apparatus. These could be placed over the wire and held at intervals to give the desired support. Ordinary cheap glass beads might be suitable, although they may not offer the same insulation properties as the special beads sold for electrical purposes. On the other hand a ceramic coil former, such as is employed for transmitting tank coils may be perfectly satisfactory for your purpose. These cost 4s. each and measure 2½ in. in diameter and 5 in. in length, and have spiral grooves to take 26 turns of wire up to 12 gauge.

International Call Signs

"The other night whilst listening on a newly-made short-wave receiver I heard an amateur calling who said he was VQ2 something or other. Is it possible to tell what country he was in, and is there any book which will give me the various countries' call signs so that I can log all these

amateurs whom I may pick up?"—K. S. (N.W.9).

THE amateur in question would have been in Northern Rhodesia. We have published the amateur prefixes and other code data, but if you are desirous of reporting to the amateurs you should obtain a copy of the Amateur Call Book from F. L. Postlethwaite, of 41, Kinfauns Road, Goodmayes, Essex. This costs 6s. post free and gives the addresses and other data of amateurs in all parts of the world.

Modifying a Transformer

"I have a new transformer, the ratio of which is 3 to 1. Can I make it into a 5 to 1? If so, how can I do this?"—W. G. (W.1).

THE ratio of a transformer is dependent upon the relation between the turns in the primary and secondary. Therefore, to increase the ratio the primary must be decreased or the secondary increased. In the former case you would probably find that the amount of wire left after stripping down to obtain the desired ratio would be insufficient to provide a suitable inductive load for the valve with which it is used and it would thus be inefficient. On the other hand you will probably find that there is insufficient room on the bobbin to accommodate the necessary extra wire to load up the secondary to the required ratio. We therefore advise you to leave the component alone and you will probably find that the ratio will not be of great importance in the average circuit.

I.F. Design

"I see on looking through some catalogues a reference to air-tuned I.F.s. I should be glad if you could explain what this means and what advantage they have over standard transformers of this type."—D. R. (Spalding).

THE standard type of transformer utilises small mica pre-sets for trimming purposes. The air-tuned type of transformer, on the other hand, has a small variable condenser with air-dielectric as the trimming medium. This obviously reduces some of the losses ordinarily encountered, and in most cases the advantages of the condenser are augmented by utilising special wire or methods of winding for the actual transformer.

Radio Control

"I am anxious to make a small radio transmitter for the control of a boat on a pond. I believe that a licence is not needed for such a purpose and should be glad if you could give me details of the type of apparatus which would be permitted."—F. L. K. (S.W.9).

WE understand that for the purpose you mention a licence is not required. You must not, however, use a spark transmitter, and as the apparatus you use may cause interference with the reception of broadcasting by local wireless receiving stations or with other wireless services, you will no doubt take adequate steps to avoid this. The P.M.G. advises restriction of transmission during broadcasting hours, a limitation of the power to a maximum of 2 watts and the use of a wavelength between 100 and 150 metres.

The coupon on page iii of cover must be attached to every query

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS		No. of	SUPERHETS.	
CRYSTAL SETS.		Blueprint.		
Blueprints, 6d. each.	Date of Issue.			
1937 Crystal Receiver	27.8.39	PW71	Battery Sets : Blueprints, 1s. each.	
The "Junior" Crystal Set		PW04	£5 Superhet (Three-valve)	5.6.37 PW40
STRAIGHT SETS. Battery Operated.			F. J. Camm's 2-valve Superhet	13.7.35 PW52
One-valve : Blueprints, 1s. each.			F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37 PW75
All-Wave Unipen (Pentode)		PW31A	Mains Sets : Blueprints, 1s. each.	
Beginners' One-valver	19.2.39	PW85	A.C. £5 Superhet (Three-valve)	PW43
The "Pyramid" One-valver (HF Pen)	27.8.38	PW93	D.C. £5 Superhet (Three-valve)	1.12.34 PW49
Two-valve : Blueprints, 1s. each.			Universal £5 Superhet (Three-valve)	PW44
Four-range Super Mag Two (D, Pen) The Signet Two (D & LF)	24.9.38	PW36B PW76	F. J. Camm's A.C. £4 Superhet 4 F. J. Camm's Universal £4 Superhet 4	31.7.37 PW59
Three-valve : Blueprints, 1s. each.			"Qualitone" Universal Four	16.1.37 PW00 PW73
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2	Four-valve : Double-sided Blueprint, 1s. 6d.	
Selectone Battery Three (D, 2 LF (Trans))		PW10	Push-Button 4, Battery Model	22.10.38 PW95
Sixty Shilling Three (D, 2 LF (RC & Trans))		PW34A	Push-Button 4, A.C. Mains Model	
Leader Three (SG, D, Pow)	22.5.37	PW35	SHORT-WAVE SETS.	
Summit Three (HF Pen, D, Pen) All Pentode Three (HF Pen, D (Pen), Pen)	20.5.37	PW39	One-valve : Blueprint, 1s.	
Hall-Mark Three (SG, D, Pow)	12.5.37	PW41	Simple S.W. One-valver	9.4.39 PW89
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48	Two-valve : Blueprints, 1s. each.	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW49	Midget Short-wave Two (D, Pen) The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.39 PW01
Genet Midget (D, 2 LF (Trans))	June '35	PM1	Three-valve : Blueprints, 1s. each.	
Cameo Midget Three (D, 2 LF (Trans))		PW51	Experimenter's Short-wave Three (SG, D, Pow)	30.7.39 PW30A
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) Battery All-Wave Three (D, 2 LF (RC))		PW53	The Prefect 3 (D, 2 LF (RC and Trans))	7.8.37 PW63
The Monitor (HF Pen, D, Pen)		PW61	The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.38 PW68
The Tutor Three (HF Pen, D, Pen) The Centaur Three (SG, D, P)	21.3.36	PW62	PORTABLES.	
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.39	PW69	Three-valve : Blueprints, 1s. each.	
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	18.2.39	PW72	F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	PW65
The "Rapid" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW82	Parvo Flyweight Midget Portable (SG, D, Pen)	3.6.39 PW77
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	28.8.37	PW78	Four-valve : Blueprint, 1s.	
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW84	"Imp" Portable 4 (D, LF, LF (Pen))	19.3.39 PW86
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.38	PW87	MISCELLANEOUS.	
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38	PW89	S.W. Converter-Adapter (1 valve)	PW48A
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.9.38	PW92	AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.	
Four-valve : Blueprints, 1s. each.			Blueprints, 6d. each.	
Sonotone Four (SG, D, LF, P)	1.5.37	PW4	Four-station Crystal Set	23.7.38 AW427
Fury Four (2 SG, D, Pen)	8.5.37	PW11	1934 Crystal Set	AW414
Beta Universal Four (SG, D, LF, Cl. B)		PW17	150-mile Crystal Set	AW450
Nucleon Class B Four (SG, D (SG), LF, Cl. B)		PW34B	STRAIGHT SETS. Battery Operated.	
Fury Four Super (SG, SG, D, Pen) Battery Hall-Mark 4 (HF Pen, D, Push-Pull)		PW34C	One-valve : Blueprint, 1s.	
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67	B.B.C. Special One-valver	AW397
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79	Two-valve : Blueprints, 1s. each.	
"Aome" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	12.2.39	PW83	Melody Ranger Two (D, Trans)	AW398
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.9.33	PW90	Full-volume Two (SG det, Pen)	AW392
Mains Operated.			Lucerne Minor (D, Pen)	AW426
Two-valve : Blueprints, 1s. each.			A Modern Two-valver	WM409
A.C. Twin (D (Pen), Pen)		PW18	Three-valve : Blueprints, 1s. each.	
A.C.-D.C. Two (SG, Pow)		PW31	Class B Three (D, Trans, Class B) Fan and Family Three (D, Trans, Class B)	AW386
Selectone A.C. Radiogram Two (D, Pow)		PW10	£5 5s. S.G.3 (SG, D, Trans)	25.11.33 AW410
Three-valve : Blueprints, 1s. each.			Lucerne Ranger (SG, D, Trans)	2.12.35 AW412
Double-Diode-Triode Three (HF Pen, DDT, Pen)		PW23	£3 5s. Three : De Luxe Version (SG, D, Trans)	10.5.34 AW435
D.C. Ace (SG, D, Pen)		PW25	Lucerne Straight Three (D, RC, Trans)	AW437
A.C. Three (SG, D, Pen)		PW29	Transportable Three (SG, D, Pen)	WM271
A.C. Lender (HF Pen, D, Pow)	7.1.39	PW35C	Simple-Tune Three (SG, D, Pen)	June '33 WM327
D.C. Premier (HF Pen, D, Pen)	28.7.34	PW35B	Economy-Pentode Three (SG, D, Pen)	Oct. '39 WM397
Ubique (HF Pen, D (Pen), Pen)		PW36A	"W.M." 1934 Standard Three (SG, D, Pen)	WM351
Armada Mains Three (HF Pen, D, Pen)		PW39	£3 3s. Three (SG, D, Trans)	Mar. '34 WM354
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) "All-Wave" A.C. Three (D, 2 LF (RC))	11.5.35	PW50	1935 36 6s. Battery Three (SG, D, Pen)	WM371
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)		PW66	PTP Three (Pen, D, Pen)	WM389
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70	Certainty Three (SG, D, Pen)	WM393
All-World Ace (HF Pen, D, Pen)	28.9.37	PW80	Minutube-Three (SG, D, Trans)	Oct. '35 WM396
Four-valve : Blueprints, 1s. each.			All-Wave Winning Three (SG, D, Pen)	WM409
A.C. Fury Four (SG, SG, D, Pen)		PW20	Four-valve : Blueprints, 1s. 6d. each.	
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D	6s. Four (SG, D, RC, Trans)	AW370
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45	2HF Four (2 SG, D, Pen)	AW421
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47	Self-contained Four (SG, D, LF, Class B)	Aug. '33 WM331
A.C. All-Wave Corona Four	6.11.37	PW81	Lucerne Straight Four (SG, D, LF, Trans)	WM350

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Issues of Practical Wireless 4d. Post Paid.
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Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

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Unicorn A.C.-D.C. Two (D, Pen)	WM304	The Request All-Waver	June '36 WM407
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Ultra-short Battery Two (SG dot, Pen)	Feb. '36 WM402	Harris Electrogram battery amplifier (1/-)	WM399
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A.W. Short-wave World-leader (HF Pen, D, RC, Trans)	AW430	Wilson Tone-Master (1/-)	June '36 WM406
Empire Short-waver (SG, D, RC, Trans)	WM313	The W.M. A.C. Short-wave Converter (1/-)	WM408
Standard Four-valver Short-waver (SG, D, LF, P)	22-7-33		
Superhet : Blueprint, 1s. 6d.			
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Harris Electrogram battery amplifier (1/-)	WM399
De Luxe Concert A.C. Electrogram (1/-)	Mar. '36 WM403
New Style Short-wave Adapter (1/-)	WM388
Trickle Charger (6d.)	Jan. 5, '35 AW482
Short-wave Adapter (1/-)	AW466
Superhet Converter (1/-)	AW457
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Surplus, Clearance or Secondhand, etc.

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Vauxhall.—All goods previously advertised are still available; send now for latest price list, free.—Vauxhall Utilities, 163a, Strand, W.C.2.

CONVERSION UNITS for operating D.C. Receivers from A.C. Mains, 100 watts output, £2/10/0.—150-watt Model for operating Radiogramophones, £3/10/0.—Send for lists.—Chas. F. Ward, 46, Farringdon Street, London, E.C.4. Tel: Holborn 9703.

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For the convenience of our customers we have moved to modern offices and showrooms at Writers Road, Holloway. Writers Road adjoins Holloway Arcade and is readily accessible from all parts of London. ARMSTRONG CO. will gladly demonstrate 1939 range of Radio chassis at the new premises. Kindly note in future all correspondence to Armstrong Manufacturing Co., Writers Road, Holloway, London, N.7. North 3213.

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ALL Wireless and Radio Engineering books available through new financial terms as low as 2/6 monthly. Write a card or call personally for details and lists from the Radio Department, Phoenix, Chandos Place, W.C.2.

MISCELLANEOUS

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Send for NEW Price List.

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POTENTIOMETERS WITHOUT SWITCH, 2 meg., 1 meg., 1 meg., 400,000 ohms, 25,000 ohms, 20,000 ohms, 10,000 ohms, 1/- each!
SPECIAL OFFER—CONTINENTAL MAINS VALVES, 4v. AC Types, 5-pin only, AC/HL, AC/L, AC/P, AC/SG, AC/VMS, AC/HP, AC/VHP, 2/6 each.
20v. 18n AC/DC Types, 8G, Var. Mu. 8G, Power, H.F. Pen., 2/- each.
U.S.A. Types, 24, 30, 41, 39/44, 35/51, 55, 50, 57, 58, 71, 77, 78, 85, 2A5, 2A6, 2A7, 2B7, 6A7, 12Z3, 210, 250, all 2 for 3/-.
TUBULAR CONDENSERS, .002, .0001, .0003 and .0005 mfd., 1/- doz. Your choice.
ELECTROLYTIC CONDENSERS. Metal Can. 8 mfd. 320 volts, 2 for 1/6. 8+8 mf. 475v. +10 mf. 50v., 2 for 2/6. 8+8 mf. 450v+8 mf. 250v., 2 for 2/6.
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MAINS TRANSFORMERS. Manufacturers' surplus, 250-250v. 60 m.a., 4v. 2a., 13v. 1a., 3/6.
BENJAMIN "CLASS B" Output Chokes, 1/6 each.
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Guaranteed Accuracy within ± 2 per cent.
Model No. 21. Model No. 314.
3in. square case. 3 1/2in. diameter round case.

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Model 311. 0-1 m/A. movement, with calibrated scale, volts-ohms-mu/A. 25/-.
VOLTAGE MULTIPLIER RESISTANCES. Guaranteed accuracy ± 2 per cent. All standard ranges, 1/3 each.
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Complete to the last detail, including all Valves and coils, as well as theoretical and wiring diagrams and lucid instructions for building and working. Each kit is supplied with a steel Chassis and Panel and uses plug-in coils to tune from 13 to 170 metres.
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2 Valve Short-Wave Receiver Kit 25/-
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MORSE KEYS. Excellent brass movement on bakelite base, 2/9 each.

PREMIER SHORT-WAVE COILS, 4- and 6-pin types, 13-20, 22-47, 41-94, 78-170 metres, 1/9 each, with circuit. Special set of S.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 3-band S.W. coil, 11-25, 19-43, 38-80 metres. Suitable any type circuit, 2/6.

ULTRA S.W. COILS, 4-10 metres. Wound silver plated Wire. Mounted on Trolital base. Inside diam. coils 1in., 3, 4, 5, 6 or 7 turns, complete with base, 1/- each.
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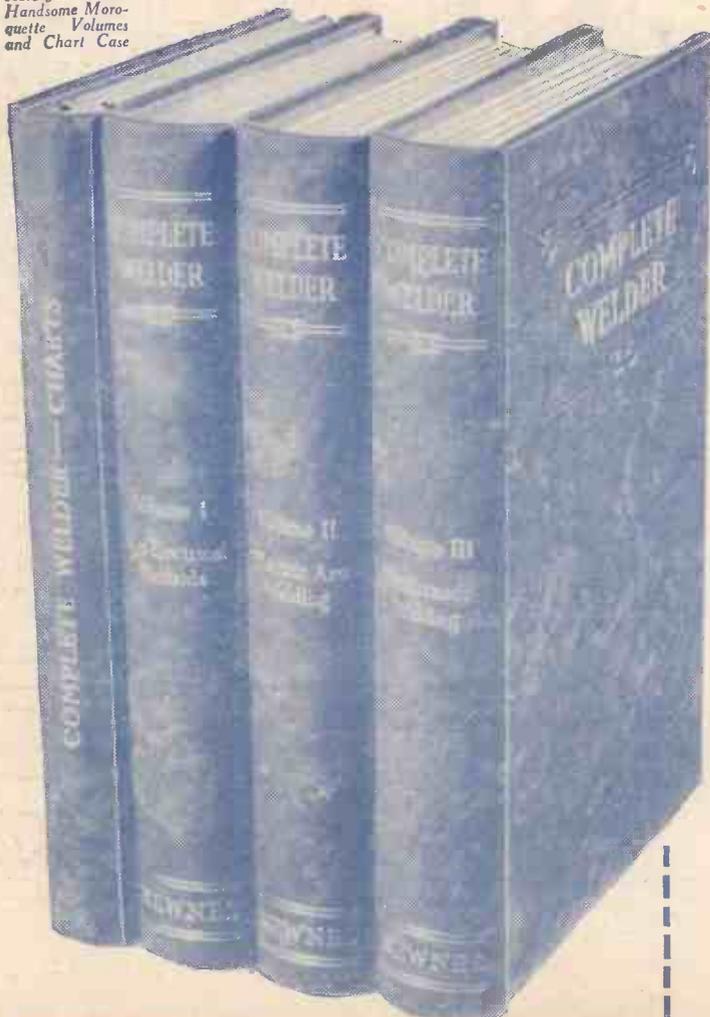
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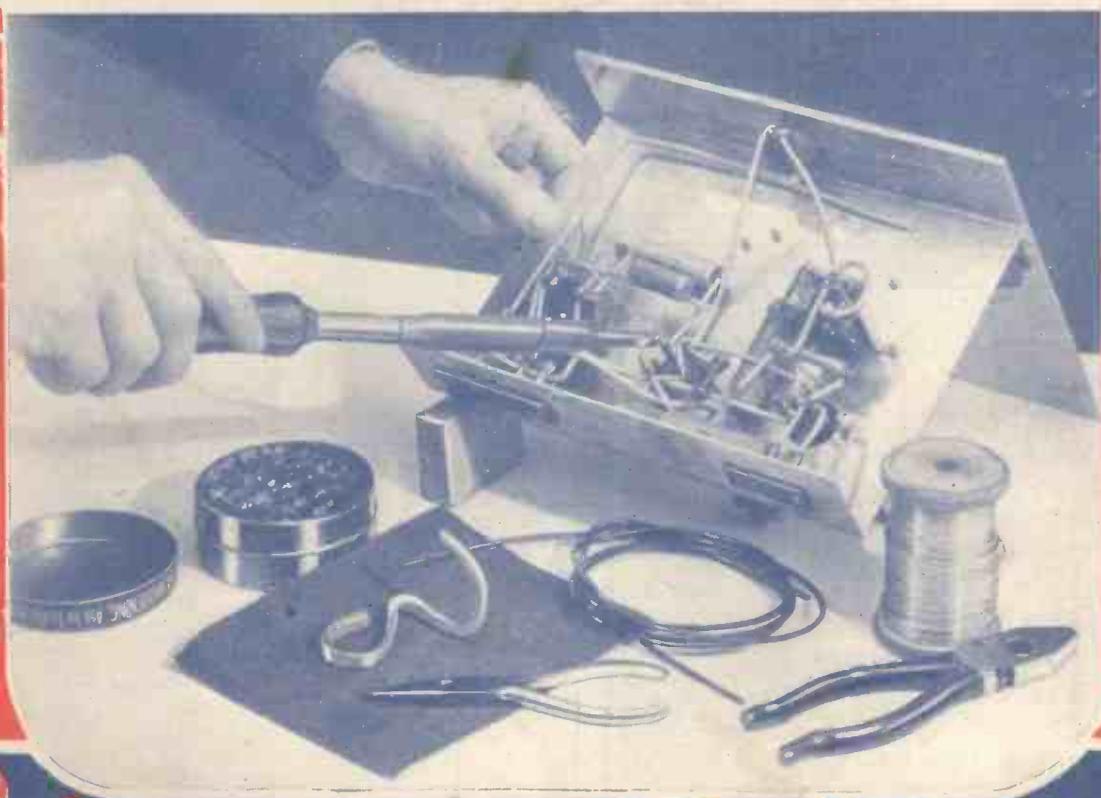
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July 29th, 1939.

AND PRACTICAL TELEVISION



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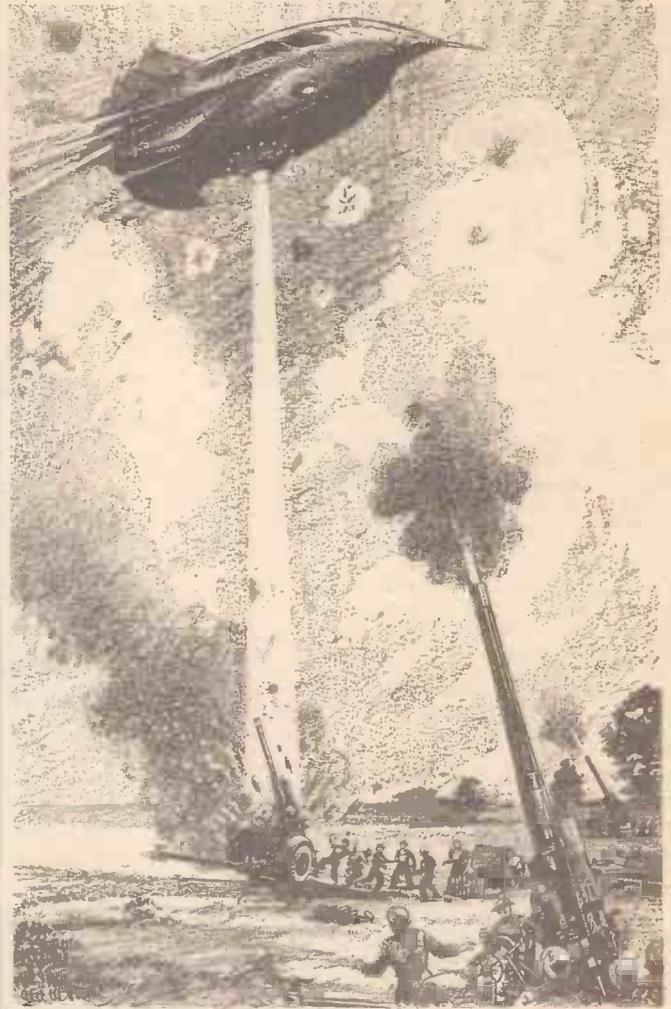
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FROM CONSTRUCTOR TO EXPERIMENTER—SEE PAGE 459



Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh.Sch.,
B.Sc., A.M.I.E.E., Frank Preston.

Vol. XIV. No. 358. July 29th, 1939.



ROUND *the* WORLD of WIRELESS

Soldering

WE make no apology for again dealing with the subject of soldering. In the early days most radio components were provided with terminals, and connections were twisted round these, and in many cases after a short period they worked loose, with the result that noisy reception or even damage to components was experienced. The modern receiver incorporates so many components that overall dimensions have had to be reduced, and many small items are now provided with wires ready for connection, so that soldering has to be employed. In a competition which we ran some time ago, we asked readers whether they preferred terminals or soldered connections, and the majority voted for the latter. Unfortunately, there are still many amateurs who regard soldering as an art which is beyond them, and their attempts are often hopeless. Provided that two rules are remembered, soldering is actually quicker and simpler than the making of loops and anchoring them beneath terminal heads. A hot iron and cleanliness are the main points, and in this issue we give some of the more interesting points regarding the wiring of a receiver so that efficiency, quickness and reliability may be obtained. A glance inside a modern commercial receiver will show how many soldered connections are made, and if it is remembered that in the majority of cases these connections are made by girls working at very high speed, it will be realised that there is no excuse for the amateur who says that he cannot solder.

Musical Games

A PROGRAMME of musical games, described as being "for all children under a hundred," has been devised by Reginald Burston, who will conduct the B.B.C. Midland Revue Orchestra on July 31st. The compere will be Martyn C. Webster. The first programme of this kind was given last Boxing Day, and there has been one other since then. "Musical Consequences" is usually one of the games included in the programme.

The Twirtle-Marshmallow Marriage

AS the fourth of the bride's fifteen fiancés, Mr. Gillie Potter had a peculiar interest in the recent events which resulted in the wedding of Aubrey Watteau Elijah, only son of the late Twisby Twirtle, Esq., J.P., of the Manor House, Great Twirtle, and of Madame Katerfelto, of "Ye Goode Pulle Uppe," Beacon's Bottom, Bucks, to the Hon. Veronica Japonica Harmonica ("Tootles"), eldest daughter of Lord and Lady Marshmallow, of Hogs-norton Towers.

It was, as listeners may imagine, a fitting climax to the local "season," and Mr. Gillie Potter, happily recovered from the sensation of having seen another man in the place that he or thirteen others might have occupied, is to give a rather daring description, in the National programme, on August 2nd, of the event, which, of course, took place at the parish church of St. George and All Dragons, Hogs-norton.

ON OTHER PAGES	
	Page
From Constructor to Experimenter	459
A Multi-purpose Tester ..	461
Readers' Radio Dens ..	462
On Your Wavelength ..	463
Short-wave Section ..	465
Readers' Wrinkles ..	467
Wiring and Soldering ..	468
Practical Television ..	470
The Art of Listening ..	472
Vibrators ..	473
Readers' Letters ..	477
Queries and Enquiries ..	479

Eating to Live

THE first series of "Eating to Live" talks dealt largely with problems of malnutrition in modern life, ending with a talk by Major-Gen. Sir Robert McCarrison on "Can Malnutrition be Prevented?" He answered in the affirmative, provided that his plan, or a similar one, were followed. This included a campaign for educating young and old in matters of choosing and preparing the best and most economical diet. A second series has now been planned which might almost be called "Cooking to Live." The idea is to translate, in four talks or discussions, the theory and advice of the first series into practical cooking terms. This series will pay special attention to restricted budgets—even below the B.M.A. level—and to Ulster's food resources. The first talk will be given by Mrs. Isabel Merrett, of Belfast, on August 1st, from Northern Ireland.

"Songs of the Fleet"

DR. W. K. STANTON will conduct the B.B.C. Midland Singers and the B.B.C. Midland Orchestra in a programme of music about the sea, to be broadcast on July 31st and August 2nd, consisting of the late Sir Charles Stanford's "Songs of the Fleet," and Balfour Gardiner's "News from Whydah." The soloist will be Norman Walker (baritone), who has frequently broadcast from North and London.

Norwegian Push

TO create new interest in modern receivers radio dealers in Norway are to offer 20 per cent. of the purchase price of a new receiver for all old receivers taken in part exchange from August 1st. The cost of this arrangement is to be carried equally by the distributors and manufacturers.

Indian Radio

IN view of the place in modern science which has been taken by radio, the authorities of the Dacca University in Bengal are to establish a Lectureship in Wireless in their Physics Department. The Research Department of All-India Radio have produced a special superhet with a special time switch for use in villages throughout the country.

"The Thirty-Nine Steps"

EPISODE 2 of the Sunday evening serial story by John Buchan, which is being broadcast from Scotland to all Regions, continues the breath-taking speed of action with which the story opened on July 23rd. Listeners on July 30th will hear how the hero, Richard Hannay, finds that the wild and seemingly improbable story of plots and secret societies unfolded by Scudder, the American journalist, really was nothing more nor less than the bald truth, Hannay decides to take on the job himself and he sets out on the first of his adventures disguised as a milkman. Jack Livesey plays the leading rôle in Winifred Carey's adaptation of John Buchan's thriller.

ROUND the WORLD of WIRELESS (Continued)

Northern Ireland's New Radio Headquarters

THE new headquarters of the B.B.C. in Northern Ireland will be opened next year. The six-storey building, which is being erected in Belfast, closely follows the lines of Broadcasting House, London, and will contain two talks studios, two dramatic studios, an effects studio, and a large studio with a floor area of 2,670 square feet. The control room will be situated on the fourth floor.

Pitcairn Radio Out of Action

A RECENT report from the Southern Pacific states that Pitcairn Island has been severely damaged by floods and avalanches. The radio station is silent.

Australian Short-wave Transmission Schedule (August—1939)

VK2ME (Sydney) 31.28 m.: Sundays (Sydney time): 3 p.m.-5 p.m. (05.00-07.00, G.M.T.); 7.30 p.m.-11.30 p.m. (09.30-13.30); Mondays: 1.30 a.m.-3.30 a.m. (15.30-17.30).

VK3ME (Melbourne) 31.5 m.: Nightly (Melbourne time): Monday to Saturday (inclusive), 7 p.m.-10 p.m. (09.00-12.00 G.M.T.).

VK6ME (Perth) 31.28 m.: Nightly (Perth time): Monday to Saturday (inclusive), 7 p.m.-9 p.m. (11.0-13.00 G.M.T.).

Concert Party from Fleetwood

FLEETWOOD takes its place in the "Round the Concert Parties" series on the Regional wavelength on August 1st, with an hour of entertainment from Ernest Binns' "Marine Follies" show from the Marine Hall.

Light Music from Leamington

JAN BERENSKA and his Orchestra, with Gabriel Lavelle (baritone), will give a programme of light music from the Pump Room, Leamington Spa, on July 30th. Gabriel Lavelle was discovered in Birmingham by Joseph Lewis. He was the only "straight" singer at the first Radiolympia and later he was trained by Gracie Fields for music-hall work.

Re-reading of the First News

IN order to help listeners in the North who find difficulty in receiving the National programme from Droitwich, the first news will be re-read at 7 p.m., in the Stagshaw programme daily, from Monday to Friday, inclusive, but NOT on Saturdays.

Toscanini at the Lucerne Festival

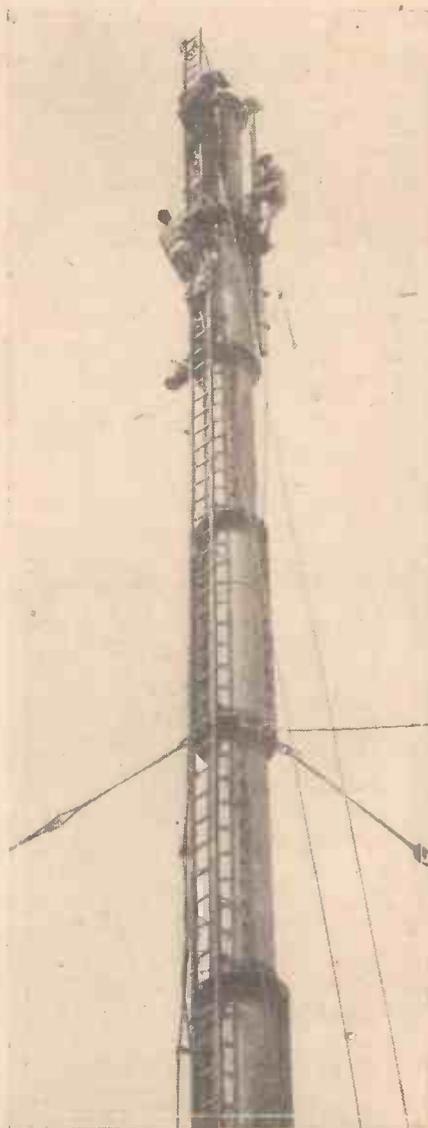
PART of the concert to be conducted by Toscanini at the Lucerne Music Festival on August 3rd will be relayed in the National programme, and listeners will be able to hear the maestro conduct Debussy's "La Mer" ("The Sea"), and the Prelude and Liebestod from Tristan and Isolde. Part of the concert from Lucerne on August 7th, to be conducted by Sir Adrian Boult, will be broadcast in the Regional programme.

Studio Variety

A SHORT variety programme to be heard on August 3rd, from the Midland Regional, will consist of one of the Cockney character sketches by "Arry and Liza," and Eric Chapman (harmonica). The latter, who lives in Nottingham and is

INTERESTING and TOPICAL NEWS and NOTES

twenty-one, played for Herman Darewski at the Spa Royal Hotel, Bridlington, has twice broadcast as a guest artist with Billy Merrin and his Commanders, and has appeared on the music-hall stage.



The steeplejacks are now busy at work demolishing the 240 ft. steel aerial mast over the Marconi experimental station at Chelmsford, which is being dismantled. Our illustration shows a precarious perch for the workmen at work on the top of the aerial mast.

Light Orchestral Concert

KEMLO STEPHEN, B.B.C. Music Assistant in Scotland, will conduct the B.B.C. Scottish Orchestra on July 29th in a programme of light music. Listeners will hear Suppé's overture, "Pique Dame," a selection from "La Bohème," the famous French "Marche Lorraine," and a humorous transcription in several styles which the conductor has made of "Yankee Doodle."

Winter Gardens in the Summer

TWO Northern Winter Gardens figure in the programmes of August 3rd—Peter Fielding and his band broadcast at 7.30 on the Northern wavelength from the Winter Gardens at Morecambe; and those who have (and who, in the North-East, has not?) danced to his band or heard his music at the Oxford Galleries, Newcastle, will be on the look-out for this item; and the late dance music on the National wavelength, played by Joe Loss and his Band, at the Winter Gardens, Blackpool.

Mantovani from Skegness

MANTOVANI and his Orchestra are to broadcast in the Northern programme on July 27th, from Butlin's Holiday Camp, at Skegness, Lincolnshire. Stella Roberta and Jack Plant will be the singers with the Orchestra.

Musical Comedy Hits

ON July 29th, Reginald Burston will conduct the B.B.C. Midland Orchestra in one of his popular programmes of musical comedy hits. The vocalists will be Nora Savage (soprano) and George Gibbs (baritone).

French Orchestral Music

THE programme of a concert of French orchestral music, to be broadcast by the B.B.C. Orchestra, under the direction of Clarence Raybould, on July 30th, will consist of two Nocturnes by Debussy, and Symphony in D Minor by César Franck.

Cinema Organ and Dance Band

LIGHT musical entertainment on the Northern wavelength on July 28th, will include a broadcast by Reginald Liver-side at the organ of the Lido Cinema, Bolton, and immediately following this, another "Dancing Here and There" programme, in which listeners will hear Clif Bateson and his New Imperials and Billy Butler and his Band.

SOLVE THIS!

PROBLEM No. 358

KELLWAY decided to fit a signal meter to his short-wave receiver, and as there were only three valves decided that it should go in the output stage. He had extension speaker terminals, fed from the usual filter output arrangement, and decided that the meter could be included across these. The meter he had was a 30 mA full scale instrument and he therefore connected this to the extension speaker sockets, but he found that it gave him no indication as to whether or not he was tuned to a station. Why was this? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 358 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, July 31st, 1939.

Solution to Problem No. 357

When Martin connected the variable component he inadvertently joined it to the wrong side of the grid condenser and thus it failed to function. The following three readers successfully solved Problem No. 356 and books have accordingly been forwarded to them:
R. Fleming, 3, Rainow Avenue, Droydsden, Manchester; B. M. Melbourn, Haddon House, Tilston Lane, Boveney, Windsor; C. H. J. Beaven, 120, Basildon Road, Abbey Wood, S.E.2.

From Constructor to Experimenter

"The Experimenters" Give Some Helpful Hints to those Constructors who Propose to Take Their Hobby Rather More Seriously, and to Obtain the Maximum of Enjoyment and Instruction From It

IN radio parlance reference is frequently made to so-called wireless constructors and radio experimenters—we don't know why "wireless" changes to "radio," with the presumed change of status. Can you give a satisfactory definition of the difference between a constructor and an experimenter? We find it rather difficult to draw any clearly-defined line between the two, but we have some ideas on the subject. Our reason for airing these is that there are many keen amateurs who would describe themselves as experimenters, although this is not an accurate title.

In our view a constructor is one who builds receivers from complete published designs, then putting them into commission as sources of entertainment until a new design is published which he believes will provide better entertainment. Of course, there are many keen amateurs who build set after set still from sound PRACTICAL AND AMATEUR WIRELESS designs, just for the fun of building them; the hobby is similar in many respects to that of model-making, although generally calling for a lower degree of manual dexterity and a greater measure of H.F. electrical knowledge. The experimenter, on the other hand, although he probably builds many receivers from complete designs, also makes others based on his own ideas and carries out various tests with a view to improving the final result—if there can be such a thing as finality in radio. But these qualifications alone do not, we think, make the person an experimenter. To be a successful experimenter it is necessary to make tests with a definite object in view or to observe the practical effects of the application of a theory. These tests must not be carried out haphazardly, but should be planned to follow a certain line of thought. Additionally, it is very important that notes should be made of the experiments conducted, so that accurate results may be tabulated. By following this procedure there is a likelihood that some valuable discoveries will be made.

Alphabetical Notes

Our own method is to keep a complete log book, arranged alphabetically, in which both the methods and results of all experiments can be recorded. A large ledger type of book with "A, B, C . . ." pages is used so that separate pages can be kept for, among other items: Aerials, Chokes, Circuits, Coils, Condensers, H.F. Couplings, L.F. Couplings, Meters, Rectifiers, Tone Controls, Valves and so forth. By doing this a considerable amount of time can be saved and whenever some new experiments on the subject already covered are to be made, previous findings can be looked up and tests continued from the point at which they were previously left.

Station Log

Another and entirely different book is kept as a log for transmission and reception, this actually being a large diary with a full page for each day of the year. If any technical tests are made while listening, or if a good hint is picked up from another amateur transmitter, a note is made in the alphabetically arranged book. Reference can be made to these notes after the listening period, and the hints tried or the tests repeated at leisure.

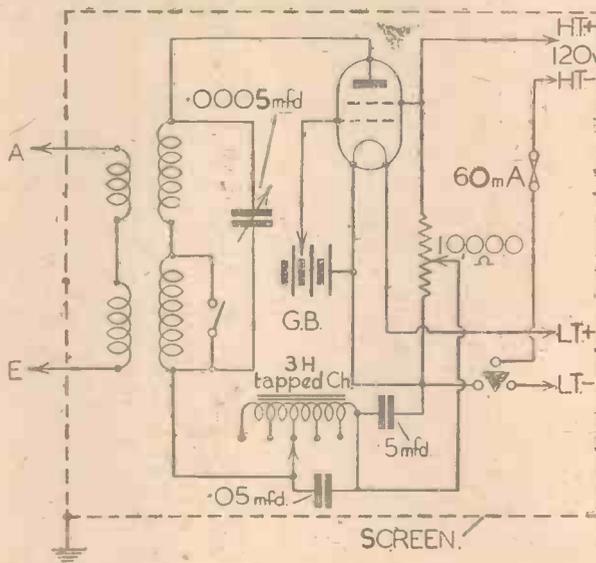
A Valuable Reference

We know that many of our readers go a step further by taking cuttings from PRACTICAL AND AMATEUR WIRELESS of every item which they consider will be of especial

will find that C and A generally occupy a greater space than most other letters: J K Q Y and Z require less space than normal.

Keeping Notes

Now something about the method of keeping the notebook. Suppose you are testing a new aerial array. Make a rough sketch, with dimensions, of the new aerial and of that which it will probably supersede, and then note the effect on signal strength by tuning to the same series of stations (preferably in different directions from the aerial) while using both aerials. Do not forget, however, that a different or modified input tuning system might have a marked effect on the apparent efficiency of



A useful type of dynatron oscillator circuit for test purposes. The G. B. voltage should normally be about 1.5. Leads marked A and E are short and used as "radiators"; or for making connection to the receiver under test.

value at a later time. These cuttings, also, should be arranged alphabetically and might well be stuck in the same book as is used for making notes of experiments. It often happens that a suggestion for a new circuit, or a new hint for making a tuning scale, or instructions for making a component are published; time may not permit of a trial during the week before the next issue comes along, so it is filed for later reference.

Those who object to cutting their copies—and we know that many do—can either buy a second copy when there is something especially important for filing, or keep a week-by-week index. The method of doing this is to use a loose-leaf notebook with a number of pages allocated to each letter of the alphabet. As soon as one set of sheets is full, additional pages can be inserted. Just one hint: you

the two aerials. Try different capacities of series condenser; if the aerial coil is tapped, try alternative tappings; vary the coupling between primary and secondary windings if this is possible. It is also important to compare the selectivity of the receiver when using the two systems, although this should be done after determining the most efficient method of connection.

A Test Oscillator

One of the best methods of carrying out comparative tests, whether in connection with circuit modifications, coils, or even inter-valve L.F. couplings, is by using a simple oscillator. This can be a single-valve affair built round a circuit similar to that given on this page. It consists of a screen-grid valve in a dynatron oscillator circuit, a tapped 3-henry choke being used

(Continued at foot of next page)

RADIO BIOGRAPHY

GERALDO

ONE of the most popular musicians Britain has ever produced, whose name is likely to be regarded with reverence for several generations to come, Geraldo rose to his present prestige from the fragments of a commercial career he smashed at his own will.

Born in the Metropolis itself, Gerald Bright was taught the piano at home and, persevering with the pianoforte tuition, won his way to the Royal Academy of Music and captured all the certificates a student could wish to capture, covering theory, counterpoint and harmony. . . . only to suddenly turn and flee on the brink of his culminating degree!

Adventure swooped down on him, and he went out to Brazil, principally to get the low-down on the coffee plantations.

It seems he did not elicit a great deal about the coffee bean, but instead came into contact with genuine tango and rumba bands, whose realistic interpretations of such exciting music he examined very closely. All that he heard and saw he stored in his head, firmly believing it would be of some tangible use one day. . . .

With that he came back home and doubled a day occupation as an insurance clerk with a thirty-shilling-a-week nightly engagement at an Old Kent Road cinema. Apart from cigarettes and food, he used his salary for expenses, touring the West End en reconnoitre until he came across a quite famous restaurant at which was installed a new American organ, a very unique attraction at that time.

He did more, he persuaded the management to let him play it, but his talent didn't seem to be the equivalent of their needs, so he lasted exactly a week before he was apologetically handed a week's notice!

Back to the picture-house in the Old Kent Road, at a slightly higher salary, continuing his door-to-door activities as an insurance clerk.

But not long afterwards he was back at the console of that Yankie organ! New proprietors had taken over, so he got his chance all over again and, thanks to swotting at organ music in his spare time, managed to hold the job down!

But the urge for travelling soon arose again, and he was on his way to somewhere, via Merseyside, when he paused in Liverpool long

enough to fix himself as a pianist in a super cinema orchestra.

Then he did go on his way . . . to the Mediterranean and the Continent . . . quite a distance



A recent portrait of Geraldo.

round the world. Getting a tan on foreign sands, he found himself day-dreaming about Brazil and its music, when an idea flashed across his brain. He conceived the project of a wholly British tango orchestra, for the Savoy Hotel had been specialising in this type of band, but always imported from overseas.

He darted back to his hotel, packed his suitcase, and headed for England on a mission which he somehow knew would bring him fame if he accomplished it.

In every restaurant in mysterious Soho he went, eating as he searched for the sort of musicians he required. Months slipped by before he had recruited the semblance of an orchestra, the queerest and most assorted assembly of instrumentalists it would be possible to imagine. Not one could really read music . . . they all played by ear!

Geraldo (who had by this time discarded his surname for the compact abbreviation which proved to be so appropriate to his future) painstakingly taught them music, fairly lugged them to practice, wrote simple orchestrations to guide them and gradually shaped their crudeness into efficiency, putting in something like twenty hours a day to achieve the feat.

Then he took a stroll round to the Savoy Hotel, sidled in and succeeded in reaching the manager's office. His offer of an all-British tango orchestra was enterprisingly accepted. He would start on a month's trial. . . .

This was nine year ago, in 1930. Geraldo has been as secure as the foundations of this famous hotel ever since.

All the while his vitality has been unending, for never has he abandoned his eagle look out for improvements, taking frequent trips abroad, for instance, to ferret out further ideas, seek new tunes, bring back the latest dances straight from Cuba, Hawaii, Scandinavia and the South of France.

His world-renowned Gaucha Tango Orchestra, with Geraldo himself a perfect figure of perfection in front, steadily advanced in size and versatility. It is interesting to note he also appeared in the Command Performance at the London Palladium in 1931.

Listeners are well acquainted with his beautiful efforts with giant orchestras on the air, thirty pieces being about his ideal complement.

"Chateau de Madrid," "Sweet Music," "Dancing Through," "Romance In Rhythm," and "Music Shop" will not easily evade the mind, for all have been masterpieces of musical production by this suave conductor.

His one-and-only theatre show to date, when he had that super pit-orchestra in the London Hippodrome hit "The Fleet's Lit Up," was yet another phase of his very varied career.

Films have also claimed his attention, and he has supervised the music for numerous British pictures, one of the latest being the Gordon Harker comedy, "No Parking."

FROM CONSTRUCTOR TO EXPERIMENTER

(Continued from previous page)

to modulate the anode circuit, so that an audible note is produced. For preference the unit, including batteries, should be fitted into a screened box, two very short leads being brought out from the aerial and earth terminals to act as "radiators." Sometimes it is more satisfactory to take short screened leads from these to the aerial and earth terminals of the receiver under test.

A standard type of dual-range tuning coil with primary winding is used, and this can be tuned to any wavelength on the broadcast bands. This should be placed at a set distance from the receiver and its note picked up on the set. Since the output is free from fluctuation a true comparison of signal strength from the speaker can be made, while the degree of selectivity of the tuning circuits can be determined by noting the tuning range over which the test note can be heard. It will be appreciated that when the receiver incorporates A.V.C. it is necessary to put this out of action if a true indication is to be obtained. It is also obvious that a unit of this kind is of little assistance in judging the value of an aerial itself, although it does assist in making comparisons of the input circuit to which the aerial is connected.

Valve Tests

When comparing two valves it should be remembered that their A.C. resistances or optimum loads might vary, and that in such cases it is essential that the anode circuit should be modified to suit each valve. Similarly, when comparing intervalve coupling circuits it should be ascertained that these are, in each case, suitable for the valve with which they are used. As an example of what is meant, it would be foolish to replace a series-fed transformer by a parallel-coupling arrangement if in each case the anode load were not chosen to suit the characteristics of the valve. In recording the results of experiments in this field, note should be made not only of the circuits tried, but also of the valve used and of its principal characteristics.

Measuring Instruments

For any kind of semi-serious experimenting at least one fairly good meter is required. A milliammeter with a full-scale reading of 10 mA. will serve for most requirements, particularly if a few series and shunt resistors are kept available for connection to the meter when it is required for voltage measurement or for reading currents in excess of those normally accommodated on the scale. If it can be afforded, a good multi-range meter is desirable, but it is better to rely on a good milliammeter

alone than to compromise by buying a cheap, unbranded meter with a multiplicity of ranges.

A Useful Start

The constructor who is a beginner so far as experimenting is concerned is advised to make an ultra-simple receiver and to include one or two meters in the circuit. Much can be learned from occasional glances at these. If this course is not practicable, fit plug-and-jack points in the anode, H.T. and L.T. circuits so that a meter can quickly be attached when necessary. Watch the meters, and make notes of their readings when the valves and batteries are new, when reaction is tightened and when strong and weak signals are tuned in. At the time, the readings might not mean very much, but it will soon be realised that they are of importance and that they have a useful significance.

It is a mistake to be too ambitious in the first place. A complicated circuit will confuse you in the same way that you might be confused by attempting to study normal production methods by going round a very large mass-production factory. "Walk before you try to run," and you will find that the interest in radio experimentation is endless.

A MULTI-PURPOSE TESTER

Constructional Details are Here Given of a Useful Piece of Apparatus for the Home Constructor

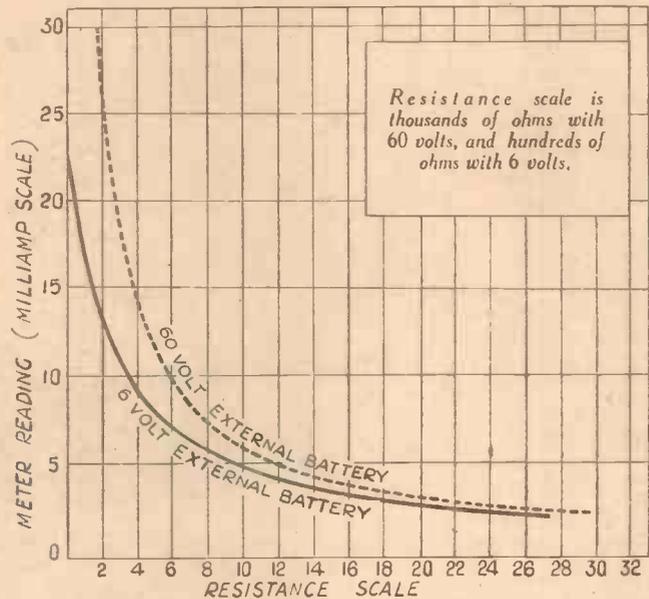
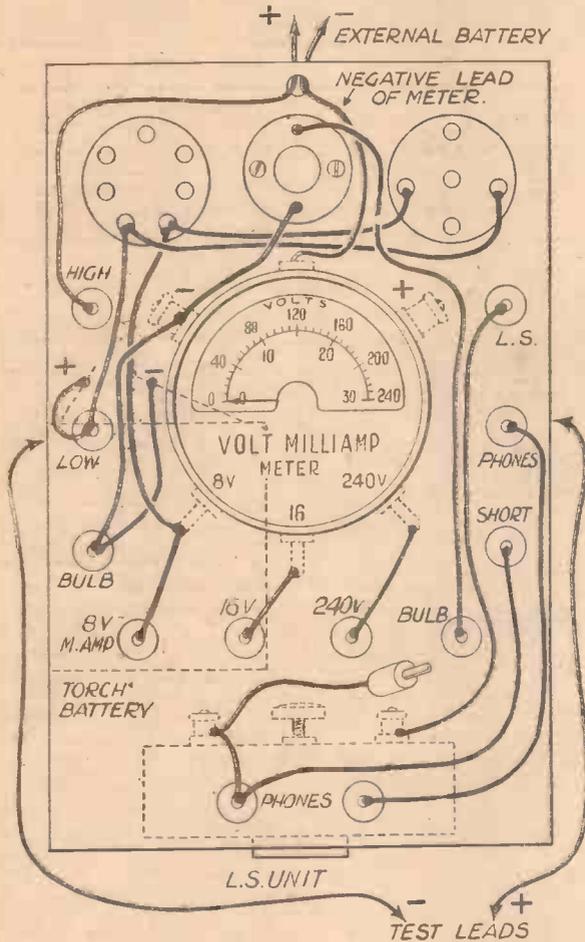
THIS useful tester, the lay-out of which is given in Fig. 1, can be simply constructed from spare components which most constructors are likely to have on hand. The meter used in the original model is a cheap three-range volt-milliamp meter of the moving-iron type, but the circuit may, of course, be modified to suit

depends solely on the size of the unit used for this loudspeaker.

Valve Testing

The valve tester is, of course, a simple filament or heater test, but is nevertheless extremely useful, as a "dud" valve is usually one with a broken filament, and the

available, the range required being chosen by means of the wander-plug and sockets. It will be noticed that the same socket is used for the milliamp and lowest voltage ranges. This is because on most meters of this type the two side milliamp terminals are internally connected to the lowest voltage range.



Circuit Testing

For circuit testing the self-contained battery—a 3 or 4.5-volt torch type, ample room for which can be found inside the box, and which can be fastened with ordinary grid bias battery clips—with either the bulb, meter, 'phones or built-in loudspeaker may be used, as preferred, or according to the resistance of the circuit under test.

Provision is also made by means of the flex and wander-plugs for an external battery of about 60 volts to be put in circuit for testing high resistances and condensers; the latter by means of the familiar single click in the 'phones, and the former by readings on the meter.

Calibration Chart

A calibration chart (see Fig. 3) can easily be drawn to enable the meter to be read in ohms, either by calculating the curve by means of Ohm's Law or by noting the meter readings obtained on known resistances.

The many uses to which the box can be put are obvious: valves, bulbs, batteries, resistances, etc., can be tested; voltages and current consumption measured; and connections and L.F. circuits tested.

any meter available. The "flush-mounting" effect is secured by cutting a hole in the panel just large enough for the meter to protrude, and fastening the meter by a strip of metal bent around it and bolted to the panel.

The built-in loudspeaker is of the ear-phone type that used to be used to work horn loudspeakers, but in place of this a single earphone, or an old recd-type loud-speaker unit with a miniature cone, may be used. The depth required for the box

ready-wired valve-holders provide a conveniently easy test for four, five or seven-pin types.

The three-meter ranges are readily

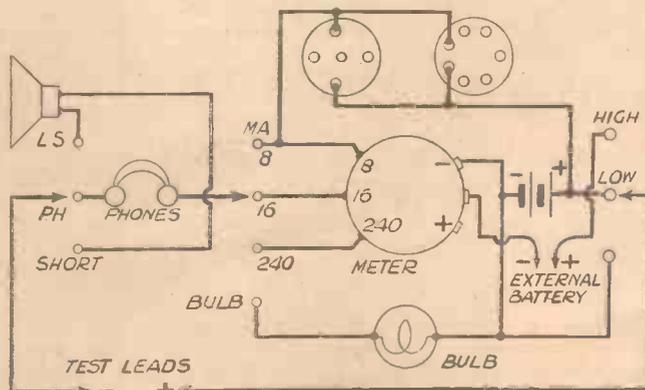


Fig. 2.—Circuit diagram.

LIST OF COMPONENTS

- 1 5-pin valveholder.
- 1 7-pin valveholder.
- 1 fuse bulb-holder.
- 1 3-range meter.
- 1 loudspeaker unit.
- 2 telephone type terminals.
- 6 pillar terminals
- 4 plug sockets.
- 1 3.5-volt bulb.
- 1 torch battery.
- 3 wander-plugs.
- Sufficient 3-ply wood for box.
- Bolts, nuts, screws, wire, etc.

OUR READERS' RADIO DENS

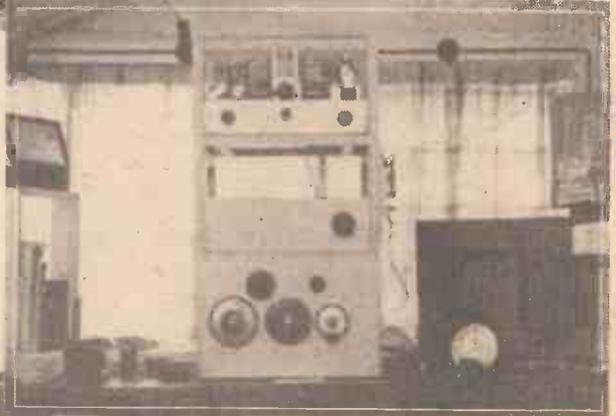
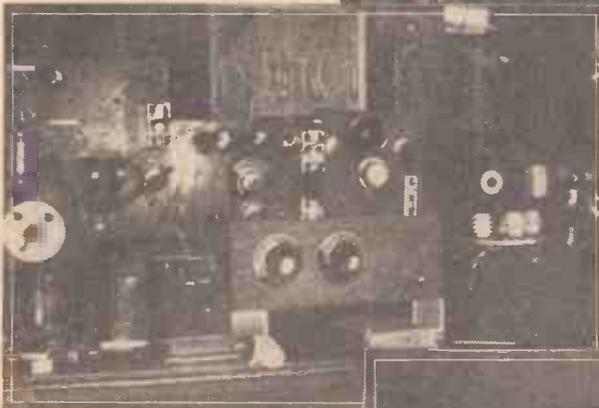


Above is 2CHD, with a fine collection of QSL cards. On the right of the bench is a 2½-watt transmitter, and on the left the O-V-2 receiver. S.W. stations in 70 countries have been logged on this. The shack has been specially constructed in the garden.

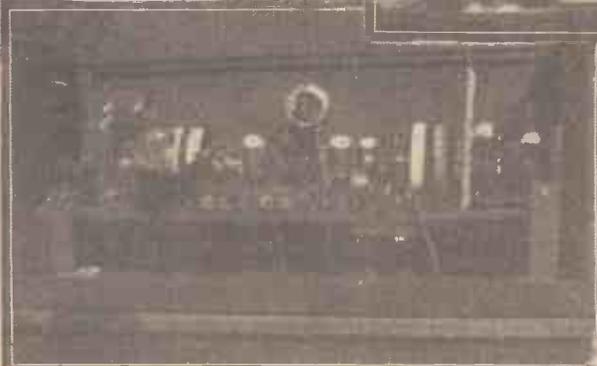
Above is one view of the really fine den owned by Dr. Hopgood, in Cornwall. Note the equipment, which includes a world clock, wavemeter, filing boxes, and barograph.



On the left is another view of Dr. Hopgood's den. In this picture may be seen the aerial board, mains units providing 1,000 volts, loudspeakers and mains and battery stand-by receivers.



Mr. Bonson, of Kenton, has made a neat corner for his equipment. Above is the receiver and other gear, and on the right is the interior of his transmitter.



A neat assembly and a tidy corner in Mr. Perry's shack. This is the den referred to by "Thermion" in our issue, dated July 15th last.

ON YOUR WAVELENGTH



The Human Radio

THOSE readers who have read the justifiably sceptical remarks I have had to make about alleged human radio sets—the person who claims that he can listen in to wireless signals without any apparatus whatever—will be astonished to learn that there are people who believe that this can be done. One or two examples of this have been brought to my notice, but I place these in the same category as the Welsh fasting girl, and other well-known “miracles,” which have turned out to have quite simple explanations, not concerned with the supernatural. One reader has sent me a cutting of an article entitled, “A Human Radio Set,” which originally appeared in the *Christian Science Monitor*. I reproduce it for your delectation:

A HUMAN RADIO SET

“The strangest and most incredible complaint ever received by the engineers of radio station WOR, New York, came when a worried gentleman called at the transmitter building a few days ago.

“The trouble started, he declared, when he began to drift off to sleep at night. Radio programmes, apparently emanating from nowhere, seemed to float through his head. When he woke up, they vanished; when he began to doze off they woke him up again. No one could explain.

“WOR engineers proved to be determined people. The problem was a challenge and so they began to query this victim of phantom reception. The questioning revealed that he works in a machine shop which specialises in the grinding of paper-cutter knives. Also he resides very near to WOR's great 50,000-watt transmitter at Carteret, N.J.

“The grinding of paper knives is a process which requires carborundum grinding wheels. Coupled with this is the fact that the gentleman in question habitually reads in bed and has a small bed-lamp attached to the frame for this purpose. Furthermore, there are gold fillings in his teeth.

“Now, if you're technically inclined, these facts fit together like crackers and cheese. Carborundum dust had settled in the gold fillings,

By Thermion

and when he snapped off the lamp it removed the partial radio short circuit caused by the filament of the lamp, allowing the bed frame to become a very efficient antenna.

“As his jaw relaxed upon falling asleep, his mouth acted as a satisfactory crystal detector, receiving the signals picked up by the bed frame.

“The solution was quite easy. The engineers gave him a new toothbrush to keep the carborundum dust from his gold fillings.

“‘It's nice being able to sleep again,’ he told his WOR friends, ‘but I do miss some of the programmes.’”

Theoretical or Wiring Diagrams?

A CORRESPONDENT claiming to be a regular reader of PRACTICAL AND AMATEUR WIRELESS, and signing himself simply “Smith,” wrote to me to claim that few readers can understand theoretical diagrams, and asking why old circuits are not republished from time to time by means of “wired diagrams” so that they can be brought more up to date. “Torch” sends the following:

REFUTATION

You're a regular reader? Oh, come, my dear Smith.

What's this story you're trying to bamboozle us with?

That “P. and A.” readers, almost to a man,

Can only build sets from a “wired” diagram.

Theoretical circuits from these you'd relieve 'em;

Tell such tales to Marines and they wouldn't believe 'em.

All the regular readers of P. AND A. WIRELESS

Long have studied our pages with interest that's tireless;

Theoretical circuits may fill you with fright,

To our instructed readers they're clear as daylight.

You simply make blots on the Smith patronymic,
Compared with your ignorance, ours isn't in it!

If a regular reader, back copies you've kept;

The suggestion of Thermion therefore's not inept.

In their pages you'll find, we are pleased to relate,

That we've frequently brought our “old sets” up to date.

So good, when designed, as to rank with the best,

A slight “titivating” restores their first zest.

You are wrong, “Mr. Smith,” as we hope you'll confess,

And the next time you write—don't forget your address!

Gas-operated Radio

IN the early days of wireless journalism I remember a colleague, who knew nothing about wireless, suggesting that in order to get rid of accumulators someone ought to invent a device which you could poke in the fire, so that the filaments could be heated for nothing. It is necessary, but only just, for me to say that this man came from the North.

However, one firm has tackled the problem of the gas-operated radio. The Milnes people, who have done a great deal of work in this connection, recently demonstrated radio operation from the gas-main. A thermo-electric generator, yielding an output of 8 watts, with tappings providing 2 volts at 3 amperes and 2 volts at 1 ampere, feeding a Milnes H.T. converter, was used and gave an output of 150 volts 15/20 milliamps. In the demonstration, Calor gas was used, and the apparatus was coupled to a battery superhet. The reception was up to standard, and there was no noise from the thermo-generator. The heat developed in the generator could be used in an airing cupboard in the home. The thermo-couple principle is used in the generator. I do not know how soon such generators will be on the market, nor whether gas-operated wireless sets will be popular. Certainly, there are many thousands of homes which use gas, and there is thus a market for a successful device.

Conventions at Radiolympia

I AM informed that, as last year, a Dealers' Television Convention is to be held on Thursday, August 24th, between 3.30 and 5.30 p.m.

Details of this, together with invitations to dealers in the Television Service area, will shortly be issued by the Television Sub-Committee of the R.M.A. In addition, there will be a series of other Conventions of first-rate importance to dealers.

On Wednesday, August 30th, and Thursday, August 31st, a Dealers' Convention will take place in the Convention Hall between 3.30 and 5.30 in the afternoon.

These times have been chosen to suit the large body of dealers whose early-closing day falls on one of these dates. The first day's discussion will be devoted to dealers' problems concerning sales promotion, and the second day's to technical problems, such as wavelength changes, but subjects like Service and Interference will almost certainly be brought up at both meetings.

Many well-known speakers, each of whom, like Sir Noel Ashbridge, is an expert on his particular subject, will be present to talk to the dealers and answer their problems. Details of the speakers will be issued later.

Many dealers will also be interested in the technical conventions, which it is suggested shall take place in the Convention Hall on the evenings of Monday to Thursday, August 28th-31st inclusive, from 6.30 to 8.30 p.m. It is expected that over 1,000 people will take part in these meetings, and dealers should bear in mind that what the technically-minded listener says to-day the general public thinks to-morrow.

"Listeners' Convention"

A "Listeners' Convention" along the lines of the recent B.B.C. television tea-party is also proposed, and the B.B.C. has been asked to cooperate in organising this, but no definite decision has yet been received. Further details of this will be announced later.

Admission to the Exhibition for these Conventions is covered by the special cheap dealers' tickets, price 9d. each.

The R.M.A. are also issuing special dealers' season-tickets at the price of 2s. 6d. each, which admit the bearer to Radiolympia every day during the run of the Exhibition.

For the Television Convention special tickets are being prepared, available on application, but the Dealer Season Ticket carries the right of admission to all other Conventions.

These tickets will be forwarded in any quantity to dealers only by the Secretary, Radio Manufacturers' Association, 59, Russell Square, London, W.C.1, on receipt of the appropriate remittance.

Notes from the Test Bench

Portable Aerials

WHEN building portable receivers there are two important points which should be borne in mind with regard to the frame aerial. Firstly, the sides of this should be at least 12in. in length to maintain efficiency, and, secondly, care should be taken to place the aerial in such a position that it does not come close to a metal chassis should this be used for the receiver. A portable was recently examined where an aluminium chassis had been used, and an endeavour had been made to reduce the overall dimensions to the smallest possible compass. The receiver was not very brilliant, but when the back of the case, upon which the frame was wound, was removed only 6in. from the receiver, the performance improved 100 per cent. A further point with regard to the frame aerial, especially if thin wire is used, is that it should be placed clear of the fumes or spray from an accumulator.

Electric Soldering Iron

WHEN receiver construction is being carried out and an electric soldering iron is used, some constructors place the iron on a sheet of metal or other metal support during the wiring process. It may be found that the metal will, in such a case, conduct away a large portion of the heat of the iron with the result that when a connection has to be made the iron is not sufficiently hot and has therefore to be held in contact with the component being soldered for an undue period, with possible damage to that component. A better plan is to rest the iron so that the tip and a portion of the iron which carries the heating element, is surrounded by air, but if the iron is not wanted for fairly long periods of time, a series resistance should be included to avoid undue waste of current and possible damage to the iron.

Wiring Supports

IN some receivers a long bare wire is sometimes called for to act as a common connecting point—a bus-bar is the name generally applied to this. If thin tinned copper wire is being used there are two schemes which will give rigidity and avoid risk of damage due to a sagging wire. In the first case small stand-off insulators may be attached to the chassis and the wire stretched between them. An alternative scheme is to use two strands of the thin wire and twist these by holding in the jaws of a twist drill. Stretch them slightly whilst twisting, and they will provide a rigid connecting link which can run for quite a considerable distance without risk of damage.

Wireless Licences

THE Post Office issued 349,546 wireless receiving licences during June, 1939. This figure represents a net increase of 26,667 in the number of licence-holders during the month after making allowance for expired licences and renewals. The approximate total number of licences in force at the end of June, 1939, was 9,009,750, as compared with 8,638,091 at the end of June, 1938, an increase during the year of 371,659. During the month there were 683 successful wireless prosecutions.

Radiotelephone Service with Lourenco Marques (Mozambique)

I AM informed by the Postmaster-General that the radiotelephone service with Lourenco Marques (Mozambique), which was opened recently, will be available for calls from all parts of this country, but in Lourenco Marques will be restricted to certain specially equipped telephones. The service will be available daily, except Sundays, from 8.45 a.m. to 5.0 p.m. G.M.T., but calls may be booked at any time. The charge for a three-minute call to Lourenco Marques will be £4 11s. 6d. before 2 p.m. (3 p.m. while British Summer Time is in force) Mondays to Fridays, and £3 1s. 6d. after 2 p.m. Mondays to Fridays, and all day on Saturdays.

"Twenty-five Years Ago"

THE late Dr. Harold Temperley, who, in addition to his many other activities, did such fine work for broadcasting, was perhaps the foremost authority in Great Britain on the origins of the Great War.

For purposes of the programme on August 4th, entitled "Twenty-five Years Ago," which he wrote for broadcasting five years ago, an enormous amount of condensation of the available evidence has been done. Nothing is included that has not been verified by the most rigid research. Here, after twenty-five years, is the story of the march of events to the great catastrophe, wrested from the archives and broadcast for all to hear.

The New *Mauretania*

ARRANGEMENTS are in hand for a television inspection of the new Cunard White Star liner, *Mauretania*, when she docks at Tilbury early in August.

B.B.C. engineers are hoping that preliminary transmission tests will be satisfactory. Tilbury is twenty-two miles from Alexandra Palace, and the maximum distance over which a mobile television unit has yet operated has been eighteen miles—from Epsom.

SHORT-WAVE SECTION

(Continued from previous page)

well away from the aerial and receiver coupling leads.

Connecting the Unit

The output terminal should be joined, as already mentioned, to the aerial terminal on the receiver, and the aerial lead now joined to the receiver should be connected to the aerial terminal or socket on the short-wave unit. The earth lead on the receiver should also be removed and connected to the earth terminal on the unit. In some cases it may then be desirable to take a separate lead from the earth terminal of the receiver to the point marked with a E in the short-wave unit diagram. This is not essential, but with some receivers will be found to offer a steadier performance. The intermediate frequency developed by the converter is about 150 to 160 kc/s, that is about 1,800 to 2,000 metres, and therefore the receiver, which is now acting as an I.F. amplifier followed by 2nd detector and L.F. stages,

must be set to this frequency. It is not a critical setting, but a little experiment is necessary to find a suitable adjustment of the receiver tuning control where the minimum of interference is experienced, and where the maximum performance is obtained. When once this adjustment has been found, all that is necessary in future is to adjust the receiver dial to that setting and carry out the tuning on the control fitted to the short-wave unit. If there is a volume control in the receiver this should be set to maximum, the control on the short-wave unit enabling the volume and sensitivity to be adjusted to the desired level.

Operating the Converter

To operate the converter, set the potentiometer about half-way on and then slowly adjust the reaction condenser until the receiver is just short of oscillation. This will be indicated as usual, by a rushing sound in the 'phones or speaker. Now turn the tuning control through the full movement and see if the sound remains constant, irrespective of any stations which you

might hear. If not, adjust the potentiometer slightly and so balance these two controls until a point is found where the reaction condenser may be left practically untouched, and all reaction effects then carried out on the potentiometer. This should bring the receiver into oscillation and out in a perfectly smooth manner, and it should be found that weak stations can be built up much more effectively than when the reaction condenser is used alone.

When carrying out the initial tests note carefully that all stations will be heard at two positions on the main tuning dial. This is quite in order, but it will generally be found that one setting will give better results than the other. This is generally the higher frequency—lower capacity setting—of the converter unit. If you intend to log stations for future reference it is also important to bear in mind that any adjustment of the tuning condenser in the main receiver will affect the adjustment of the converter tuner and therefore the former control should always be set to the same point.

Leaves from a Short-wave Log

Good Signals from Prague

LISTENERS report that broadcasts destined to the United States of America in the English and Czech languages are well received during the late hours of the night from OLR4B, Podebrady-Prague (Czechoslovakia), on 19.58 m. (15.32 mc/s). The power of the transmitter is 30 kilowatts.

New Stations in Dominican Republic

AT Trujillo City: HI6H, on 45.45 m. (6.6 mc/s), 25 watts; HI2D, on 48.34 m. (6.206 mc/s), 100 watts. Call: *Accion Catolica Dominicana*. At La Romana, HI3C, on 49.14 m. (6.105 mc/s), 30 watts; at Santiago, HI9B, the 100-watt station, which was previously working on 49.59 m. (6.05 mc/s), now announces its frequency as 6.383 mc/s (47 m.). It is also reported that a 30-watt station has been opened at San Cristobal, namely HI8T, on 49 m. (6.122 mc/s).

The Legion of the Lost

THE Foreign Legion in French Morocco has installed its own transmitter; it is a short-wave station to be known as Radio Maroc (3), working on frequencies ranging from 8.125 mc/s (36.92 m.), to 11.94 mc/s (25.13 m.). The latter channel is one which has been used by CNR2, Rabat.

Another Channel for British Honduras

ZIK2, Belize, which has been broadcasting on 28.3 m. (10.6mc/s), is now stated to have raised its wavelength to 58.5 m. (5.3 mc/s), and will use this channel until further notice. The call for this frequency is ZIK3. So far the wavelength has been mainly used in that region by the commercial transmitters in the Bahamas.

Radio Saigon

THE 12-kilowatt transmitter opened by the French colonial authorities at Saigon (French Indo-China), is now operating to a regular schedule on 49.05 m. (6.116 mc/s). An English programme is broadcast daily at B.S.T. 08.15, and at 16.30. Man and woman announcers.

Local time is 5 hours ahead of Greenwich Mean Time, and distance from London, by air line, approximately 6,100 miles. Address for reports: Société Indo-Chinoise de Radiodiffusion, Boite Postale, 412, Saigon (French Indo-China, Asia).

Now a Regular Broadcaster

RADIO programmes emanating from the medium-wave station VONF, at St. John's (Newfoundland), via VONG, on 50.16 m. (5.98 mc/s) are now being heard almost nightly. Reception reports will be verified if they are addressed to stations VONF and VONG, Post Box 135, St. John's (Newfoundland). Imperial Postal reply coupon should be enclosed to reimburse postage.

TELEVISION FEATURES

TWO PLAYS

A SPECIALLY adapted version of "Prison Without Bars," by Peggy Barwell, will be transmitted on July 29th, and Lionel Brown's comedy of the racing stables, "Fox in the Morning," on July 30th.

"LE PATRIOTE"

MAURICE TOURNEUR'S great film "Le Patriote" is to be televised from Alexandra Palace on August 4. Harry Baur plays the part of the Czar Paul I, and Pierre Renoir that of Pahlen (The Patriot) in this historical drama of intrigue in the Russian court at the end of the eighteenth century. Suzy Prim is seen as Anna Ostermann.

MAKING ARTIFICIAL EYES

IF viewers tune in on the evening of August 8th they may be startled by the sight of what appears to be a human eye filling the whole of the television screen. Actually it will be a giant glass eye which will be constructed by Steer Wardman, a Nottingham craftsman, to demonstrate how glass eyes are made. The work is so minute and delicate that the shaping and marking of a standard "eye" would be too small to be clearly shown.

The modern glass eye fits the socket so

The Logging of Quito

GOOD signals have also been picked up during the past few days from HC2JB, Quito (Ecuador), now operating on 24.08 m. (12.46 mc/s), as against its former channel of 33.53 m. (8.948 mc/s). In the English announcement the broadcast is stated to be "The Voice of the Andes in Quito, Ecuador, just a little south of the Equator, and high up in the Andes." Transmissions in the English language are made almost nightly at B.S.T. 19.00, 20.00 and 22.00, and broadcasts in the native tongue (Spanish) are carried out until 03.00, or even later. The distance from London is roughly 5,600 miles. Address: Radiodifusores HCJB y HC2JB, Casilla Postal, 691, Quito, Ecuador (South America). Other stations in the Ecuadorian capital are: HC1TQ, Empresa "El Telegrafo," on 44.78 m. (6.7 mc/s), 150 watts; HCIGQ, on 32.61 m. (9.2 mc/s), 150 watts; HCLAY, 41.67 m. (7.2 mc/s), 200 watts, with the slogan *El Grito en el Cielo* (The Call from the Sky).

perfectly that it can be controlled by the eye muscles. By means of the giant eye, viewers will see how the glass is blown and fused, and how, with infinite care, the cornea is grafted over the pupil.

The successful artificial eye must be perfectly shaped, must be individual, and must exactly match the real eye of its wearer. The colour must be correct even to the tinting of the white.

FINAL TEST MATCH AT THE OVAL

A SPECIAL gate is now under construction at Kennington Oval to admit the B.B.C. mobile unit, which is to televise the final Test Match, England v. West Indies, beginning on August 19th.

Last year, when the England v. Australia final Test was televised, the B.B.C. engineers found it impossible to bring the control van under the arch of Hobbs' Gate, although tyres were deflated and roof ventilators removed. It was consequently necessary to enter by Vauxhall Gate, and the camera positions were not all that could be desired.

Thanks to the new entrance, which may be christened "Television Gate," it is hoped to secure ideal camera sites this year much nearer to the pitch.

A PAGE OF PRACTICAL HINTS

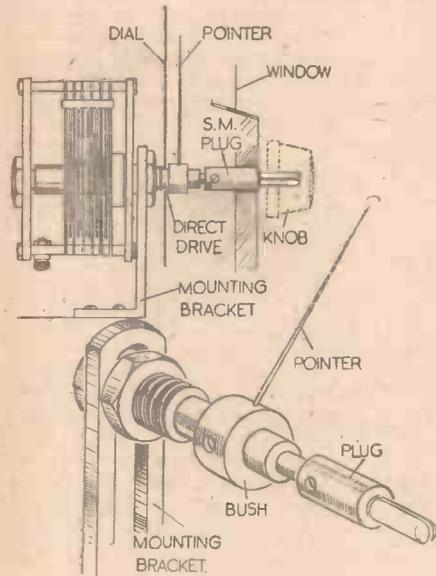
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

An Improved Dial Arrangement

FINDING the knob dial of the tuning condenser in my receiver rather clumsy, I hit on the idea of fitting a modern dial with the aid of the following components: a mounting bracket, a plug connector from a mains plug, a pointer, and a dial. As the illustration shows, I mounted



A simple method of improving a dial.

the condenser approximately 1 in. behind the panel, the pointer then being screwed on to the fixed gear direct drive spindle, and a dial placed behind it. A hole was then made for the plug connection to pass through, for screwing on to the slow-motion drive, after which the dial window was cut, and the knob put on the spindle. —LEONARD EDWARD KING (Bishop's Stortford).

A Handy Five-purpose Unit

THIS unit was made up in a tin measuring about 4 in. cube. Standard 6-pin plug-in coils are used, the normal grid winding being tuned by a .0001 mfd. condenser with a 100:1 slow-motion dial for calibration purposes. The general construction and simple circuit may easily be followed from the diagrams.

This unit may be used as:

1. Frequency meter (absorption) by unscrewing bulb and placing coil near the receiver.
2. Artificial aerial, by connecting bulb and joining link leads from transmitter points marked 4 and 5.
3. As a crystal set on long and medium waves, with appropriate coils, by joining 'phones to 2 and 3, aerial to terminal 4, earth to 2 and 5, and unscrewing bulb.
4. As a 'phone monitor by connecting headphones to 2 and 3, and placing unit near the transmitter. Remove bulb.

THAT DODGE OF YOURS!
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.

SPECIAL NOTICE
All wrinkles in future must be accompanied by the coupon cut from page iii of cover.

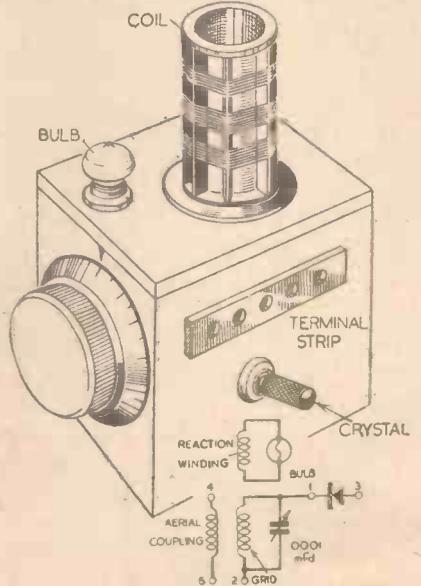
5. As a wave-trap by connecting aerial to terminal 1, and terminal 2 to aerial socket on receiver, remove bulb, and tune to unwanted signal.

If the crystal is replaced by a detector valve (for which there is ample room near the coil), the unit may also be used as a field strength meter, by connecting a 0.1 mA meter to 2 and 3, and removing the bulb; a short aerial may be necessary. —C. W. CRAGG (Oakham).

A Light Current Relay

THE other day I purchased a cheap 0.20 milliammeter which, excepting for a damaged case and sticky movement, promised to be convertible into a light current relay for series anode working.

In the accompanying sketches it will be seen that in a very simple way the function is made adjustable by drilling and tapping 4 BA. holes round the periphery of the

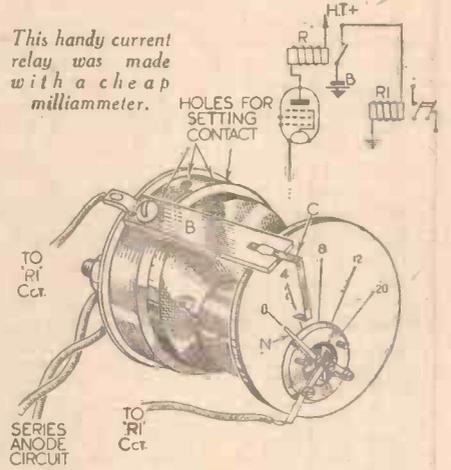


A compact home-made five-purpose unit.

moulding, and fitting an 18 gauge aluminium strip, B, to one end of which is soldered a phosphor bronze contact strip, C.

This contact is arranged to stop the needle of the meter at the chosen current setting, and it will be noticed that this needle is shortened. To obtain positive action to complete the circuit for the master relay, "RI" via the battery "B," the actual current passing in the anode circuit of the valve or valves is always adjusted to approximately 2 mA in excess of the actual

This handy current relay was made with a cheap milliammeter.



"buffer" contact setting. This procedure, however, does not noticeably jar the needle movement.

The connection to the needle for the "RI" circuit is taken through the actual movement, and whilst, at first, I had doubts as to the efficiency or continuity here, ultimate tests proved O.K. It was important to keep the "B" current low to prevent sparking and binding between the needle and buffer contact, and finally I resorted to a home-made bell bobbin relay for "RI," operating on 3-volts only. —C. R. LUKE (Halesworth).

WIRELESS TRANSMISSION FOR AMATEURS

Edited by F. J. GAMM

Explaining how to Learn the Morse Code: Applying for a Licence: Building and Operating the Set. Illustrated by Many Practical Diagrams.

Price 2/6 or 2/9 by post

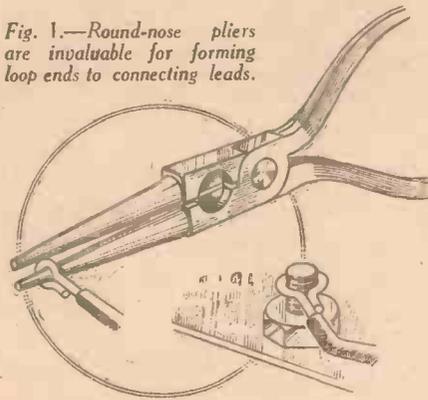
From George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, Strand, W.C.2.

THERE are still many constructors who are afraid to tackle a receiver in which soldering is called for, and many others who attempt the job, but instead of carrying out the proper method try to make use of "cold solder" and other aids. Soldering is regarded by many as a difficult or skilled process, whereas, when once the necessary fundamentals are borne in mind, it is so simple that a child can solder satisfactorily. The first attempts, will no doubt, be unsuccessful, but if half an hour or so is devoted to tests with odd pieces of wire and metal, it will be found that the idea will soon be mastered and soldering will then be found simpler than the making of loops and attachment of wires to terminals. In these days the constructor is forced, in most cases, to resort to the soldered method of connection, not only on account of the fact that compactness which is called for in modern receivers demands that all excess material be removed from the chassis, but because many components are now supplied with only wire ends for connection. There is not room in a modern receiver to accommodate the older type of component with terminals attached, and furthermore when terminals are employed there is a risk of lowered efficiency. If a wire end component is soldered to the points between which it has to be joined, there are direct connections; nothing to work loose; no risk of corrosion setting in due to poor contacts between uneven surfaces of metal, and the general result from an appearance point of view is much more pleasing.

Insulated Leads

Let us look at a modern commercial receiver and see what principles are adopted on the wiring side. Firstly, insulated

Fig. 1.—Round-nose pliers are invaluable for forming loop ends to connecting leads.



sleeving is freely used. This material is quite reasonable to buy, may be obtained in various colours, and simplifies testing by identifying certain leads. This sleeving is slipped over bare tinned copper wire such as is generally employed for connection purposes. There is, however, another type of wire which is readily obtainable, and this is of the covered type. It is sold under many different names—"Quickwyre," "Push-back" and so on. The outer covering may be pushed back very easily, and in use the required length is cut off and the inner tinned wire bared for soldering merely by pushing along the insulated coating. When using the insulated sleeving the best plan is to attach one end of the bare wire to one part of the circuit and then to stretch it to the other point to which it has to be joined. Make a slight bend and

WIRING ANI

Hints and Tips for Easier
as to the Correct Procedure
Making More

then place a length of sleeving by the side of the wire and cut it to the bend in the wire. Slip it down over the wire, and hold the wire against the soldering tag or other point to which it is to be attached, whilst it is soldered in position. The excess wire is then cut off with a pair of end-cutters. In this way the sleeving will cover all parts of the wire and there will not be a quarter of an inch or so of bare wire at the end.

Some difficulty is experienced in making an earth connection to the screened wire which is generally employed for connection to the top cap of a valve, or for screening other leads. The wire in this case runs

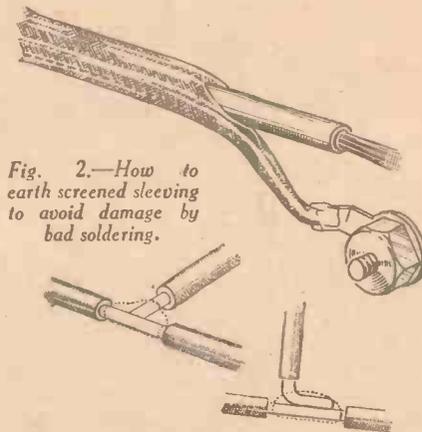


Fig. 2.—How to earth screened sleeving to avoid damage by bad soldering.

Fig. 3.—When joining wires make an angular joint as shown in the lower illustration. The other method is not so strong.

inside a length of insulated sleeving, and an outer covering of braided tinned-copper wire is laid on. This should be cut to the desired length, cutting through the insulated sleeving at the same time. Turn back the cut ends of the sleeving and run solder round. Alternatively, slip a piece of rubber tubing or larger diameter insulated sleeving over to keep the ends of the wire from introducing short circuits. For earthing purposes it is sometimes difficult to clean the wire and the application of the soldering iron may result in the internal insulated sleeving being burnt. The best plan for earthing, therefore, is to draw through the insulated sleeving from the opposite end, and at a point about 1 in. from the other end pierce through the braided sleeving with an awl. The insulated sleeving should then be pushed out through this hole and the odd length of braid may then be pulled out and attached beneath an anchoring bolt or other earthing point as shown in Fig. 2.

Soldering Tags

To attach leads to certain components, soldering tags are provided. These may be anchored beneath terminal leads or may be riveted to the actual component. Where terminals are used, and soldering tags are added, double- or treble-ended tags may

MANY readers are interested in directional reception or direction finding, and the following details will, no doubt, be of interest. They appeared in a recent issue of the American magazine *Radio*.

The simple loop aerial, once so popular for use with broadcast receivers, still has many uses as a direction finder. When properly constructed, it will give a highly accurate indication, because while the two "noses" are quite broad, the two nulls are very sharp.

A loop suitable for direction finding purposes is easy and inexpensive to construct, and will come in very handy round the amateur station for tracking down the source of power line and similar interference, and for orienting fixed beam aerial arrays. The latter application will be discussed in detail later.

Constructional Details

If a high degree of accuracy is desired, the loop must be constructed with care. A home-made direction finding loop capable of giving highly accurate direction indications has been made in the following manner: Six turns of rubber-covered wire are threaded through a circular aluminium pipe 20 in. in diameter. The shield cover itself is not a closed loop; if it were, there would be little signal pick-up. The aluminium pipe shield makes a neat-finished looking assembly.

A SIMPLE DIRECTION FINDER

Interesting Details of a Home-Made

The aluminium pipe shield is of 1 in. inside diameter stock, which was bent into a perfect circle by a local pipe bending company for a few pence. It is best to have some concern having proper facilities do the bending for you; if you attempt the job yourself it will most likely be a rather sad-looking mess before you have finished bending it.

A piece of bakelite tubing, of such a diameter that it will fit snugly over the aluminium pipe, joins the gap in the pipe and holds the assembly together. Six turns of No. 18 stranded, rubber insulated wire are threaded through the shield with the assistance of a stiff wire "snake." The centre turn (3rd) is tapped and connected to one terminal (frame or outside) of the three conductor 'phone plug which turns in a jack and so acts as a bearing. The two ends of the loop are connected to the remaining terminals of the plug.

The bakelite mounting sleeve should be slipped over one end of the aluminium pipe and the turns threaded through both sleeve and pipe, because otherwise it would not be possible to put the sleeve in place after the pipe is threaded.

SOLDERING

Construction, and Details Procedure to Adopt When Modern Receivers

be used to simplify the connection of more than one lead. This will avoid the risk of the first one coming adrift when a second is added. In this connection it is often found difficult when wiring according to some schemes, to attach a second or third wire or component to one point, as the previous connections are unsoldered if the iron is held in place too long. When soldering is properly carried out, however, it is possible to attach a second lead or more to the same point and the iron is held just long enough for the top part of the solder to run and a good joint to be formed before the first lead is loosened. However, a simple and effective way of overcoming this difficulty is to attach a short length of thick wire to the point in question, and let this stand up vertical. Any additional components or leads may then be attached at different points along this single wire, the joint being made before the heat has travelled along the wire and loosened others. The idea is shown in Fig. 4. An alternative scheme, and one which is often adopted by some constructors, is to twist all the wires and parts together and solder them into one piece, but the resultant thickness may be such that it cannot be attached to some parts—such, for instance, as a valve leg on an octal valve-base, where there is not much clearance.

When joining two wires together, one end should be bent so that it runs parallel with the remaining wire, as shown in Fig. 3. Do not place the end of the wire at right angles to its partner and expect a good sound joint to result. The overlap need only be about $\frac{1}{4}$ in. and the joint will be perfectly sound. When making this type of joint leave the iron long enough to ensure that the solder has run down between the two adjacent surfaces, and if too much flux is employed it may run into this space and burn and thereby prevent the two from being in good electrical contact. This is one of the rules of soldering—do not use too much flux. A good flux is very essential, but you need only a trace. The surface should be cleaned, preferably by rubbing with fine emery cloth.

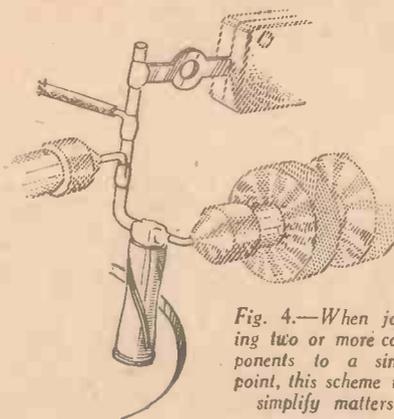


Fig. 4.—When joining two or more components to a single point, this scheme will simplify matters.

RECEIVER DIRECTION FINDER

Home-made Loop Aerial Device

Pointer Indicator

A pointer attached to the loop rotates round a large 360 degree scale, which is fixed permanently to the mounting base. Inside this scale is a smaller scale, which is movable. It is calibrated in degrees like the larger one. The two scales, one stationary and the other adjustable, together with a compass will permit one to make all the calculations necessary for direction finding, whether on a mobile unit, such as a boat, or at a fixed location. If desired, a sight may be fastened to the bottom part of the loop itself, as it will come in handy for certain uses of the loop.

The scales can be purchased from most drawing materials supply shops, but will be found rather expensive. Suitable scales can be drawn on heavy paper with drawing instruments if cost is a consideration.

Using the Aerial

The receiver used in conjunction with the loop should have balanced (doublet) aerial input. A twisted cord (no longer than necessary) is run from the aerial terminals to the two outside loop terminals. A separate wire is run from the earth terminal on the

loop (centre tap) to an external earth, and to the receiver chassis. The receiver should have high sensitivity if it is desired to check with distant stations, as the pick-up capabilities of any small loop of this type are none too good. The loop will work satisfactorily over the broadcast band and up into the 160-metre amateur band. Pick-up and accuracy on the higher frequency amateur bands will be rather poor, however.

The loop can be made smaller, if necessary, such as might be desirable for certain types of mobile work. A 12in. loop will have considerably less pick-up than the 20in. one described.

Orienting Beam Aerials

A simple and accurate method of orienting fixed aerial arrays with a high degree of accuracy is as follows: On a large globe, stretch a piece of thread from your location to the place on the globe you want your array aimed at. Somewhere along this line, or the line formed by projecting on through your location in the opposite direction, the line made by the thread, you will probably find a city having a high-power broadcast station that can be heard on your broadcast receiver when using the loop. The station need not be exactly on the line formed by the thread, because you can allow for a few degrees deviation when erecting the array. Tune in the station on the loop, and orient your array accordingly.

Cleanliness

Draw the wire or tag through the cloth until it is bright and clean. Next apply the thin film of flux, using a match-stick or other thin piece of wood—not your fingers as these will convey grease to the object. Now take the hot iron—if it is an electric iron which has been switched on for some time, it will be at a suitable heat. If you are heating an ordinary iron by the gas, the heat will be right when the flame round the bit is a bright yellowish green. Draw the tip of the iron across a sheet of fine emery laid on the bench—just to remove any trace of dirt or burnt material which might be on it. Place the end of a stick of solder on the tip and it should immediately commence to run. If properly cleaned the iron will carry quite a large quantity of solder, far more than is needed for normal soldering in a radio set, so don't pick up too much. Carry this to the point to be soldered and as soon as this is touched the flux on the job should give off a short loud hiss and the solder should almost immediately run right round the joint and maintain its bright silver colour. Leave the two parts in contact (if they are being held whilst the soldering is taking place) until the surface is seen to dull slightly. This will indicate that the joint has cooled and that it may now be moved.

To facilitate the picking up of sufficient solder on the tip of the iron, the stick of solder should be bent as shown in the illustration on our cover this week. The most suitable solder for normal radio-

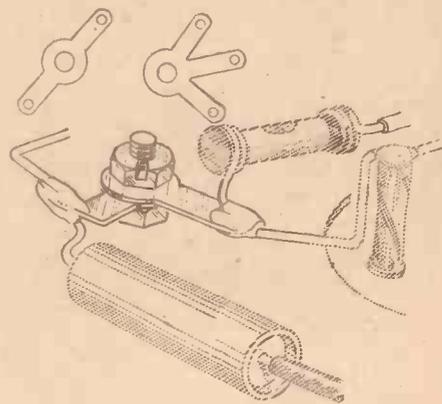


Fig. 5.—Multi-ended soldering tags simplify the attachment of several parts to a given point.

constructional work is that known as tinman's or blow-pipe solder. The latter is very thin, but melts very quickly. Tinman's is sold in heavier sticks, but with a good electric iron is perfectly suitable for radio work and is slightly stronger than blow-pipe—containing more lead. Resin-core solder is also available and removes the necessity of flux, but this material is preferably applied to the point of the iron, whilst the latter is in contact with the joint, and the resin then flows to the joint and assists in making good contact. A few experiments with some odd lengths of wire will soon enable you to accomplish the "knack" of judging the iron temperature, amount of flux and solder to use, and you will then agree that soldering is quicker than the older method of wiring and is much more reliable.



Practical Television

July 29th, 1939. Vol. 4. No. 162.

IN so far as television was concerned, the most important address given at the recent C.E.A. conference at Blackpool was that delivered by Major Bell, who chose as his title "Television—Facts and Problems." The first part of his paper dealt with a brief description of the equipment used by Baird, E.M.I., and Scophony, for their big screen work, and no new facts were brought to light. The only interesting point was the suggestion put forward that if it was the intention of the first two firms to maintain their front projection apparatus in the stalls about 40 to 50ft. from the screen, then it might be a good policy to have the installation like that of the cinema organ. That is to say, a platform would raise it into position from below floor level when required, and lower it out of sight on completion of the rediffused programme. This would prevent any interruption to the view of those front stall patrons by the twin receivers, although it was admitted that the sets, in themselves, occupied only a relatively small space. Major Bell then went on to deal with what he called television's problems as related to the cinema industry, and it was noticed that the speaker was of the opinion that while big screen television would never become a substitute for film shows, it would prove a most valuable adjunct if the trade lost no time in organising itself correctly.

A Question of Cost

NO particular apprehension was felt at the thought of Britain's nine million radio-set owners becoming viewers, because there would always be the human desire to go out for entertainment provided the cinemas took steps to give the public the entertainment they wanted with film and television. The first point to consider, however, was the cost to the exhibitor, and the opinion was expressed that a hire-purchase scheme with adequate service covering an agreed period of years would no doubt be the most satisfactory solution. Next came the question of copyright fees, and it was felt that an extortionate sum demanded by promoters would be wrong, as invariably it was out of all proportion to the cinemas' seating capacity, and in any case would necessitate the raising of prices. The public, except in the case of certain isolated events, would expect to see rediffused programmes without any increased seating charge, and only in this way could it be regarded as a form of added attraction. To deal with this adequately it was proposed that something on the lines of a combination of a Performing Right Society licence and a licence analogous to the B.B.C. licence should be created. Exhibitors with big screen equipment installed would then pay into this common fund agreed sums for the programme which they use. There is no doubt that this is a most reasonable suggestion, and one to which the Government should give its most earnest consideration.

C.R. Tube Projection

WITH many cathode-ray tube receiving sets using magnetically-controlled tubes, the user will notice that on switching

off the set at the end of a transmission a large area of light, quite bright in intensity, appears on the centre of the screen coated with fluorescent powder, and then gradually dies away. The smaller the area of fluorescence, the greater becomes the possibility of damaging the screen of the tube, and the effect is due to the time constant of the high potential anode circuit being in excess of that of the modulator electrode circuit. Many schemes have been devised to prevent this occurring, and one of the latest methods is to incorporate a switch in a section of the modulator-electrode circuit. When the set is turned off this switch is opened at the same time, and thus prevents the fixed condenser in the modulator feed from discharging too rapidly, and thereby checks the



Following the success of the "Inspector Hornleigh Investigates" series, a new feature recently started on the radio called "What Price Crime?" Leading figure in the new series is ex-Detective Inspector Jack Henry, of New Scotland Yard. Our illustration shows Jack Train (centre) taking a gun from Carleton Hobbs, watched by ex-Detective Inspector Henry.

emission from becoming evident on the screen during the dying-away process.

Horizontal Polarisation

IT is known that considerable attention is being directed towards the American television service with a view to ascertaining whether any advantage is accruing from the use of a horizontally polarised carrier wave for the radiation of the television signals. For some time the belief has been held that a substantial decrease in the effects of motor-car ignition interference would be brought about by employing this method, and confirmation or otherwise of this was expected from the United States. Unfortunately, the very nature of the city buildings seems to preclude any definite information becoming available. Most of the buildings are so high that the roof aerial when installed is well out of any interfering field provided by cars in the streets below. Only the results obtained in distant suburbs

where the houses are of a more normal type, and comparable in roof height to those found in this country, will provide any real data, and so far the number of sets sold is too small to justify technical conclusions. One factor has become apparent, however, and that is the horizontally-polarised receiving aerial exhibits a greater directional effect than is noticed in the case of vertical polarisation. Whether this can be applied with advantage to a television service only time will tell.

A Welcome Gesture

DURING the course of the recent B.B.C. television tea party one member of the audience rather boldly asked how many of those present had taken steps to ensure that their motor-cars did not cause interference to both short-wave listeners and ultra-short-wave viewers, as a result of any electrical radiation from the ignition systems. This must have struck home as far as the B.B.C. themselves are concerned for they have now asked their staff to take steps to suppress all electrical interference caused by their motor-cars. Staff engineers are to assist in this matter with the result that the cost involved will only be a nominal one. A co-operative gesture of this kind is of a more welcome nature than the threat of compulsion because of the

difficulties involved in an undertaking of a more national character. All B.B.C.-owned vehicles have been treated in this way, and also those of the Air Ministry and War Office. In the case of the Post Office, however, the department which should set the best example, since they are the one most concerned, it is freely admitted that their own house is not in proper order. This is said to be due to the fact that with the present organisation they have not complete control over many of their mail vans, but it is an incongruous situation which is difficult to understand.

PATENTS AND TRADE MARKS.

Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this journal.

TELEVISIONS

A Joint Memorandum

WHEN the exhibitors' and renters' associations of the cinema industry met the Postmaster-General as a joint deputation to discuss television a few weeks ago, they were asked to prepare a memorandum stating their side of the case. In spite of delays, due partly to the Blackpool conference, steps are now being taken to complete a report which will be equitable to both these sections of the industry. The News Reel Association have been asked to deal with the question of withdrawing news reel films from the B.B.C., but whether this will materialise is not yet known definitely. It seems certain, however, that if supplies were stopped, then the B.B.C., through its own film unit, would fill the breach with a news reel made up specially to suit the needs of television. The attitude is still adopted by both the C.E.A. and K.R.S. that to furnish the B.B.C. with any films would only provide competition with their own business, and yet they are still expecting a square deal on the big screen question to suit their own requirements. Whether complete co-ordination will be possible on all points between exhibitors and renters is not yet known, for it must not be overlooked that one is the customer and the other the salesman. Naturally, the renters do not look kindly on any development which is likely to reduce film playing time, and in return the exhibitor could quite justifiably regard the advent of television as a means for negotiating better terms with the renter. The situation is certainly an intriguing one, and fraught with difficulties, and that is why members of the C.E.A. were recently advised to keep an open mind on big screen television until the Postmaster-General had made known the contents of the Television Advisory Committee's report.

A Financial Offer

IN connection with the financial problem which confronts the cinema industry in its endeavour to find a satisfactory solution to rediffusion fees, so that theatres with big screen equipment installed can show pictures to their patrons, a more concrete proposition is now under discussion by members of the Cinematograph Exhibitors' Association. This is to the effect that a sum of £100,000 should be paid annually to the B.B.C. for large screen reproduction rights. This will be shared by all cinemas having apparatus installed, the individual sums due being based on seating capacity. It is felt that the additional attraction of tele-

vision to a cinema's ordinary film programme would bring about added patronage, the present figure for which is in the neighbourhood of 100,000,000 per year in British cinemas. Since the renters are paid a certain percentage of the cinema takings they would benefit, the exhibitor would have his share, and the B.B.C. its quota. The suggestion has the merit of being one of the first really sound ones, and would vest the rediffusion rights in the B.B.C. and not in a joint body consisting of the B.B.C. and the promoters of the event being televised. A goodwill offer of this nature is a step forward welcomed by all interested parties, and since the public showing of pictures is the normal business of the cinema industry, they are naturally anxious not to exhibit an antagonistic attitude which will bring into being a situation where music-halls, public halls or even church halls will be licensed to show television pictures, and thereby divert patronage from the cinemas themselves. The views of the renters on this proposed policy have not yet been made known, and any formal adoption by the organising committee will naturally depend on their attitude.

Television at Olympia

AS in previous years, we understand that the mobile section of the television branch of the B.B.C. will take the opportunity created by the Radio Show to provide users of television apparatus with relays of the exhibition and stage show. Another unit of this section will be at the Zoo, and special arrangements will be made to provide demonstration transmissions on closed circuits. During the Show the studios at the Alexandra Palace are to be overhauled and renovated.

● AROUND the SALES

INFORMATION that SAVES you MONEY!

If you're after an A.C. All-wave 4-valve Superhet Chassis—fully tested and complete with valves—there's an excellent N.T.S. bargain going at £4/12/6; you get a free matched speaker by the way, and 5/- secures the lot, balance in 16 monthly payments of 7/-. My advice to battery users is secure the N.T.S. All-wave SG 3-valve Battery Chassis model 7032, marked down this week at 47/6 (less valves) or 62/6 with British valves; 5/- deposit again secures. Amazing Bargains these.

Don't miss these Amplifier offers: 70/- (or 5/- deposit) only, buys a 7-watts AC model from N.T.S., built on a steel chassis and four valves fitted. If you must use a battery amplifier, invest in a 4-watts output model going complete at 55/- or 4/- down. Recommended lines for Public address work.

Kit with valves given free! Owing to the increase in short-wave licensing, the N.T.S. Bandspread 4-valve SG-Pentode output model is a good "buy" at 49/6 or

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Criticism, Chat and Comment

The Art of Listening

THERE are, broadly speaking, two classes of music, known as "absolute" and "programme," respectively. So much of the world's great music belongs to the former category—most of it, in fact—and so much of it is thereby misunderstood and discarded. The following remarks are addressed to those who would like some enlightenment on the subject in the hope that the great calamity of listening to "Classical" music unappreciatively may be avoided. "What is it all about?" "I can't make head nor tail of it," "It's all Dutch to me," are remarks one hears during or after the performance of a classical work, and which need never be uttered if a few vital points are constantly borne in mind.

First of all, definitions. "Absolute" music is purely subjective. It is written solely for the beauty of its harmony and melody, and for the perfection of its construction within the particular "form" chosen by the composer. The great thing to bear in mind is that at no point does it set out to tell a story or to paint a picture. So that you need never make the remarks above quoted because the answer will always be the same! Supreme examples of "absolute" music are, of course, the symphony, sonata, quartet, etc., anything, in fact, written in symphonic form, and such other forms as are used for church music, fugues, suites, variations, etc.

Now "programme" music, whilst being subjective, as all music must inevitably be, is the direct opposite inasmuch as it sets out to create some image in our mind's eye, or to set some definite train of thought working within us. Opera will readily occur to the reader as being the chief field for this type of music, as is song accompaniment. It is also probably superfluous to name such works as Grieg's "Peer Gynt" Suite, Tchaikowsky's "1812" Overture, and Handel's "Dead March," from "Saul" as typical examples of programme music. Although written in one or other of the classic forms, they stand or fall by the realism with which they convey to the listener the picture they set out to portray. That most of the world's most popular compositions belong to this category of programme music is readily understood, and by no one more so than the "highbrow" musician himself. Such modern examples as Debussy's "L'après midi d'une faune," and Stravinsky's "Firebird" suite, and many others, all of which can be heard in the forthcoming "Proms," are among the most highly treasured works in musical literature. Which brings me to the all-important question of the best way of listening to music.

Except in such inescapable cases as a military march, an imitation of some obvious noise like a hurdy-gurdy, a barrel organ or a thunderstorm, waves, etc., all music should be listened to subjectively, that is as absolute music, wherever possible. And when I say that most of it is subjective, no matter how unintentionally, I may surprise some of my readers. But I can easily prove it.

Grieg's "Peer Gynt" music is an excellent example to take. How many people know anything about Peer? Very few, I wager. And I am quite ignorant of the story myself. "The Hall of the Mountain King" and

"Anitra's Dance," etc., mean nothing to me over and above the meaning of the words "hall" and "dance" with which I am quite familiar, and which could not, of themselves, be very well drawn in terms

Our Music Critic, Mr. Maurice Reeve, Discusses the Pros and Cons of "Absolute" and "Programme" Music

of music. As to who "Anitra" is, and what sort of a dance it is that she dances, and why; or who the King is, and what he is King of, etc.; of all this I know absolutely nothing—forgive my ignorance. I have no doubt it is all in the music, and that it is a very fine piece of programme music, but the fact that I enjoy listening to "Peer Gynt" every time I hear it, in spite of the fact that I know nothing whatever of what the music sets out to portray, proves conclusively that I look on it as "absolute" music in the same way as I do a Bach Brandenburg Concerto, which is also, incidentally, full of dance measures.

And it is the same with everything, barring such eccentricities as Honneger's "Pacific 251," or Rimsky Korsakov's "Flight of the Bumble Bee." It is impossible to believe that anybody can, at this day, listen to "1812," and be on the look-out for the fight between the French and Russians at Moscow with the triumph of the latter, which was the theme that inspired Tchaikowsky to write the work and which he succeeded in portraying as vividly as any painter could have. No.

PROGRAMME NOTES

Promenade Concerts

AMONG the artists who will be making their first appearance in the coming season of Promenade Concerts, which opens at Queen's Hall, on Saturday, August 12th, are two singers of international fame; Richard Tauber and Dino Borgioli.

Tauber will appear in the Schubert-Liszt concert on August 15th, and will sing lieder by Schubert and arias by Mozart and Weber, while Borgioli will make his first bow to a "Prom" audience on Saturday, September 16th. He will be heard in "Che gelida manina," from Puccini's "La Bohème," and in an "aria" from Flotow's "Martha."

Richard Tauber made a very successful début in "The Magic Flute" at Chemnitz in 1912, and as a result secured an engagement with the Dresden Opera which lasted for ten years. Since then he has become an international celebrity, appearing with equal success in the theatre and the concert-

Believe it or not, it is the music which moves us, those haunting Russian peasant dances, that solemn opening theme, the rushing tumult of strings. The actual "battle" and the rival anthems are deemed rather vulgar, whereas the issues involved, France and Russia, mean less to the man in the street than Arsenal v. Aston Villa—much less. But it is the "naturalists" who are exposing themselves, not Beethoven.

Of course, this advice presupposes a taste for music, an appreciation for sounds and of the relations of sounds to each other and to the work in general. Naturally, the average person who "likes good music" has this, whether he knows it or not, and whether it is or is not accompanied by even the slightest modicum of technical knowledge. But technical knowledge, of itself, is not needed in order to appreciate good music, any more than a knowledge of botany or geology is needed before we can appreciate a beautiful view on a holiday. It is a state of mind, or a point of view which is requisite. And I hope my few words will have helped readers to the better understanding of the many good things that will be "on the air" in the immediate future.

And that is how we can, and should, listen to Bach, Beethoven, and Brahms. Revel in the melodies and harmonies, and, above all, get to know something about the plan on which it is built so that we can follow it along, logically and understandingly. Occasionally, as in Beethoven's "Pastoral" symphony, there is a hint of a programme. But the storm therein is never thought of as a picture of a storm, whilst the birds that sing later on, when the sun comes out, are not real birds at all, according to the "naturalists." All operatic scenes performed at concerts divorced from their "Covent Garden" context, as on the Wagner nights at the Proms, are inevitably transformed into, and listened to as, "absolute" music.

hall, as well as in films and on the radio. Both this year and last year he sang at Covent Garden in the International Season of Grand Opera.

Dino Borgioli, who is also an operatic tenor of international reputation, was born at Florence, and has sung at the world's most famous opera-houses—in New York, London, Paris, Rome, Salzburg, and San Francisco. This season he is taking part in the Glyndebourne Festival.

Beethoven Quintet

THE principal Midland programme in the evening of August 1st, is a recital of the Beethoven Quintet, Opus 16, for pianoforte, oboe, clarinet, bassoon and horn. The players are W. K. Stanton, Lucy Vincent, Richard Walthew, William Foote and John Denison, respectively.

Broadcast from Schubert's House in Vienna

LISTENERS will be able to hear Schubert's celebrated "Death and the Maiden" Quartet on August 1st, when it is to be broadcast from the house where the composer used to live in Vienna. The artists in this programme will be the Vienna String Quartet.

VIBRATORS— PRINCIPLES AND CONSTRUCTION

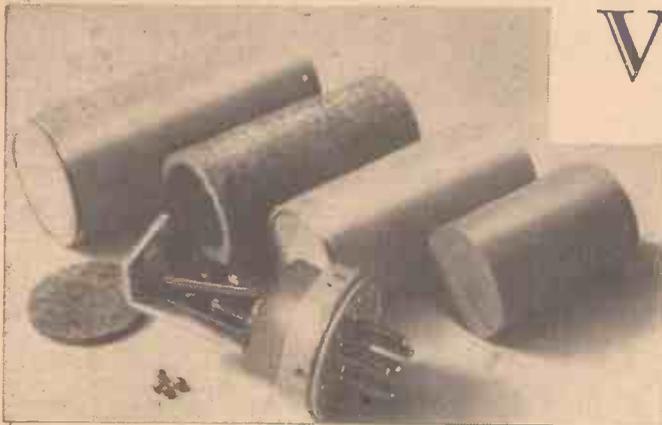


Fig. 1.—A standard vibratory rectifier taken to pieces to show the constructional features.

Last Week We Dealt with the Main Types of Vibrator which Are Now Available. This Week the Author Describes a Novel Experimental Interruptor

LAST week I covered all the main features of the types of vibrator and vibratory rectifier which are now on the market or which have so far been produced. Some time ago, however I experimented roughly with a different type of device for interrupting the current, and it gave promise of success. Time has, however, not allowed me to make the complete apparatus, but a description will undoubtedly be of interest to other experimenters.

Instead of being vibratory, this unit employed a rotary principle, and consisted essentially of a very small electric motor with three commutators, one being the motor commutator.

The other commutators were used to interrupt the current and rectify it. Fig. 2 gives details of the construction. In my experiments I used a 220-volt mains motor to drive the commutators, but the drawing shows a complete unit for 6 volts, the motor windings being suitable for this supply.

There is nothing special about the motor and it need only be very small; it has to be self-starting, so it must have a tripolar armature at least. The whole assembly is screened, as usual, but the commutators can also be screened from the motor, as shown.

Commutator Details

The only parts that need any detailed description are the two commutators, and their construction is very simple, consisting of three parts only.

The main part is a fibre block driven on to the shaft and running true; the contacts are pieces of copper of the shape shown, the hole is pushed over the shaft and the projecting strips bent down over the fibre. It helps if the fibre is slightly recessed to take the strips, and the edges of the strips are bevelled; the free ends of the contact strips are secured by a ring forced over them. A fibre washer separates one commutator

from the other, and the contacts of either must be insulated from the shaft by making the holes much larger than the shaft:

The carbon brushes to bear on these commutators are carried in simple holders, as shown in the inset, and are kept in contact by a light spring.

Each commutator must have an equal

number of strips, because they must short-circuit the brushes; an odd number would not do this. Also, the distance between the strips must allow of no contact between the brushes. I have stressed this point because it is different from an electric motor commutator, the brushes of which always bear on one segment or another.

To any reader who likes to experiment the idea may prove useful. The writer was only able to try it for a few minutes, but it showed promise of success, and may prove to have a greater life than a vibrator.

Those who just want to get H.T. from L.T. would be advised to keep to one of the vibrators, which will run for many hours with satisfaction, but the realexperimenter may care to carry on with the rotary device, and make a success of it.

Screening

Finally, vibrators are miniature transmitters and, usually, plenty of screening is needed, so put your unit in a metal case with a detachable top, and if your battery leads are other than very short a choke and condenser filter can be included in them, inside the case, of course, and if the armature sticks on the pole piece, glue a thin piece of paper on to the pole.

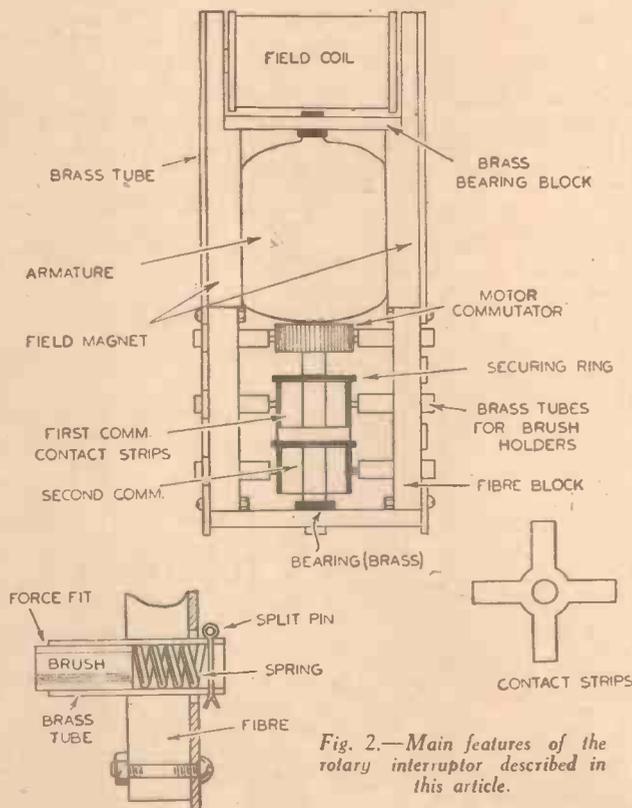


Fig. 2.—Main features of the rotary interruptor described in this article.

Special Broadcast by Gracie Fields

MISS GRACIE FIELDS, who recently left the Chelsea Women's Hospital to convalesce at her home at Peacehaven, on the Sussex coast, will broadcast a special message to listeners on Sunday, July 30th. Outside broadcast lines, installed for the occasion, will enable her to speak from her bedroom, to which a special microphone will be connected. John Watt, B.B.C. Director of Variety, will introduce her to listeners and, on their behalf, express a hearty "Welcome back." "Our Gracie's" message will be broadcast to Empire as well as to National listeners.

In reference to the talk, Mr. Bert Aza,

SUNDAY BROADCASTS

her manager, said: "Although her doctors tell me that Gracie will by then be strong enough to broadcast, she herself does not know of the plans we have made. I am not going to tell her for several days yet, because I do not want her to start worrying about what she is going to say. But I do know that she is very anxious to express her gratitude to her public for their enormous amount of kindness since she has been ill.

"I should like to emphasise that her offering will be appropriate to the day of the week on which she is speaking."

Village Pantomime

IN the series entitled "Running Your I Own Show," Harold Cheesman will give, on July 30th, a talk on "Our Village Pantomime." Mr. Cheesman is a bank clerk in Nottingham. In his leisure time he has organised a number of concerts and plays in villages around; his biggest effort being a pantomime at Nuthall. From his experiences there he will be able to give some hints to other producers.

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
 Wednesday, July 26th.—*The Finest Stories in the World*—2, Elijah.
 Thursday, July 27th.—*County Councils*, a discussion.
 Friday, July 28th.—*Yorkshire*, feature programme.
 Saturday, July 29th.—*Variety programme*.

REGIONAL (342.1 m.)
 Wednesday, July 26th.—*Cavalry Mechanisation, Aldershot* feature programme.
 Thursday, July 27th.—*Captain Ritchie Remembers*: incidents and adventures in the life of an old Scots Seafarer, from Scotland.
 Friday, July 28th.—*Accent on Rhythm*: a programme of dance tunes old and new, from Northern Ireland.
 Saturday, July 29th.—*Orchestral Concert*: Leken programme, relayed from Brussels.

MIDLAND (296.2 m.)
 Wednesday, July 26th.—*Holiday Taunts*: a summer revue.
 Thursday, July 27th.—*Birmingham Repertory Theatre Company* presents *Muted Strings* (recording).
 Friday, July 28th.—*Elizabethan songs* sung at an Elizabethan Manor House.

Saturday, July 29th.—*Looking Back*: many years in the Orchestra: Dr. W. H. Reed's reminiscences.

WEST OF ENGLAND (285.7 m.)
 Wednesday, July 26th.—*A Village Tour*—4, Somerset.
 Thursday, July 27th.—*A Concert Party programme* from the New Theatre, Newquay.
 Friday, July 28th.—*In My Garden*, short talks by all types of West Country gardeners.
 Saturday, July 29th.—*Poole Speed Trials*: a commentary from Poole Park.

WELSH (373.1 m.)
 Wednesday, July 26th.—*Fifty Years of Secondary Schools*, a talk.
 Thursday, July 27th.—*The Royal Welsh Show*, a description of the cattle parade from the Show Ground, Caernarvon.
 Friday, July 28th.—*Orchestral concert*.
 Saturday, July 29th.—*A Welshman's Calendar*: July.

NORTHERN (449.1 m.)
 Wednesday, July 26th.—*Change of Air*: a cabaret entertainment.

Thursday, July 27th.—*Country Fancies*: Three Scenes by Stephen Kirby—2, Clodhopper.
 Friday, July 28th.—*Dancing Here and There*: dance music.
 Saturday, July 29th.—*Merry-go-round*: gramophone recital.

SCOTTISH (391.1 m.)
 Wednesday, July 26th.—*Johnson's Scottish Journey from Aberdeen to Inverness*.
 Thursday, July 27th.—*Concert Party programme* from the Jubilee Theatre, Leven.
 Friday, July 28th.—*Gaelic Concert*.
 Saturday, July 29th.—*Scottish Dance Music*.

NORTHERN IRELAND (301.1 m.)
 Wednesday, July 26th.—*Orchestral programme*.
 Thursday, July 27th.—*Irish Rhythms*: orchestral concert.
 Friday, July 28th.—*Accent on Rhythm*: a programme of dance tunes, old and new.
 Saturday, July 29th.—*The Gate Theatre Productions Company, Dublin*, in *Weep for Polyphemus*, a solution by Denis Johnston of the riddle of the life of Dr. Jonathan Swift.

NEWS AND NOTES

Radio Sales in Canada

SALES of radio receiving sets in Canada in the first quarter of the present year showed an increase of more than 20 per cent. on the first quarter of 1938. This contrasts with a small decrease from 1937 in the first quarter of last year. The quarter's sales this year were the highest since 1932. Increased sales were reported this year from all provinces. Accompanying the increase in sales, production was doubled as compared with the same portion of last year.

Sales of radio receiving sets in Canada in the first quarter of the current year numbered 40,073 as against 33,075 in the first quarter of 1938. In 1937 the number of sets sold in the first three months was 36,356, while in 1932 it was 42,404. Total sales in 1938 numbered 251,259 as compared with 133,454 in 1932. In 1931, the year of highest sales, the number sold in the first quarter was 47,653 and in the twelve months 286,122. The greater number of sets are normally sold in the last half of the year.

Production of radio receiving sets in

Canada in the first quarter of the present year numbered 33,611 as compared with 15,648 in the first three months of last year. Production in the first quarter of 1937 was 40,434 and this was the highest since 42,430 in 1932 and 41,129 in 1931. The yearly output in 1938 was 242,721, which compared with 289,247 in 1937, with 121,468 in 1932, and with the peak of 291,711 in 1931.



Joe Loss, the famous dance band leader of broadcasting fame, doing the "Booms-a-daisy" (London's newest dance sensation) with Miss Annette Mills, the composer of the song of the same title.

Transatlantic Broadcast

AFTER describing the Ulster Derby a few weeks ago, Raymond Glendenning rushed off the racecourse to catch the New York boat. He arrived at the World's Fair on July 24th—and even while on holiday he continued to broadcast commentaries. In the evening on August 3rd, Glendenning will describe the Ulster exhibit in the World's Fair. He will speak on the transatlantic telephone at the Ulster stand in the British Pavilion, and will describe the exhibit staged by the Irish Linen Guild. The broadcast has been arranged specially for Northern Ireland listeners. Northern Ireland's B.B.C. Director, Mr. G. L. Marshall, will be with Glendenning when he broadcasts from the Fair.



The Postmaster-General has appointed Colonel A. S. Angwin, D.S.O., M.C., T.D., Engineer-in-Chief of the Post Office, to be a member of the Post Office Board.

The resignation of Mr. Alfred Barker, leader of the Northern Orchestra, and for many years leader of the Hallé and Liverpool Philharmonic Orchestras, has just been announced. His many duties as leader have prevented him in recent years from accepting engagements as a soloist, and it is in this capacity, combined with an important position in London, that he intends to continue his career.

The vacancies created by Mr. Barker's resignation have been filled by the appointment of Mr. Laurance Turner, one of the principal violins of the B.B.C. Orchestra, and leader of one of its studio sections. He will begin his duties in Manchester early in October. Mr. Turner is a native of Huddersfield and was a member of the Hallé Orchestra before he went to London.

NOTES FROM THE TRADE

New McMichael Radiogram

A RADIOGRAM for less than £15 is the slogan for the new McMichael receiver illustrated on this page. Towards the end of last season McMichael introduced a table radiogram priced considerably below the figure for the conventional instrument, and the success of this has led them to introduce a new model this year. Known as Model 903, this employs a 7-stage all-wave superhet circuit covering from 18.5 metres upwards with every feature needed for first-class reception and an undistorted output of 5-watts. The cabinet is only 20ins. in width. There are 4 valves in the circuit (which is an A.C.-mains-operated model) arranged as



McMichael Table Radiogram Model 903, costing £14 17s. 6d.

triode-hexode frequency changer; I.F. amplifier; double-diode-tetrode for detector, A.V.C. and output, and an indirectly heated H.T. rectifier. The wavebands are 18.5 to 50, 190 to 550 and 850 to 2,000 metres. There are four main controls—two on each side of the scale. These are volume-on-off, tone, wave-range and tuning. An extra radio-gram switch is conveniently mounted on the motor-board. The three wavebands are in separate sections on the floodlit scale, each with its own pointer extending behind both stations and wavelengths. The actual waveband in use is indicated by a coloured pointer moving across the bottom of the tuning scale as the wave-change knob is rotated. A large energised speaker completes the receiver. A point of interest to quality enthusiasts is that when switching over to "gram" a special selective, negative feed-back circuit is introduced, compensating for deficiencies in recording, whilst special circuit precautions enable the receiver to be used at maximum

sensitivity with the minimum of mains interference noises. The price of the receiver is £14 17s. 6d., or on easy terms.

Cossor Car Radio

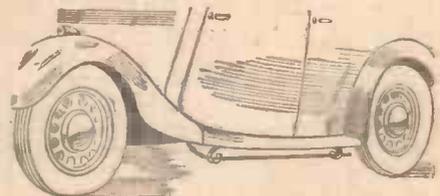
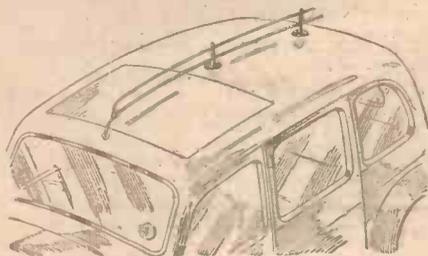
MESSRS. COSSOR have now entered the car radio market and their first model is illustrated here. This is in two units, a push-button tuner and a speaker unit. The latter incorporates the main part of the receiver, whilst the tuner unit includes a single valve in addition to the necessary coils and condensers. The six push-buttons cover the medium and long wavebands from 195 to 1,875 metres, and the receiver is sent out with the buttons adjusted to six stations indicated by flood-lit indicators. The stations may be altered very easily, even whilst driving. Merely push in the button and rotate the adjuster knob above the button in either direction until the desired station is heard.

An entirely new version of the superhet circuit, which has been developed in the Cossor Laboratories is used in the receiver and is built around 5 valves. Very high quality is claimed, and the apparatus is very simple to install.

Two types of aerial are available, one for the roof and one for slinging beneath the car. This is supported on two flexible rubber pillars, ensuring that the aerial is not damaged or put out of shape if some obstruction is encountered. The price is 11 guineas.

McCarthy Ltd.—Change of Address

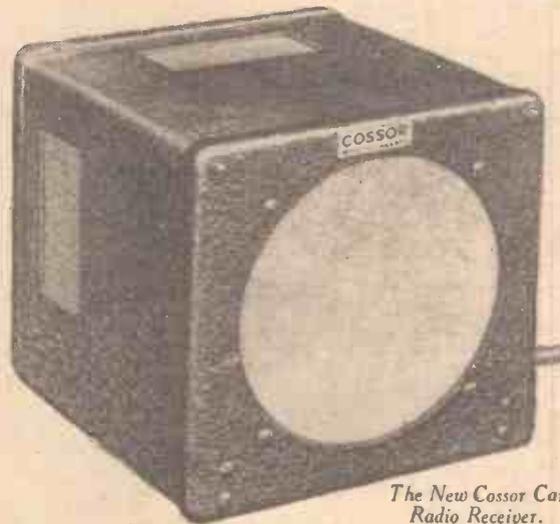
MESSRS. H. MCCARTHY, LTD., announce the removal of their Sales and Service Department from 92, Queensway, Bayswater, W.2, to the new Works at Wyndham Works, Acton, W.3. Here the new Hartley-Turner and McCarthy apparatus will be produced and details will be announced in due course.



Ferranti Car Aerials—on the left the roof model and on the right the under-chassis model.

Ferranti Car Aerials

TWO car aerials have been introduced by Messrs. Ferranti, one for the roof and one for the running-board or chassis. The roof aerial, which is of streamline design, costs 21s., and the underchassis model costs 10s. 6d. The latter consists of a steel tube 48ins. in length and 1/2 in. in diameter, suspended by a heavy



The New Cossor Car Radio Receiver.

canvas ribbon, reinforced and covered with rubber. The aerial thus swings free and will not be easily damaged. The roof aerial consists of two brass rods, nickel and chromium plated, each 63ins. long and 1/8 in. in diameter. It is supported at three points, suction pads being used at two points to avoid damage to the roof. The third support is a continuation of the lower rod and passes through the roof to the receiver, the lead-in being connected at the roof junction.

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RADIO CLUBS & SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

Special Notice: Will club secretaries please send in reports in the form they appear on this page.

RADIO, PHYSICAL AND TELEVISION SOCIETY
Headquarters: 72A, North End Road, West Kensington, W.14.

Hon. Sec.: C. W. Edmans, 15, Cambridge Road, North Harrow, Middlesex.

Meetings: Friday evenings at 8.5 p.m.
DURING the month of June six new members joined the society; two members obtained artificial aerial transmitting licences, and one member obtained his full transmitting licence.

No lectures were delivered during the month but a committee meeting was held to make preliminary arrangements regarding the proposed field-day to be held towards the end of August. There are vacancies for one or two non-members to take part in this field-day. Non-members who are interested should make application as early as possible to the hon. secretary, or to the society's headquarters. At least two meetings will be held prior to the field-day; members will, of course, receive notification by post.

SALE AND DISTRICT RADIO SOCIETY
Headquarters: St. Mary's Schools, Barkers Lane, Sale.
Hon. Sec.: S. C. O. Allen (2FCQ), 31, Binnerdale Drive, Sale.

Meetings: Weekly, on Thursday evenings at 7.30 p.m.

MR. H. MARSHALL, a member of the society, has just been issued with the call G4ND, and he will take over the slow wave transmissions from Mr. Robinson (G5UP). The transmissions are on Wednesday evenings at 9 p.m., on a frequency of 1,915 kilocycles, and to avoid confusion this frequency is being retained for the transmissions from G4ND. Sunday afternoon practice on the 7 m/c band will still be given by G5UP.

As most members of the society intend eventually to apply for amateur transmitting licences it is intended to extend still further the facilities for Morse practice by reducing the time at present devoted to the business portion of the meeting. Up to the present, practice has been given on an audio-frequency oscillator connected to a mains amplifier, but in future buzzers and headphones will be available.

Visits to transmitting stations, inspection of a ship's radio equipment, and a social gathering are among the events which it is hoped to arrange for the next few weeks.

The headquarters of the society are within easy reach of most parts of the Manchester and North Cheshire districts.

COXHOE AND DISTRICT AMATEUR RADIO SOCIETY
Headquarters: (Temporary) Slake Terrace Inn, West Cornforth.

Hon. Secs.: Mr. D. F. Chatt (2HKI), 23, North View, Sherburn Hill; Mr. R. Bowes (2DTA), 10, Blackgate, Coxhoe.

Meetings: Every Tuesday, 7.30 p.m.

A MEETING was held at the above headquarters on Tuesday, July 11th, at 7.30 p.m. Mr. D. F. Chatt gave some hints on the use of various components and circuit diagrams to the less advanced section of the society. Construction of the 0-v-1 receiver was carried out by other members. The usual group discussions were held by various members. The acceptance of an offer for more permanent headquarters was discussed, and, it is hoped, arrangements will be carried out shortly in this direction. Mr. D. F. Chatt has obtained an A.A. call (2HKI). Any co-operation from "hams" or others with radio experience would be welcomed.

LIVERPOOL AND DISTRICT SHORT-WAVE CLUB
Headquarters: "Tower Room," St. Barnabas Hall, Penny Lane, Liverpool, 18.

Hon. Sec.: L. Frank (2F10), 4, West Albert Park, Liverpool, 17.

Meetings: Weekly, at 7.45 p.m., on Thursdays.

A COMMITTEE for the above club has been formed, and the nominations were as follows: Chairman, C. Brindley; Hon. Sec., L. Frank (2F10); Treasurer, L. Hodge; Executive Committee, D. Siddall (G4BM), and W. Carney (2AZV).

Registration fee is 1s, and a charge of 6d. will be made per meeting attended.

All those interested are cordially invited to write for further particulars.

Free parking space is available for cars and cycles in the grounds.

SLADE RADIO
Headquarters: All Saints Parochial Hall, Broomfield Road, Slade Road, Erdington, Birmingham.

Hon. Sec.: L. A. Griffiths, 47, Welwyndale Road, Erdington, Birmingham.

Meetings: Alternate Thursdays, 8.30 p.m.

THE programme for the summer quarter is as follows:

July 27th: Lecture by Mr. Burr, of the Mullard Wireless Service Co., Ltd. August 17th: Propulsion and control of Model Railways from D.C. and A.C. mains. Lecture and demonstration by Mr. N. B. Simmonds. August 20th: Direction finding test. August 24th: Latest receivers reviewed and demonstrated. September 7th: Construction night. Exhibition and discussion of members' own-built apparatus. September 17th: 5 metre D.F. Field Day. September 21st: Lecture on television, by Mr. G. W. Stockton, of the General Electric Co., Ltd. September 23rd-24th: Direction finding test (night).

ROMFORD AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters: Red Triangle Club, North Street, Romford.

Hon. Sec.: Rowland C. E. Beardow (G3FT), 3, Geneva Gardens, Chadwell Heath.

Meetings: Every Tuesday at 8.30 p.m.

ROMFORD participated in another interesting R.D.F. contest, this time held by Welwyn which, I understand, was well organised and patronised. Romford entered four cars and 24WF again came in first in record time, three prizes thus being taken by the first car in, for the winner, driver, and passenger.

Membership still shows an increase, and we are pleased to congratulate our blind member on obtaining his A.A. licence.

August Bank Holiday will again see us assisting at the Red Triangle fête. Visitors in the district are always welcome at the above address.

REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

T. H. A. (Longshaw). What is the object of placing the condenser in the position mentioned? We cannot see the reason, and that is why we have not described such a scheme.

A. S. (Havant). From Westinghouse Brake and Signal Co., Ltd., 82, York Way, King's Cross, London, N.1, price 13s.

P. C. (S. Woodford). We could not recommend a blueprint for your purpose. We only guarantee when parts which we specify are employed.

A. A. (Pontypool). The blueprint is No. PW.30A, price 1s. A standard plug-in S.W. coil may be used.

G. J. O. (Cheltenham). The reason is sometimes bound up in the fact that a ground wave is received as well as the direct wave. In other cases it is merely due to instability and damping effects of aerial-earth.

J. F. E. (Waterfall, Co. Cork). We cannot advise concerning the receiver, and you should write to the makers, who will assist you regarding the difficulty.

H. M. (Acton, W.3). We regret that we have no details now in our file concerning the coil in question.

A. S. (Lochgelly). The trouble may be due to a wrong connection; wrong value of H.T.; defective H.F. choke or your aerial-earth system.

W. E. M. (Clapham). We suggest you obtain a blueprint and then get the parts which we recommend. Some of your parts may be defective, and you will be introducing trouble by incorporating them in a receiver.

K. R. (Spalding). Write to Brown Bros., Gt. Eastern Street, London, E.C., and R. Cadisch and Son, 5, Red Lion Square, W.C.1.

ITEMS OF INTEREST

Australia's Radio Network

WITH the advent of the new VQ4AT transmitter at Atherton (Queensland) the Commonwealth of Australia now owns over 120 broadcasting stations, including the short-wave transmitter VLR.

A Transatlantic Record

A RECENT three-way radio conversation between film stars at Oslo, New York, and Hollywood was carried out in connection with the production of a scene in the film "The Second Violin," which is shortly to be released. The speakers were Sonja Henie in the Norwegian capital, Rudy Vallee in New York, and Tyrone Power, who was working at Hollywood. The studios were connected through the N.B.C. network, and the results obtained were perfectly satisfactory.

Another Radio Stunt

AT a performance given recently at Breslau (Germany) an interview was carried out by the radio studio commentator with an artist, Camilio Mayer, during the latter's turn on the slack wire. Equipped with a microphone and followed by an assistant carrying the requisite cable connection the artist broadcast his replies to questions put to him by his interviewer in the circus arena. The two-way conversation was conveyed by land-line to the Breslau transmitter, and thence distributed throughout the German radio network.

Radio Vlaanderen

A BRANCH of the Belgian Socialist party established at Ghent has opened a small broadcasting station at Meirelbeke; the wavelength is 201.1 m. (1,492 kc/s). All transmissions are carried out in the Flemish language. The call is: *Hier Radio Vlaanderen* (Flanders).

A Station for Tangiers

THE Tangiers (Morocco) broadcasting station used during the Civil War by the Spanish insurgents has now been acquired by a French concern. It will be completely overhauled, and will resume its broadcasts in French and Arabic towards the end of the autumn.

France's Poste National

ACCORDING to a Paris report the high-power long-wave station installed at Allouis, a small village some twelve miles from Bourges, in the centre of France, will be officially opened towards the end of this month.

Not a Listener's Paradise

DURING the first quarter of 1939 the German authorities have sentenced 145 persons for "illicit" listening to foreign broadcasts. The penalties ranged from two to thirty days imprisonment or, alternatively, to fines up to 150 marks.

A Summer Revue

SIDNEY ANDREWS and John Bridgeman, who collaborated in a play called "The Secret of the Service," in which the typical spy story is burlesqued, are the authors of a topical revue entitled "Holiday Taunts," which Martyn C. Webster will produce on July 26th. The artists will be Diana Morrison, Marjorie Westbury and Dorothy Summers, Hugh Morton, Fred Forgham and Godfrey Baseley, with Harry Engleman and Donald Edge at the pianos.

RADIOLYMPIA

August 23rd to September 2nd

(Both dates inclusive)

LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

A.R.P. and Radio

SIR,—In these days of continual emergency preparation, one is apt to overlook the vital necessity of providing adequate wireless programme reception apparatus; in view of this, I feel that the following suggestions will not be amiss.

Due to the restrictions which would undoubtedly be imposed on electricity consumers, it will be essential for readers to think along practical lines and equip their shelters with battery receiving sets. Some people have suggested that the hey-day of the crystal set will return, but I am of the opinion that it will inspire greater confidence in a family if they are allowed to hear what is being broadcast, rather than to rely on the listening-in of one member of the party. Headphones are easily attachable to a set, and could be fixed whenever several members of the family felt like having a short spell of sleep.

The radio will be of great assistance to the public during an emergency, and it is up to every practical listener to take steps to see that those around him will hear distinctly all announcements as they are transmitted.—ERIC L. ADLEM (Notting Hill, W.11).

A DX Log from Sheerness

SIR,—I wish to thank you for the prize you awarded me for solving Problem No. 354.

I have just received one pound of best Guatemala coffee from their TGWA station. The QSL card is very attractive and well worth writing for. DX concerts are held every other Sunday morning at 07.00 until 08.00 B.S.T. Prizes of coffee are offered for the best DX reports. There are also two air mail triangular stamps on the QSL card.

I am very interested in 39 mc/s. 'phone reception, and I have QSL's from W3ESY, 4EPJ, 8EXI, and W9ACU, who I consider the best DX. I have heard that he was only using 20 watts, and my report was his first from Europe on this band. On the 3rd of this month I heard W1GIF, 2HJB, 4AKI, 8BOZ, and on July 8th I heard W2EPY and W3CRO, all on 75 metre 'phone. I have lately had QSL cards from VS7RA, VQ3HJP, VU2FA, KAILB, CX2CO, PK4FS, and CO7VP.

The best DX heard here lately have been VP6YB, VS7RA, VU2JG, VP5IS, VP7NS, VP6MR, VP3CO, VK2AD, VK3BM, 4JP, 4AG, HR5C, XE2BB, XE2FC, OA4AW, TI2FG, YV1AQ, 5ACA, HK4CF, PY2BH, 2FA, 4BI, 6AG, VU2FA, 2CQ, K4FAY, EMG, ZE1JA, PK4HW, 4JD.

I would like to correspond with any reader in Australia, India or U.S.A. I have just had my A.A. licence granted and I am now awaiting my call.

I have been a reader of your paper for nearly three years and I consider it the best radio weekly.—EDDY H. TROWELL (27, Unity Street, Sheerness, Kent).

Exchanging QSL Cards

SIR,—Having noticed several letters recently offering to exchange QSL cards, I shall be pleased to exchange cards with any S.W.L. or full-ticket amateur at home or abroad.—J. TRUSSELL (171, Barcroft Street, Cleethorpes, Lincs.).

SIR,—Other readers may be interested to know that I have received four QSL cards from Poland (Warsaw), i.e., SP25, SP31, SP48, SPD, and hope to get SP19 soon. They are very nice cards, and are worth having. Would like to exchange S.W.L. cards with any reader at home or overseas.—T. H. PLATER (14, Littlegarth, Saffron Lane, Leicester).

SIR,—I have been reading your paper for four years now, and would like to get in touch with any "full-ticket ham" or S.W.L.'s of about 17 years of age, in any of the following continents: Eastern Asia, Central Africa, or South America.

I will also exchange my card with readers in these zones.—E. H. MAGEE (21, Carbery Avenue, Bournemouth, England).

CUT THIS OUT EACH WEEK

Do you know

- THAT special receivers are available with Braille tuning indicators.
- THAT an adjustable beat frequency oscillator enables the note of a C.W. station to be adjusted to any desired pitch.
- THAT the advantage of the above is that a station may be read through bad interference merely by changing the pitch of the note.
- THAT care should be taken when screening certain leads, as you may introduce greater losses due to capacity effects.
- THAT a meter or similar instrument should not be placed near a magnetic type of speaker.
- THAT the frequency of the mains must be considered when choosing a mains transformer as in certain cases the transformer may be unsuitable.
- THAT solid copper wire is to be preferred for some types of transmitting aerial.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newman, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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Car Radio

SIR,—I agree with your correspondents, Mr. Bowden, and Mr. Blyth, that you should give us a constructive article on car-radio. A certain authority has said that this is too difficult for the home constructor so I think that it is up to PRACTICAL AND AMATEUR WIRELESS to show the way. I should prefer a superhet using American valves such as 6D6, 6A7, 6D6, 75, 41, 84, in that order, a P.M. L.S., and a vibrator for H.T. to be used on a 6v. battery.—LESLIE J. COOPER (Rugeley).

S.W.L.'s Please Note

SIR,—I derive much pleasure and sometimes valuable information from the logs which are sent in by readers of PRACTICAL AND AMATEUR WIRELESS. These are usually very accurate and calls are given correctly. I was, therefore, greatly surprised to see a number of "wrong calls" in a log from a reader published in the issue dated July 15th. Some of these show how easily a mistake can be made in reading foreign prefixes, and others show carelessness on the part of the listener. For instance, CK1AF; FV1CA, BS70A, GK2AGJ, should read EK1AF, SV1CA, VS70A and VK2AGJ. Why can't S.W.L.'s take more care in logging 'phone signals?—FRED. C. BLAIR (Belfast).

Reception of 20 m. 'Phone Stations

SIR,—The 20 m. logs that have appeared in your excellent paper from time to time has prompted me to send the following list of stations, all of which have been received since June 9th on an 0-v-1 receiver used in conjunction with an ordinary 50ft aerial running around the loft: CN8AU, BA, MZ, CE3AT, CO8JK, CT2BC, BP, EA7BH, EK1AF, FA8CF, IH, K4FSP, KA1FH, LU5CZ, LU7AG, OH2OI, QM, PY1GR, PY2BH, 2CT, 3DZ, EN, 4BL, BK, EJ, PY5BL, SUIRH, SU5BO, 5KW, TI2RC, VE3EO, VK4IO, VPTNS, VQ2CM, VU2FA, JG, W4BMR, W6GRL, W7BVO, W9MM, ARA, YV5AK, ZB1L, 2B, ZS1T. All "W" districts have been received except W5.

The receiver was built from knowledge gained from your excellent periodical.—DONALD W. HUNTER (East Barnet).

Correspondents Wanted

SIR,—As a regular reader of PRACTICAL AND AMATEUR WIRELESS, I shall be glad to get in touch with another reader of your most instructive paper who has experimented with radio for about two or three years.—JACK LEVER, 13, Salt River Road, Salt River, Cape Town, U. of S.A.

SIR,—Being a short-wave enthusiast, I should like to get in touch with any other readers in this district.—P. SIMPKINS, 2 and 3, St. Thomas Street, Winchester, Hants.

SIR,—I have been a reader of your fine magazine for three years, and I have gained a great deal of knowledge from it. I would be pleased if you would put me in touch with any SWL's or ham who wish to exchange cards.—T. J. PARRY, Garth, 20, Erskine Road, Colwyn Bay, North Wales.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM.

From all Booksellers 5/- net, or by post 5/6 direct from the Publishers, George Newman, Ltd. (Book Dept.), Tower House, Southampton St., Strand, London, W.C.2.

LATEST PATENT NEWS

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume or in bound volumes price 2s. each.

Abstracts Published.

WIRELESS RECEIVING-APPARATUS.—Mitchell, F. A. No. 504022.

Upon a press-button 18 (Fig. 1) being depressed, a circuit from rectifier 21 is com-

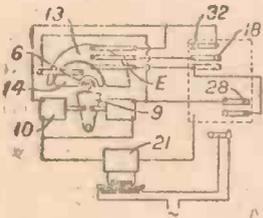
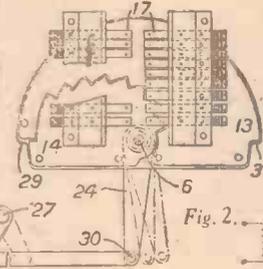


Fig. 1.



control a polarized relay and the station selecting buttons may operate the wave range changing buttons, if necessary. Specifications 416435, 416775 and 501370. (Group XXXVIII), are referred to.

VALVE CIRCUITS.—Lorenz Akt.-Ges., C. No. 504091.

In a class B amplifier the bias voltage of the output valves is obtained from the anode circuit of preceding valves. The push-pull output valves 3, 4 (Fig. 3) are

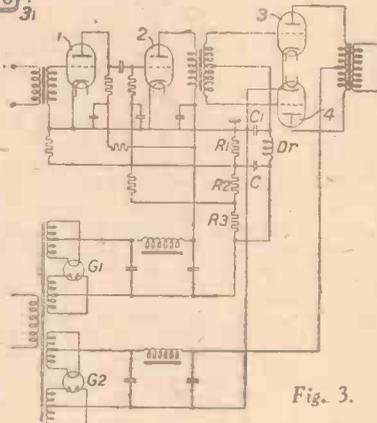


Fig. 3.

pleted over a contact 17, e.g. E, to energize a solenoid 10 which rotates, through a sector 9, the shaft 6 of the tuning element, the circuit being broken when the contact passes on to the insulation between contact plates 13, 14 mounted on the shaft. In order to effect a change in the wave range, a button 28 or 32 is depressed to rotate the shaft to one of its extreme positions, projections 29, 31 (Fig. 2) engaging a pin 30 to actuate through a linkage, the shaft 27 of a wave range switch. It may be arranged that in further positions of the shaft 24, the apparatus may be set for playing gramophone records and television reception. In a modification (not shown), the wave range changing press-buttons

supplied with anode current by valve G2, whilst valves 1 and 2 are supplied from

valve G1. Grid bias for valve 1 is obtained across resistance R1, for valve 2 across resistances R1+R2 and for valves 3 and 4 from resistances R1+R2+R3. Additional grid circuit smoothing elements Dr, C1, C may be provided if desired.

AERIALS—DIRECTIVE WIRELESS SIGNALING.—Berry, R. J. (Lorenz Akt.-Ges., C.) No. 504163.

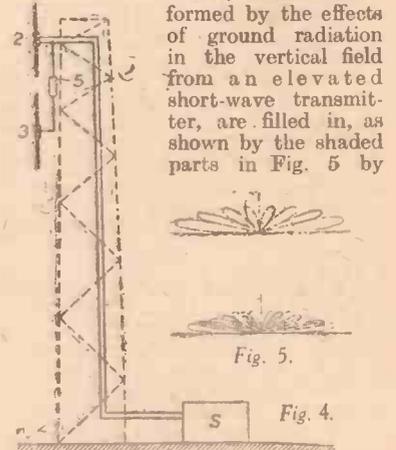


Fig. 5.

Fig. 4.

The "silent zones" formed by the effects of ground radiation in the vertical field from an elevated short-wave transmitter, are filled in, as shown by the shaded parts in Fig. 5 by

using a second transmitting dipole which is arranged at a different elevation from the first. The main aerial 2 (Fig. 4) is directly energized from the transmitter S, whilst the aerial 3 is energized either by radiation from the first, or through an inductive or other coupling 5. The auxiliary aerial may be replaced by metal sheets, wire-meshes, or the like. The two dipoles may be provided with reflectors which are alternately keyed to produce a navigational beam.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office. The Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription, £2 10s.)

Latest Patent Applications.

- 18939.—Baird Television, Ltd., and Anderson, E. G. O.—Television, etc., circuit arrangements. June 29th.
- 19079.—Belling and Lee, Ltd., Lee, E. M., and Hodby, A. L.—Moisture-proof glands. June 30th.
- 19080.—Belling and Lee, Ltd., Lee, E. M., and Hodby, A. L.—Aerials for radio-receivers. June 30th.
- 19321.—Emerson, E. A.—Television accessory. July 3rd.
- 19634.—General Electric Co., Ltd., and Peters, W. H.—Cathode-ray tube assemblies. July 5th.
- 19050.—Hinchen, D. T.—Radio aerials. June 30th.
- 19114.—Lorenz Akt.-Ges., C.—Television receivers. June 30th.
- 18960.—Philco Radio and Television Corporation.—Remote control system for radio-receivers, etc. June 29th.
- 18961.—Philco Radio and Television Corporation.—Remote control system. June 29th.
- 19134.—Philips Lamps, Ltd., and Kaye, J. B.—Aerial systems for radio-receivers. June 30th.
- 19331.—Radioakt.-Ges. D. S. Loewe.—Arrangement for separating the

signals for frame and line synchronization in television receivers. July 3rd.

Specifications Published.

- 508373.—Radioakt.-Ges. D. S. Loewe.—Interlaced line scanning of films.
- 508377.—Blumlein, A. D.—Television or other signal transmission systems. (Cognate Application, 16079/38.)
- 508304.—Marconi's Wireless Telegraph Co., Ltd.—Radio receivers and the like.
- 508552.—Baird Television, Ltd., Daniels, L. C., and Marcus, G. E.—Cathode-ray tubes and like electron-discharge devices.
- 508520.—British Thomson-Houston Co., Ltd., and Gabor, D.—Cathode-ray devices. (Addition to 479064.)
- 508409.—Battrum, F.—Troughing or gutter brackets for wireless aerials.
- 508249.—R. C. A. Photophone, Ltd., and Underhill, J.—Reproductions of recorded sound.
- 508434.—Naamlooze Vennootschap Philips' Gloeilampen-Fabrieken.—Cabinets for radio-receivers and other containers.
- 508297.—Telefunken Ges. Fur Drahtlose Telegraphie.—Lecher line coupling arrangements for use on ultra-short waves.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

FORESIGHT REWARDED

NEARLY nine years ago one of the biggest hotels in New York announced that the whole of their new premises were being wired for television reception as well as radio. Although the idea was scoffed at, since in 1930 the only service which could be demonstrated was a crude one on a low-definition standard, the work was proceeded with and over 2,000 rooms had these facilities provided. The television points have been dormant until now, and the inauguration of the American television service in New York has enabled this hotel to install sets straight away, and give their guests novel facilities not enjoyed by its rivals. Further reports from America concerning the television transmissions indicate that the standard of the transmitted and received pictures is still below that enjoyed in this country. There is a lack of programme technique which is surprising when it is remembered that the Americans have paid many visits to London to study the B.B.C. methods with the idea of avoiding some of the pitfalls which the initiation of a service brings in its train. It is much too early to attempt to judge the value of the different picture standards which the Americans have chosen when compared to the B.B.C. ones. From the British point of view this is far more important than anything relating to programme presentation, for it may have a bearing on the standards to be adopted for the new stations when they eventually make their appearance in England.

READ "THE CYCLIST"
2d. Every Wednesday.



QUERIES and ENQUIRIES

Resistance Rating

"Kindly advise re the following: If a mains set specifies a $\frac{1}{2}$ -watt resistor and 1 watt is used, what is the effect in the set? Also, why in some battery sets 1 watt is used and yet in mains sets $\frac{1}{2}$ watt are used. Also kindly advise as to firm supplying a good rotary radiogram switch."—S. J. P. (Enfield).

WATTAGE is the unit of power, and it is power which is required to drive the current through a resistance. The formula for calculating the power rating of the resistor (or in other words the wattage) is current squared times the resistance. Thus, 10 milliamps flowing through 10,000 ohms resistance would give $.01 \times .01 \times 10,000$ (current being expressed in amps.). The answer is 1 watt. Another way of arriving at the wattage is to calculate the voltage drop across the resistance (by multiplying the current in amps. by the resistance) and then multiplying that voltage by the current. Thus you will see that each resistance has to be considered alone, irrespective of whether it is in a battery or a mains set. You can use resistances with higher ratings—and this is desirable—but not with smaller ratings. If a 1-watt resistance is needed and you use a $\frac{1}{2}$ -watt component, it will probably be damaged or destroyed due to the heat which would be generated. Messrs. Bulgin can supply the switch you require.

Crystal Filter

"I have noted once or twice lately, especially in your communications sets reviews, reference to a crystal filter or gate. I am a newcomer to radio and should be glad if you could tell me just what this is and what function it performs in a receiver. Can it be fitted to any set?"—C. T. S. (Glossop).

THE arrangement in question is a selectivity aid included in the I.F. stages of a superhet. It is usually placed in the second I.F. stage, and is a special circuit comprising the secondary of an I.F. transformer, special variable condenser and a crystal. This has the same frequency as the intermediate frequency used in the receiver, and there are various circuit arrangements possible. They differ according to the I.F. which is used. The arrangement provides very high selectivity, and is sometimes known as a Single Signal arrangement. It may be fitted to any superhet, but at the moment it is not possible to purchase a complete crystal unit for inclusion in a receiver, although the separate parts may be obtained.

Band-spreading

"In looking through a number of elaborate superhet circuits, I note that there are apparently several methods of obtaining band-spread tuning. The usual is to use a parallel condenser of small capacity, but I see that the coil may also be tapped and a portion only of the coil tuned by the band-spreader. Is there any advantage attrib-

able to any particular scheme, and what do you recommend for best results?"—L. C. (Cheltenham Spa).

THE most direct scheme is the parallel condenser. To use the tapped method you must first tap the coils, and if these are commercial models the tapping may not be easy to carry out. So far as actual results are concerned, there is very little difference, and we prefer the parallel condenser in view of the fact that the coils may be used without alteration, and if a good slow-motion dial is fitted to the band-spreader, the tuning is quite effective even on the 10-metre band.

Field Strength Meter

"Can you recommend a circuit for a field strength meter which is not only easy to

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
 - (2) Suggest alterations or modifications of receivers described in our contemporaries.
 - (3) Suggest alterations or modifications to commercial receivers.
 - (4) Answer queries over the telephone.
 - (5) Grant interviews to querists.
- A stamped addressed envelope must be enclosed for the reply. All sketches and drawings, which are sent to us should bear the name and address of the sender. Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

build up but also reliable and simple to use? I should like this to add to my amateur station, as I hope to get my full licence soon."—L. R. W. (W.3).

THE most effective arrangement is a single-valve detector stage with a milliammeter in the anode circuit. The valve should preferably be arranged as a linear rectifier, with a short rod or length of wire to provide pick-up. A small variable condenser in this lead will enable the amount of pick-up to be controlled. The H.T., G.B., etc., should be adjusted to bring the valve to cut-off, and the application of the signal will then result in an increase in anode current. You could draw up a scale of currents, but this is not usually necessary, and the meter is merely used as a comparator. The instrument must, of course, be entirely screened so that the only pick-up is via the short aerial lead.

NOW READY!

WORKSHOP CALCULATIONS, TABLES AND FORMULÆ

By F. J. GAMM

3/6, by post 3/10, from George Newnes, Ltd., Tower House, Southampton St., London, W.C.2.

Colour Codes

"I have some resistances which have rings of colour round them, but no dots as mentioned in your list of colour codes which was published some time ago. Can you tell me whether these are standard colours or whether they follow some different scheme?"—J. G. (N.W.5).

IN some cases, instead of colouring the body of the resistor, its tip and marking with a dot, three rings of colour are placed on it. In other cases, the body is coloured, but two rings of colour are then made to indicate the tip and the usual dot. The outer ring is the tip in this case. Where there are three rings the body colour is generally much wider, and the next two rings are read in the order, tip and dot.

Abbreviations

"In one of your articles on transmitting there is a reference to an E.C.O. and a T.P.T.G. I am not familiar with these references, and should be glad if you could tell me what they stand for."—P. D. (Waterfall, Co. Cork).

THE E.C.O. is an electron-coupled oscillator, and T.P.T.G. stands for tuned plate, tuned grid. The E.C.O. is, briefly, the arrangement where the cathode of the valve is taken to a tapping on the grid coil. The T.P.T.G. circuit is, as its name implies, a transmitter circuit where the plate and the grid circuit are both provided with coils and variable condensers so that they may be tuned. The valve oscillates when grid and plate circuits are tuned to the same frequency, due to coupling through the valve capacity.

Hurricane All-Wave Three

"I should like to build a receiver which, whilst it would be suitable for use as a broadcast receiver, could also be adapted for use as a short-waver. This seems to me to indicate that I must use plug-in coils. I do not like the all-wave tuner, as this is limited to its wave ranges. Is there a receiver in your lists which would be suitable for the purpose above-mentioned? I should like, if possible, to have an H.F. stage, and do not mind separate tuning circuits."—J. B. A. (Kenton).

THE Hurricane All-Wave Three should meet your requirements. This utilises B.T.S. One-shot plug-in coils, and the valve combination is S.G., detector and pentode output stage. The detector is also a pentode. The receiver may, of course, be used to cover all wavelengths with the aid of the plug-in coils. The blueprint is No. PW.89, and the receiver was described in our issue dated 30.4.38.

Vibrators

"I note that many car radios use a vibrating unit for the supply of H.T. Have you described how these work and where they may be obtained, as I wish to make up a receiver to use this type of supply? I have several good car accumulators standing idle which I could use."—S. S. W. (Barnsley).

WE described the vibrators in last week's issue, and no doubt this has given you the main information you require. Messrs. A. F. Bulgin, of Abbey Road, Barking, can supply various models for use in either home-made or commercial receivers, and also the necessary additional parts needed to make up an H.T. unit for the purpose.

The coupon on page iii of cover must be attached to every query

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS		No. of	SUPERHETS.	
Date of Issue.		Blueprint.		
CRYSTAL SETS.				
Blueprints, 6d. each.				
1937 Crystal Receiver	—	PW71	Battery Sets : Blueprints, 1s. each.	
The "Junior" Crystal Set	27.8.33	PW94	£5 Superhet (Three-valve)	5.6.37 PW40
STRAIGHT SETS. Battery Operated.				
One-valve : Blueprints, 1s. each.				
All-Wave Unipen (Pentode)	—	PW31A	F. J. Camm's 2-valve Superhet	13.7.35 PW52
Beginners' One-valver	19.2.33	PW85	F. J. Camm's "Vitesse" All-Wave (5-valver)	27.2.37 PW75
The "Pyramid" One-valver (HF Pen)	27.8.33	PW93	Mains Sets : Blueprints, 1s. each.	
Two-valve : Blueprints, 1s. each.			A.C. £5 Superhet (Three-valve)	— PW43
Four-range Super Mag Two (D, Pen)	—	PW36B	D.C. £5 Superhet (Three-valve)	1.12.34 PW42
The Signet Two (D & LF)	24.9.33	PW76	Universal £5 Superhet (Three-valve)	— PW44
Three-valve : Blueprints, 1s. each.			F. J. Camm's A.C. £4 Superhet 4	31.7.37 PW59
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2	F. J. Camm's Universal £4 Superhet 4	— PW60
Selectone Battery Three (D, 2 LF Trans)	—	PW10	"Qualitone" Universal Four	16.1.37 PW73
Sixty Shilling Three (D, 2 LF RC & Trans)	—	PW34A	Four-valve : Double-sided Blueprint, 1s. 6d.	
Leader Three (SG, D, Pow)	22.5.37	PW35	Push-Button 4, Battery Model	22.10.33 PW95
Summit Three (HF Pen, D, Pen)	—	PW37	SHORT-WAVE SETS.	
All Pentode Three (HF Pen, D Pen)	20.5.37	PW39	One-valve : Blueprint, 1s.	
Hall-Mark Three (SG, D, Pow)	12.6.37	PW41	Simple S.W. One-valver	9.4.33 PW88
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48	Two-valve : Blueprints, 1s. each.	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW40	Midget Short-wave Two (D, Pen)	— PW38A
Genet Midget (D, 2 LF Trans)	June '35	PM1	The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.33 PW91
Camco Midget Three (D, 2 LF Trans)	—	PW51	Three-valve : Blueprints, 1s. each.	
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	—	PW53	Experimenter's Short-wave Three (SG, D, Pow)	30.7.33 PW30A
Battery All-Wave Three (D, 2 LF RC)	—	PW55	The Prefect 3 (D, 2 LF (RC and Trans))	7.8.37 PW63
The Monitor (HF Pen, D, Pen)	—	PW61	The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.33 PW63
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62	PORTABLES.	
The Centaur Three (SG, D, P)	14.8.37	PW94	Three-valve : Blueprints, 1s. each.	
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69	F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	— PW65
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	18.2.39	PW72	Parvo Flyweight Midget Portable (SG, D, Pen)	3.6.39 PW77
The "Rapido" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW32	Four-valve : Blueprint, 1s.	
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	23.8.37	PW78	"Imp" Portable 4 (D, LF, LF (Pen))	19.3.33 PW86
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW84	MISCELLANEOUS.	
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.39	PW87	S.W. Converter-Adapter (1 valve)	— PW49A
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.33	PW80	AMATEUR WIRELESS AND WIRELESS MAGAZINE	
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.9.33	PW92	CRYSTAL SETS.	
Four-valve : Blueprints, 1s. each.			Blueprints, 6d. each.	
Sonotone Four (SG, D, LF, P)	1.5.37	PW4	Four-station Crystal Set	23.7.33 AW427
Fury Four (2 SG, D, Pen)	8.5.37	PW11	1934 Crystal Set	— AW444
Beta Universal Four (SG, D, LF, Cl. B)	—	PW17	150-mile Crystal Set	— AW450
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	—	PW34B	STRAIGHT SETS. Battery Operated.	
Fury Four Super (SG, SG, D, Pen)	—	PW34C	One-valve : Blueprint, 1s.	
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46	B.C.C. Special One-valver	— AW397
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	20.9.30	PW67	Two-valve : Blueprints, 1s. each.	
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	0.10.37	PW70	Melody Ranger Two (D, Trans)	— AW393
"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	12.2.33	PW83	Full-volume Two (SG dot, Pen)	— AW392
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.9.33	PW90	Lucerne Minor (D, Pen)	— AW428
Mains Operated.				
Two-valve : Blueprints, 1s. each.			A Modern Two-valver	— WM409
A.C. Twin (D (Pen), Pen)	—	PW18	Three-valve : Blueprints, 1s. each.	
A.C.-D.C. Two (SG, Pow)	—	PW31	Class B Three (D, Trans, Class B) Fan and Family Three (D, Trans, Class B)	25.11.33 AW410
Selectone A.C. Radiogram Two (D, Pow)	—	PW19	£5 5s. S.G.3 (SG, D, Trans)	2.12.33 AW412
Three-valve : Blueprints, 1s. each.			Lucerne Ranger (SG, D, Trans)	— AW422
Double-Diode-Triode Three (HF Pen, D, Pen)	—	PW23	£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34 AW435
A.C. Ace (SG, D, Pen)	—	PW25	Lucerne Straight Three (D, RC, Trans)	— AW437
A.C. Three (SG, D, Pen)	—	PW29	Transportable Three (SG, D, Pen)	— WM371
A.C. Leader (HF Pen, D, Pow)	7.1.39	PW35C	Simple-Tune Three (SG, D, Pen)	June '33 WM327
D.C. Premier (HF Pen, D, Pen)	—	PW35B	Economy-Pentode Three (SG, D, Pen)	Oct. '33 WM337
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A	"W.M." 1934 Standard Three (SG, D, Pen)	— WM351
Armada Mains Three (HF Pen, D, Pen)	—	PW33	£3 3s. Three (SG, D, Trans)	Mar. '34 WM354
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50	1935 £6 6s. Battery Three (SG, D, Pen)	— WM371
"All-Wave" A.C. Three (D, 2 LF (RC))	—	PW54	PTP Three (Pen, D, Pen)	— WM389
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	—	PW56	Certainty Three (SG, D, Pen)	— WM393
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70	Minute Three (SG, D, Trans)	Oct. '35 WM396
All-World Ace (HF Pen, D, Pen)	28.8.37	PW80	All-Wave Winning Three (SG, D, Pen)	— WM400
Four-valve : Blueprints, 1s. each.			Four-valve : Blueprints, 1s. 6d. each.	
A.C. Fury Four (SG, SG, D, Pen)	—	PW20	65s. Four (SG, D, RC, Trans)	— AW370
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D	2HF Four (2 SG, D, Pen)	— AW421
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45	Self-contained Four (SG, D, LF, Class B)	Aug. '33 WM331
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47	Lucerne Straight Four (SG, D, LF, Trans)	— WM350
A.C. All-Wave Corona Four	6.11.37	PW81	£5 5s. Battery Four (HF, D, 2 LF)	Feb. '35 WM381
			The H.K. Four (SG, SG, D, Pen)	Mar. '35 WM384
			The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	Apr. '36 WM401
			Five-valve : Blueprints, 1s. 6d. each.	
			Super-quality Five (2 HF, D, RC, Trans)	— WM320
			Class B Quadrydne (2 SG, D, LF, Class B)	— WM344
			New Class B Five (2 SG, D, LF, Class B)	— WM340

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Issues of Practical Wireless 4d. Post Paid.
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Practical Mechanics 7d.
Wireless Magazine 13d.

The Index letters which precede the Blueprint Number indicate the periodical in which the description appears: Thus P.W. refers to PRACTICAL WIRELESS, A.W. to Amateur Wireless, P.M. to Practical Mechanics, W.M. to Wireless Magazine.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Mains Operated.		Mains Operated.	
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Economy A.C. Two (D, Trans) A.C.	— WM286	Unicorn A.C.-D.C. Two (D, Pen)	— WM394
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Mantovani A.C. Three (HF Pen, D, Pen)	— WM374	£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '36 WM401
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Harris' Jubilee Radiogram (HF Pen, D, LF, P)	— May '35 WM388	SUPERHETS.	
Battery Sets : Blueprints, 1s. 6d. each.			
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The Request All-Waver	— June '36 WM407	1935 Super-Five Battery (Superhet)	— WM379
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Heptode Super Three A.C.	— May '34 WM359	"W.M." Radiogram Super A.C.	— WM366

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Four-valve : Blueprints, 1s. 6d. each.		One-valve : Blueprints, 1s. each.	
Holiday Portable (SG, D, LF, Class B)	— AW393	S.W. One-valver for America	15.10.33 AW429
Family Portable (HF, D, RC, Trans)	— AW447	Rome Short-waver	— AW452
Two H.F. Portable (2 SG, D, QP21)	— WM363	Two-valve : Blueprints, 1s. each.	
Tyers Portable (SG, D, 2 Trans)	— WM367	Ultra-short Battery Two (SG det, Pen)	Feb. '36 WM102
SHORT-WAVE SETS—Battery Operated.			
One-valve : Blueprints, 1s. each.		Home-made Coll Two (D, Pen)	— AW440
S.W. One-valver for America	15.10.33 AW429	Three-valve : Blueprints, 1s. each.	
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Ultra-short Battery Two (SG det, Pen)	Feb. '36 WM102	The Carrier Short-waver (SG, D, P)	July '35 WM390
Home-made Coll Two (D, Pen)	— AW440	Four-valve : Blueprints, 1s. 6d. each.	
Three-valve : Blueprints, 1s. each.		A.W. Short-wave World-beater (HF Pen, D, RC, Trans)	— AW436
World-ranger Short-wave 3 (D, RC, Trans)	— AW355	Empire Short-waver (SG, D, RC, Trans)	— WM313
Experimenter's 5-metre Sot (D, Trans, Super-regen)	30.6.34 AW433	Standard Four-valver Short-waver (SG, D, LF, P)	22-7-33 WM353
The Carrier Short-waver (SG, D, P)	July '35 WM390	Superhet : Blueprint, 1s. 6d.	
Four-valve : Blueprints, 1s. 6d. each.		Simplified Short-wave Super	Nov. '35 WM397
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Empire Short-waver (SG, D, RC, Trans)	— WM313	Two-valve : Blueprints, 1s. each.	
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Mains Operated.			
Two-valve : Blueprints, 1s. each.		Emigrator (SG, D, Pen) A.C.	— WM352
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MISCELLANEOUS.	
S.W. One-valve Converter (Price 6d.)	— AW329
Enthusiast's Power Amplifier (1/6)	— WM397
Listener's 5-watt A.C. Amplifier (1/6)	— WM392
Radio Unit (2v.) for WM392 (1/1)	Nov. '35 WM399
Harris Electrogram battery amplifier (1/-)	— WM390
De Luxe Concert A.C. Electrogram (1/-)	Mar. '36 WM403
New Style Short-wave Adapter	— WM389
Trickle Charger (6d.)	Jan. 5, '35 AW462
Short-wave Adapter (1/-)	— AW456
Superhet Converter (1/-)	— AW457
B.L.D.L.C. Short-wave Converter (1/-)	— May '36 WM405
Wilson Tone Master (1/-)	— June '36 WM406
The W.M. A.C. Short-wave Converter (1/-)	— WM403

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RECEIVERS, COMPONENTS AND ACCESSORIES
Surplus, Clearance or Secondhand, etc.

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Vauxhall.—All goods previously advertised are still available; send now for latest price list. —Vauxhall Utilities, 163a, Strand, W.C.2.

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REPAIRS in Moving Coil Speakers, Cones and Coils fitted and Rewound. Fields altered. Prices Quoted, including Eliminators. Loudspeakers repaired, 4/-; L.F. and Speech Transformers, 4/- post free. Trade invited. Guaranteed. Satisfaction, Prompt Service, Estimates Free.—L.S. Repair Service, 5, Balham Grove, London, S.W.12. Battersea 1321.

LOUDSPEAKER repairs, British, American, any make. 24-hour service, moderate prices.—Sinclair Speakers, Alma Grove, Copenhagen Street, London, N.1.

NEW LOUDSPEAKERS

3,000 SPEAKERS from 6/6 each, P.M. and energised 4in. to 14in., including several Epoch 18in.—Sinclair Speakers, Alma Grove, Copenhagen Street. N.1.

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BANKRUPT BARGAINS. Brand new 1938-9 models, makers' sealed cartons, with guarantees, at less 50% below listed prices. Also Portables and Car Radio. Send 1jd. stamp for lists.—Radio Bargains, Dept. A.W., 261-3, Lichfield Road, Aston, Birmingham.

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"**STAND-BY**" Crystal Set. Specified coil 2s., case 9d., or complete kit of parts 10s. 3d., post free.—T. W. Thompson and Co., 176, Greenwich High Road, S.E.10.

LITERARY

ALL Wireless and Radio Engineering books available through new financial terms as low as 2/6 monthly. Write a card or call personally for details and lists from the Radio Department, Phoenix, Chandos Place, W.C.2.

MISCELLANEOUS

THERE'S MONEY IN RADIO!—If you understand radio you can make substantial profits in spare time. For hints and ideas get **MONEY-MAKING MADE EASY**, by L. Harvey Wood. Available from all booksellers, 2/6 net, or by post, 2/10, from the Publisher, C. Arthur Pearson, Ltd., Tower House, Southampton Street, London, W.C.2.

PREMIER
★ **RADIO** ★
STOCKTAKING SALE

Huge Reduction in Prices of TRIAD U.S.A. VALVES
from 2/3 each!

Send for NEW Price List.

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SPECIAL OFFER U.S.A. MIDGET RECEIVERS, M.C. Speakers, 100-250 volts, A.C. or D.C., 4 valves, medium and long waves, 52/6. 5 valves, medium and long waves, £3/19/6.

POTENTIOMETERS WITH SWITCH, 1/2 meg., 1 meg., 20,000 ohms and 10,000 ohms, 1/3 each.

POTENTIOMETERS WITHOUT SWITCH, 2 meg., 1 meg., 1/2 meg., 400,000 ohms, 25,000 ohms, 20,000 ohms, 10,000 ohms, 1/- each.

SPECIAL OFFER — CONTINENTAL MAINS VALVES, 4v. AC Types, 5-pin only, AC/HL, AC/L, AC/P, AC/SG, AC/VMS, AC/HP, AC/VHP, 2/6 each.

20v. .18a AC/DC Types, SG, Var. Mu. SG, Power HP Pen., 2/- each.

U.S.A. Types, 24, 30, 41, 30/44, 35/51, 55, 50, 57, 58, 71, 77, 78, 85, 2A5, 2A6, 2A7, 2B7, 6A7, 12Z3, 210, 250, all 2 for 3/-.

TUBULAR CONDENSERS, .002, .0001, .0003 and .0005 mfd., 1/- doz. Your choice.

ELECTROLYTIC CONDENSERS Metal Can. 8 mfd. 320 volts, 2 for 1/6. 8+8 mf. 475 v.+10 mf. 50v., 2 for 2/6. 8+8 mf. 450v+8 mf. 250v. 2 for 2/6.

T.C.C. DRY ELECTROLYTICS. 8+8+4 mi. 500v., 2/- each.

MAINS TRANSFORMERS. Manufacturers' surplus, 250-250v. 60 ma., 4v. 2a., 13v. 1a., 3/6. **PREMIER Heavy Duty Class B Driver Transformers,** 5/- each.

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ROLA 8in. P.M. MOVING COIL SPEAKERS with output Transformer, 15/-

ROLA 10in. P.M., 19/11. CELESTION SOUNDEX, 6in., P.M., 10/6.

MAGNAVOX Mains Energised 8in. M.C. Speakers, 2,500 ohm field. With transformer, 9/11 each.

PREMIER SHORT-WAVE KITS

Complete to the last detail, including all Valves and coils, as well as theoretical and wiring diagrams and lucid instructions for building and working. Each kit is supplied with a steel Chassis and Panel and uses plug-in coils to tune from 13 to 170 metres.

1 Valve Short-Wave Receiver or Adapter Kit 17/6

1 Valve Short-Wave Superhet Converter Kit 20/-

1 Valve Short-Wave A.C. Superhet Converter Kit 22/6

2 Valve Short-Wave Receiver Kit 25/-

3 Valve Short-Wave Screen Grid and Pentode Kit 58/6

MORSE KEYS. Excellent brass movement on bakelite base, 2/9 each.

PREMIER SHORT-WAVE COILS, 4- and 6-pin types, 13-26, 22-47, 41-94, 78-170 metres, 4/9 each, with circuit. Special set of S.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 3-band S.W. coil, 11-25, 19-43, 38-86 metres. Suitable any type circuit, 2/6.

ULTRA S.W. COILS, 4-10 metres. Wound silver plated Wire. Mounted on Trolitul base. Inside diam. coils 1in., 3, 4, 5, 6, or 7 turns, complete with base, 1/- each.

UTILITY Micro Cursor Dials, Direct and 100.1 Ratios, 3/9.

PREMIER Short-Wave Condensers, all-brass construction, with Trolitul insulation. 15 mmf., 1/6; 25 mmf., 1/7; 40 mmf., 1/9; 100 mmf., 2/-; 160 mmf., 2/3; 250 mmf., 2/6.

TROLITUL, DOUBLE SPACED TRANSMITTING CONDENSERS, 15 mmf., 2/9; 40 mmf., 3/6; 100 mmf., 4/-; 160 mmf., 4/6.

COIL FORMERS, 4- or 6-pin low-loss 1/- each.

Orders 5/- and over sent Post Free. Under 5/- please add 6d. Postage.

Have you had our 1939 Catalogue, Handbook and Valve Manual? 90 pages of Price 6d. Radio Bargains and Interesting Data.

ALL POST ORDERS TO: Jubilee Works, 167, Lower Clapton Road, London, E.5. Amherst 4723.
CALLERS TO: Jubilee Works, or our NEW PREMISES, 169, FLEET STREET, E.C.4. Central 2833.
or 50, High Street, Clapham, S.W.4. Maccaulay 2381.

"**THE OUTLINE OF WIRELESS,**" by Ralph Stranger. Fifth Edition, 8s. 6d.—This book which covers the subject from A to Z, is to be recommended to all who desire to master the theory of Modern Wireless. At all Booksellers and Newsagents, or by post 9s. from George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, Strand, London, W.C.2.

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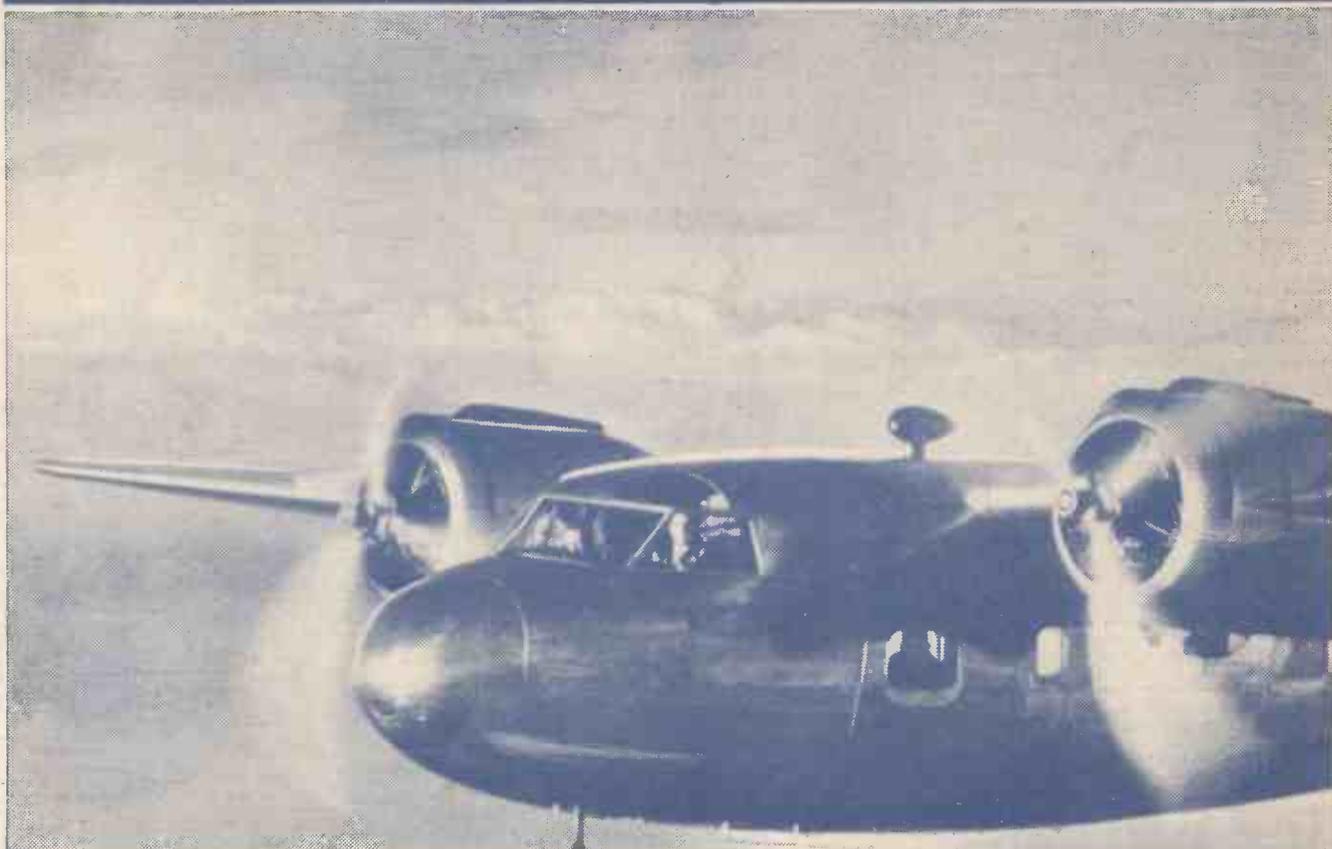
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