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ANTI-STATIC AERIAL UNIT

Practical Wireless

9D

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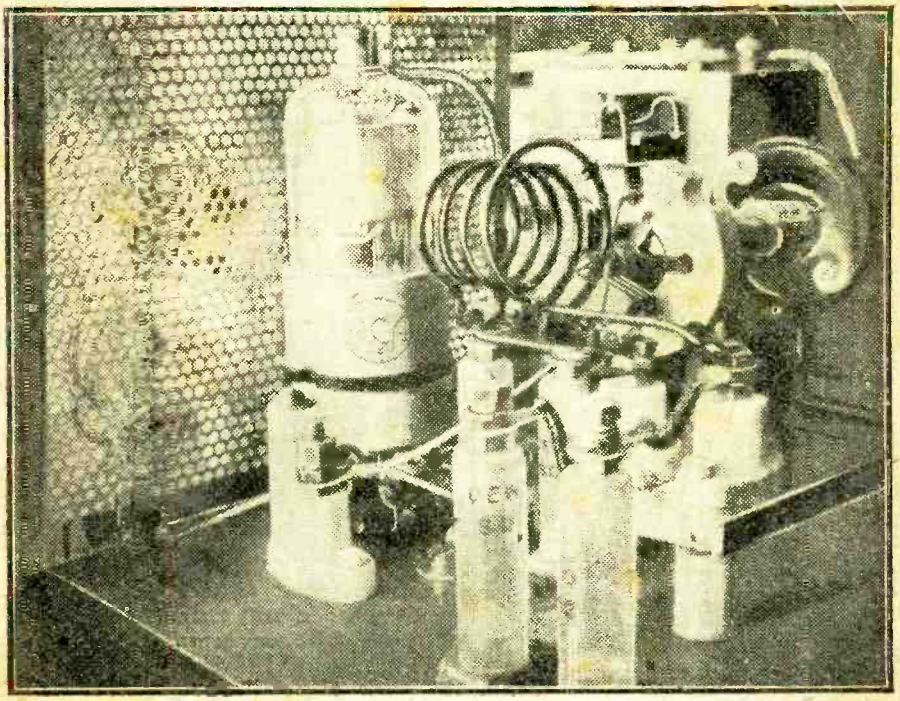

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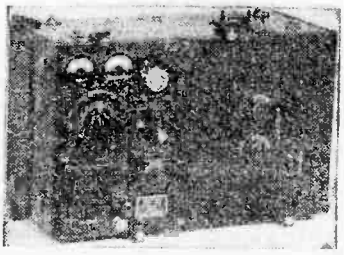

Transmitter-receiver for short waves 40 metres. Provision for crystal control. Uses standard headphones and microphones. Battery operated, requiring standard 120 volts h.t. and 2 volts l.t. Includes 9 valves standard English types. Six valves in receiver and three in transmitter. Circuit Rx, 2RF., Det., 2 Audio and Power. Tx, Osc. PA and modulator.

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Practical Wireless and PRACTICAL TELEVISION
16th YEAR OF ISSUE
EVERY MONTH
VOL. XXIV. No. 502. MAY, 1948.
Editor F.J.CAMM

COMMENTS OF THE MONTH — BY THE EDITOR

The Cost of Servicing

MUCH has been written in the daily and weekly newspapers on the subject of the unsatisfactory state of the radio retail trade as it applies to servicing, for most retailers also undertake service work. One of our contributors last month summarised the general complaints, and we can add to that our own experiences, as well as those of the many readers who have written to us on the subject.

There can be no doubt that there are many radio retailers who regard servicing as a means of extortion, relying upon the ignorance of the vast section of the radio public in order to impose exorbitant and quite unwarrantable charges for minor repairs, for imaginary work, and for fictitious replacements.

Very naturally the honest dealer is incensed at the unwelcome publicity which has been accorded his profession, for it may lead the public to believe that all radio engineers are tarred with the same brush. We know that there are many honest service engineers who charge reasonably, and we also know that there are large numbers of people of a suspicious nature who always think, however reasonable the charge, that they are being robbed. Sometimes, they endeavour to justify their claim that they have been overcharged by going to another dealer and asking how much he would charge to perform the same work. Thus fortified in their views, they will go back to the dealer who performed the work and accuse him of dishonesty, forgetful of the fact that the dealers may be bitter enemies or very keen rivals.

But as our contributor pointed out, the service engineer may be thoroughly qualified and yet be dishonest. It is not always the quack service engineer who robs the public. To most people a wireless receiver, like a watch, is a black box of mystery. The watch-repairing trade has achieved an unenviable reputation for just that sharp practice now adopted in the radio trade. In saying this we readily agree that there are honest traders, and that it is only the malcontents from whom one usually hears. At the same time, the volume of complaints is such that we are entitled to conclude that sharp practice is in existence at a higher level than in other trades.

One dealer who wrote to us the other day put the other point of view. He dealt with the case of a customer whose set had lost efficiency, and as he was a keen music lover he wanted it brought back to concert pitch. This necessitated checking up the working voltages throughout the set, comparing the readings of all components with the manufacturers' service sheet, replacing a number of parts which were sub-standard, rewiring, and carrying out the normal work of cleaning up and adjusting.

A workman was occupied on the task for over six hours, and this included retrimming the condensers. The set was demonstrated to the customer, who expressed himself as thoroughly satisfied. He was presented with the bill for 24s., representing payment for six hours' work, overheads, and new parts. Seven days later, however, the same customer returned with the receiver, which had again lost quality of reproduction, and charged the dealer with having been extortionate and not having carried out the work which had been paid for. He said that he had had the receiver examined by an "expert," who told him that nothing had been done to it. Further examination showed that the receiver had been tampered with since it left the dealer's hands, and when this fault was rectified under the eye of the customer he went away mollified.

It is possible that a number of complaints printed in the newspapers emanate from those who have not given the dealer a chance to justify his charges, but we do not think very many of them come within that category. All costs have risen within the last five years, and in certain cases the ugly head of purchase tax rears itself. The dealer cannot be blamed for that. Unfortunately there is a section of the public which thinks that its labours should be rewarded with higher wages, whilst the work of others should remain static.

It must be remembered that a dealer has to pay more for his components, more for his labour, more for his electric light, and pay higher rates. Little wonder, therefore, that servicing costs are going up.

F.J.C.

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The Editor will be pleased to consider articles of a practical nature suitable for publication in "Practical 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 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.

ROUND THE WORLD OF WIRELESS

Interference-free Tyres

TO improve radio reception on motor cars, Fort Dunlop is at present experimenting with a new tyre, developed from one used by the R.A.F. during the war, which removes the static electricity generated by the movement between tyre tread and road surface.

Dr. Morris Reed

DR. MORRIS REED, Ph.D., M.Sc., M.I.E.E., has been appointed Chief Radio Engineer of Philips' Mitcham works. Dr. Reed will be in charge there of all engineering activities relating to radio and television receivers and allied apparatus.

After graduating from the City and Guilds College in 1926, with 1st class honours B.Sc. in engineering, he spent three years with the International Standard Electric Corporation, as telephone engineer. From 1929 to 1946, Dr. Reed was with Siemens Brothers and during his 17 years with that company, he occupied, in succession, the positions of Head of the Wireless Laboratory, Chief Radio Engineer and Assistant to Chief Engineer, Telecommunications Department.

Longest Phototelegraph Service in the World : U.K.-N.Z. in 15 Minutes

PHOTOTELEGRAPH service was recently inaugurated between Cable and Wireless, Ltd., in London and the New Zealand Administration in Wellington.

The new service operates over the longest distance phototelegraph circuit in the world. Pictures are automatically relayed via Colombo, and travel more than 18,000 miles by wireless. A picture measuring up to 60 sq. inches is received in 10 to 15 minutes.

Empire rates are charged: £5 for a picture measuring up to 24 sq. inches, and proportionately for larger sizes up to 90 sq. inches. Photographs, letters, documents, diagrams, machine drawings and even cheques may be transmitted by phototelegraphy.

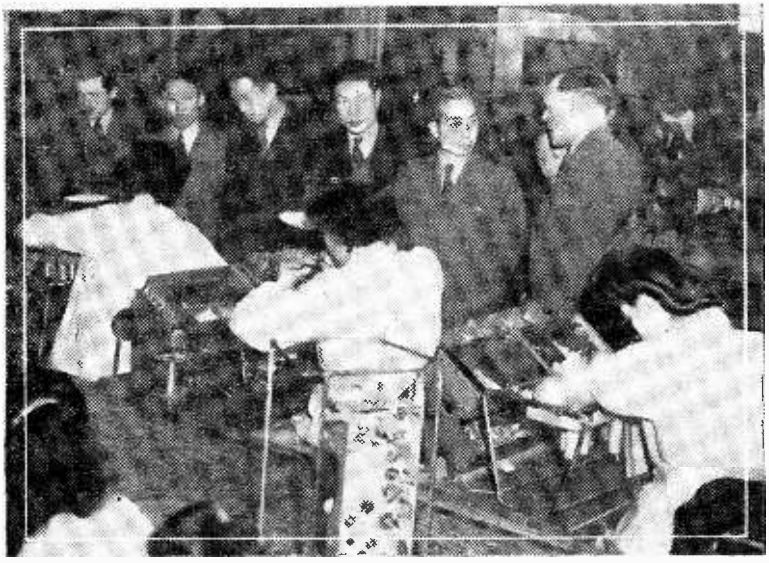
Philco Radio

MR. K. H. YANDELL, formerly in charge of the Operations Planning Department of Airmec, Ltd., has now been appointed Assistant Secretary and Accountant of Philco Radio and Television Corporation of Great Britain, Ltd., and of Airmec International Sales, Ltd.

British Sound Recording Association

THE lecture on "High Quality Disc Recording" by W. S. Barrell, B.Sc., was, owing to the special nature of the demonstrations and exhibits, held at E.M.I. Studios.

A further lecture on "Loudspeakers, with particular reference to High Fidelity Monitoring Reproducers," was given by D. E. L. Shorter (B.B.C. Research Dept.) at the Royal Society of Arts.



A party of five Chinese students recently visited the Philips factory at Mitcham. They are seen above in the radio assembly shop. Note the useful chassis cradles to facilitate handling of the chassis.

Radio and Tel. Chairman Visits America

MR. LAURENCE D. BENNETT, Chairman of Radio and Television Trust, Ltd., is now in the United States. In addition to visiting the Philco Corporation, Philadelphia, Mr. Bennett will also be examining the export possibilities in America for other products of the Radio Tel Group which includes in addition to British Philco, Airmec, Airmec International Sales, Ltd., Airmec Laboratories, Ltd., The Britannic Electric Cable and Construction Co., Ltd., British Mechanical Productions, Ltd., The General Access Co., Ltd., and the Hopkinson Motor and Electric Co., Ltd., as associated companies or wholly owned subsidiaries.

Just the Job

QUITE a few enthusiasts who combine the hobby of radio with cycling have built themselves radio sets for use on a cycle, with varying degrees of success. Now, however, experimental work is in progress by an American firm on a miniature radio which is only about three inches square. The tiniest of valves are used, and the circuit, instead of being wired, is printed in a metallic substance on an insulating background. This set can be clipped to the cycle handlebars, or even to the rider's wrist, and it is claimed that it will transmit and receive on the short waves and receive normal broadcasts. These sets would be just the thing for enabling riders to keep in touch at all times except, of course, for one snag—the cost of the sets.

FM Stations on the Air

THE number of FM stations on the air giving service in the U.S.A. is 300. Additional construction permits have been issued for 670, with conditional grants for 250 more. Nearly 150 applications are pending. Thus total FM stations in all stages now number above 1,300. In comparison, AM licences and construction permits now total nearly 1,900, up one-third from a year ago.

Broadcast Receiving Licences

THE following statement shows the approximate number of licences issued during the year ended 31st January, 1948.

Region	*Numbers*
London Postal	2,100,000
Home Counties	1,466,000
Midland	1,595,000
North Eastern	1,729,000
North Western	1,462,000
South Western	961,000
Welsh and Border ..	644,000
Total England and Wales ..	9,957,000
Scotland	1,059,000
Northern Ireland	180,000
GRAND TOTAL	11,196,000

This number includes 39,000 television licences. This represents an increase of 6300 over the previous month—the largest monthly increase ever recorded.

Prosecutions in January for operating wireless receiving apparatus without a licence numbered 278.

Ceylon Police Get Radio-telephone

THE General Electric Co., Ltd., has recently completed yet another of its many export orders for tele-communication equipment. In this instance, it is the Ceylon Police Force who have been equipped with eight mobile transmitter-receiver units for their police cars and one 100-watt F.M., V.H.F. fixed station transmitter-receiver with remote control gear. The "Simplex" method of operation is provided.

Civil Air Safety

AN Air Traffic Control Centre was the contribution of the Ministry of Civil Aviation (Scottish Division) to the Scientific Engineering and Fuel Efficiency Exhibition held at Glasgow recently.

For the first time in Scotland, the public were taken behind the scenes of the Air Traffic Control services provided by the Ministry to ensure safe and regular flying by air-line, charter and private-owner pilots flying anywhere over the United Kingdom.

The stand at Kelvin Hall was in direct touch with Approach Control at Renfrew, Aerodrome Control in the Tower at Prestwick Airport, and Trans-atlantic Aircraft Control at Redbrae, which controls all aircraft on the transatlantic routes flying to and from any part of the United Kingdom. Air Traffic Control Officers were heard holding two-way conversations over the radio-telephone with pilots of airliners on the last stages of their journey across the North Atlantic.

Plug-in Unit Receivers

FOLLOWING a recently published account of an American idea using plug-in units for receiver construction to simplify servicing, we understand that an English company are shortly to commence manufacture of receivers on similar lines.

A close-up of the G.E.C. paraboloid aerial and mobile television laboratory used in recent television link field trials.

Switched-coil Short-wave Converter

With High-sensitivity and Low-noise Content. By C. SUMMERFORD

IN the July, 1947, issue of PRACTICAL WIRELESS an article appeared entitled "A Quality S.W. Superhet Unit," in which details were given of an efficient and original short-wave receiver.

Judging by the amount of correspondence I received from readers, this design aroused more than a little interest. Although most of the letters were appreciative, many contained suggestions for modifications or improvements, and quite a few asked for a separate converter unit having certain circuit refinements incorporated in the above-mentioned receiver. After "boiling down" these suggestions the following list emerged:

(1) For a separate converter based on the "Quality S.W. Super."
(2) As above, but incorporating stabilised power pack.
(3) As (1) and (2), but with switched separate coils.
(4) For a switched-coil arrangement for use in the "Quality S.W. Super."
(5) To use ex-Service equipment where possible.

Every effort has been made to meet all of these requirements in the circuit about to be described.

The Circuit

With the exception of the switched-coils and one or two smaller modifications, the circuit, as will be seen by reference to Fig. 1, closely resembles the early part of "The Quality S.W. Super.," while the stabilised power pack (Fig. 2) is a smaller version of that described for "The Ten-watt Quality Amplifier" (PRACTICAL WIRELESS, April, 1947).

Although there are several turret coil assemblies on the market, it was decided that although some of these are very efficient, the cost would be too high for the average constructor. In view of this, the coils chosen are the well-known "Wearite" P type which may be purchased at 3s. each.

As four each are needed for the radio-frequency and oscillator tuned-circuits, the total coil cost will be 24s.

A 3-bank, 2-pole, 4-way switch will be required but, as this may be obtained ex-W.D. at 2s. 6d., this does not add much to the cost.

The four padding condensers will cost a further 2s. 6d. so that the entire cost of the R.F. and oscillator tuned-circuits with the exception of the tuning condensers will be 29s.

Coil L6 in the mixer anode circuit is also a "Wearite" P type—PO1, actually—and this is tuned by a .0003-μF variable condenser to a frequency of about 600 kc/s.

With an intermediate frequency of 600 kc/s, the tuning coils as given in the list of components will tune over (in metres): Range 1, 9 to 20; range 2, 12 to 30; range 3, 24 to 60; range 4, 75 to 150, approximately.

As 3-bank, 2-pole, 6-way wave-change switches are also available at 2s. 6d., readers may like to

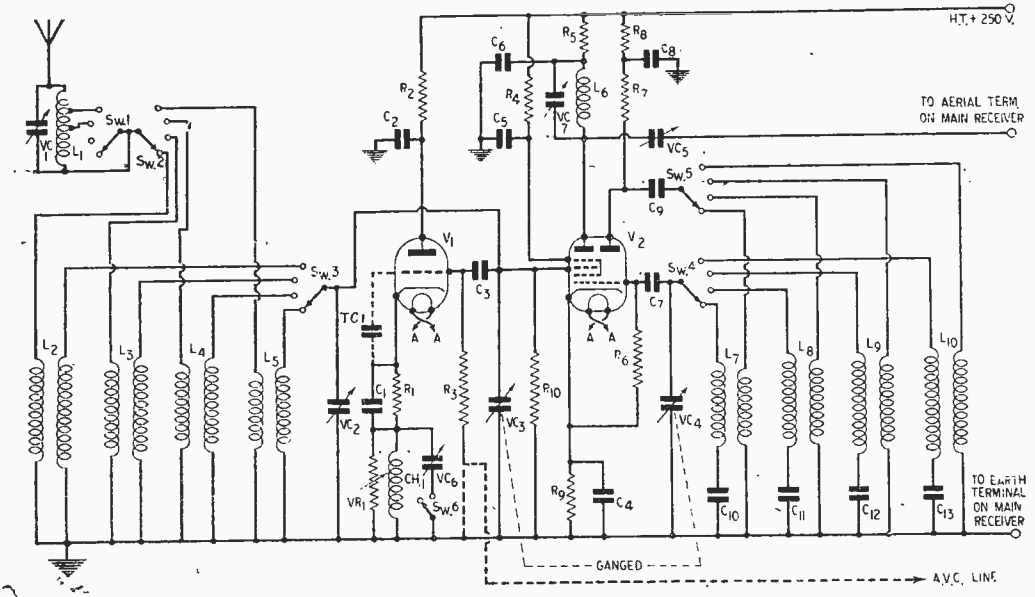


Fig. 1.—Theoretical circuit of the converter unit.

incorporate these in place of those specified, using the extra contacts for switching-in further coils so that the range may be extended into the medium-wave band. If this is done "Wearite" coils PA2, PA7 and PO2, PO7 should be used; extra padding condensers will, of course, be necessary.

Although not absolutely essential, it is an advantage to mount the coil L6 and condenser VC7 in a screening-can. The condenser, which may be a small mica variable, should be secured to the top of the screening-can in such a way as to be completely insulated from it. It is a good plan to use a rubber grommet for this purpose.

To facilitate ease of wiring between coil and condenser it is best to use flexible wire. An ordinary knob may be used for adjusting the condenser.

approximately 16 mA; therefore, at first glance, a power pack to supply 16 mA at 250 volts would seem to meet the situation. This is not so because, besides the current taken by the converter unit, a minimum of 5 mA is required by the stabilisers N1, N2, and this brings the current drain up to 21 mA. However, instead of building a power pack to supply the *minimum* requirements it is better to build one to have a surplus. If it is then built as a separate unit it may be used for energising other pieces of apparatus. It is interesting to note that the junction between the two stabilisers is 125 volts positive relative to earth, and is, therefore, just right for supplying H.T. to battery receivers, including the class B type.

As 300 volt 60 mA. mains transformers are

LIST OF COMPONENTS (Fig. 1)

L1 50 space turns on 1¼in. former, tapped at 15 and 4 turn.
L2 "Wearite" PA4.
L3 ,, PA3.
L4 ,, PA5.
L5 ,, PA6.
L6 ,, PO1.
L7 ,, PO4.
L8 ,, PO3.
L9 ,, PO5.
L10 ,, PO6.
Ch.1 Standard s.w. choke.
VC1 .0002 μF variable condenser.
VC2 .00002 μF variable condenser with slow-motion drive.
VC3 and VC4 .00016 μF var. condenser (ganged) with wide-vision dial and slow-motion drive.
VC5 .0001 μF var. condenser.
VC6 .00016 μF var. condenser.
VC7 .0003 μF var. condenser (midget mica).
C1, C2, 4, C5, C6, C8 .01 μF mica condensers.
C3 .00005 μF mica condensers.
C7 .0001 μF ,, ,,
C9 .001 μF ,, ,,
C10 .005 μF ,, ,,
C11 .005 μF ,, ,,
C12 .002 μF ,, ,,
C13 .0008 μF ,, ,,
VR1 10,000 ohms carbon type potentiometer.
R1 1,000 ohms ½ watt resistor.
R2, 5, 8 5,000 ohms ½ watt resistor.
R3 .25 megohm ½ watt resistor.
R4, 7 40,000 ohms ½ watt resistor.
R6 100,000 ohms ½ watt resistor.
R9 350 ohms ½ watt resistor.
R10 .25 megohm ½ watt resistor.
TC1 30 μμF midget trimmer.
Sw.1, 2, 3, 4, 5 3-bank, 2-pole, 4-way wave-change switch.
Sw.6 Single-pole On-Off toggle switch.
V1 6C5G.
V2 6K8G.

The aerial wave-trap coil has been slightly modified since the original one was described; total turns are the same, but tappings are now made at 4 and 15 turns instead of 6 and 20. Incidentally, it may be necessary to short out this coil completely on the longer wave ranges—it depends a lot on the size of aerial used.

In "The Quality S.W. Super," article it was suggested that a further variable resistor should be wired in in series with the existing variable resistor to provide adequate R.F. regeneration above 80 metres. In this circuit a different arrangement is used; the frequency of resonance is lowered by the addition of a shunt variable condenser which is switched into circuit as required.

The condenser TC1, included to re-inforce the grid-cathode capacity of V1, may or may not be necessary—the probability is that it will—and this takes the form of a 30 μμF postage-stamp type trimmer.

Power Pack

If really smooth R.F. regeneration is to be obtained it is a virtual necessity that the high-tension supply to the unit shall be very stable, otherwise maximum sensitivity will not be possible. Therefore, a power pack based on that in the "Ten-watt Quality Amplifier" is used, as has been mentioned earlier in this article.

The total H.T. current required by the unit is

easily obtainable, one of these has been chosen. Two 15 Henry L.F. chokes and 32 μF of capacity, plus the condenser-like effect of the stabilisers, ensures a rock-steady, well-smoothed supply. The two condensers, C16 and C17, are inserted as a guard against modulation-hum and are very necessary. A four-pin plug and socket is used to connect the two units.

Connection and Operation

Many readers will know how to connect the converter to the main receiver, but for the sake of those who do not, the following details are given.

The earth connection on the converter must be connected to the earth terminal on the main receiver, and the aerial transferred to the aerial terminal on the converter; the output lead from the converter should then be connected to the aerial terminal on the main receiver. The latter should now be tuned to about 600 kc/s (500 metres) and the tuned circuit L6-VC7 in the converter adjusted to a similar frequency. Condenser VC5 should be adjusted to give the required amount of selectivity, and everything is then ready for operation.

When using the unit for the first time, it is better to select either ranges 2 or 3 to accustom one's self to the feel of things. These ranges are bound to be fairly lively at any time of the day; consequently, it will be much easier to carry out initial adjustments.

To tune, first move the main dial until a signal is heard, then swing the variable aerial trimmer (VC2), at the same time gently increasing the value of regeneration control VR1. A point should finally be reached at which the circuit is just on the verge of oscillation. Failure to reach this point will imply that the cathode-grid capacity of V1 is too low, and the remedy is to fit TC1 and increase its value until things are in order. Although not shown in the circuit diagram, a very simple switching arrangement may be used between converter and main receiver. It entails the use of a single-pole change-over switch, and is explained by Fig. 3.

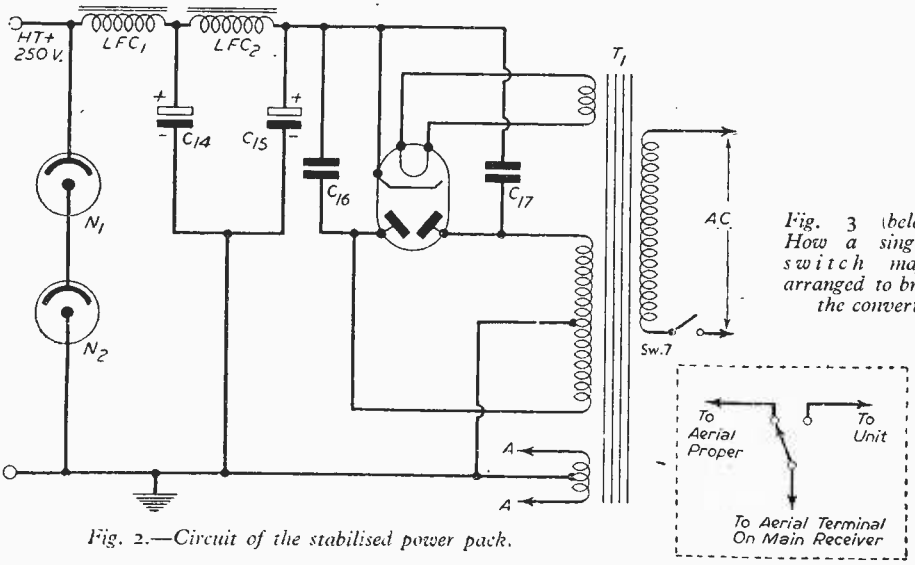


Fig. 2.—Circuit of the stabilised power pack.

Fig. 3 (below).—How a single-pole switch may be arranged to bring in the converter.

LIST OF COMPONENTS

T1 200-250-volt primary, 300-0-300-volt 60 mA, 5 volt 2 amp., 6.3 volt 2-3 amp. secondaries mains transformer.

LFC1, LFC2. Each 15 Henry 90 mA., 240 ohm smoothing choke.

C14 16 μF 500 volt electric condenser.
C15 8 μF 500 volt electric condenser.
C16, 17 .01 μF 1,000 volt working condenser.
N1, N2 Cossor S130 stabilisers.
Sw.7 Single-pole On-Off toggle switch.
Rectifier : 5Z4.

For Use in Complete Receiver

Those who wish to incorporate the circuit of Fig. 1 as part of a single receiver may do so by making the following small alterations.

(1) A 465 kc/s I.F. transformer must be substituted for the tuned-anode circuit L6-VC7.

(2) The padding condensers C12 and C13 will need to be increased to .0024 μF and .0009 μF respectively.

(3) VC5 will not be needed—the transformer secondary will take its place.

(4) The grid return of V1 may be taken to the A.V.C. line with advantageous results.

Using ex-W.D. Valves

Readers who wish to use ex-W.D. valves may like to know the service equivalents of those used in the apparatus. Here they are :

6C5G = { NR.78 / VT.65A / VT.94 / VR.67 } = near equivalent.

6U8G = { VT.167 / VT.167A } = ditto

5Z4G = VT.74

S130 = CV.45

B.B.C. Year Book, 1948

MARCH 8th, 1948, saw the publication of the twenty-first B.B.C. Year Book to be produced by the Corporation, thus celebrating a double majority—its own coming of age and the Silver Jubilee of the B.B.C.

This time the Year Book contains 17 leading articles with W. E. Williams, to begin with, setting himself the unenviable task of selecting the six best broadcasters of 1947.

The shorter articles in the Year Book which, as usual, is lavishly illustrated, cover the year's broadcasting in the three Home programmes, review the work of the Television Service, Engineering, the Overseas, Monitoring and European Services, and report on last year's Radiolympia.

The Year Book for 1948 costs 2s. 6d. (by post 2s. 10d.), and may be obtained through any newsagent or bookseller or, in case of difficulty, direct from the B.B.C. Publications Department, The Grammar School, Searle Road, Wembley, Middlesex.

Test Instrument Design–5

This Month, Equipment for V.H.F. Work is Dealt With.

By P. E. TOOKE

TEST apparatus for V.H.F. work consists mostly of "experimental rigs" built for the job in hand and nothing else. The reason being, starting from the low end and working up into the V.H.F. ranges, the test gear available from commercial sources gets less and less.

Signal generators using acorn valves and special H.F. circuits can be obtained up to 240 Mc/s or higher, but that is about all.

As nearly all gear for V.H.F. work is wanted for frequency checks, I propose to explain a few circuits of the most common in use. First, the resonant

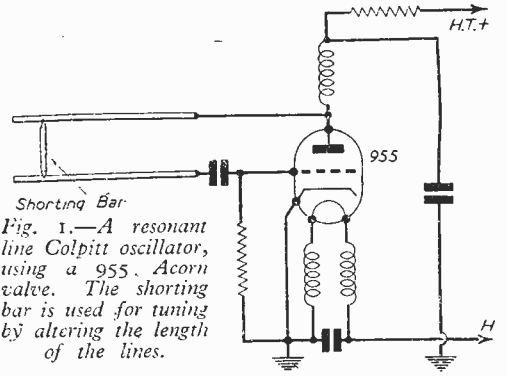


Fig. 1.—A resonant line Colpitt oscillator, using a 955 Acorn valve. The shorting bar is used for tuning by altering the length of the lines.

line type of wavemeter. This is, perhaps, the simplest of all, and comprises two rods generally approximately quarter wavelength of the frequency to be checked. At one end a sensitive meter or galvo. is connected in series with the ends of the rods. The meter is normally arranged to slide with contacts along the rods, so altering their effective length.

If the rods are held near the oscillator under test and the lengths adjusted until the meter peaks, the length of rod is then quarter wavelength of the oscillator. It is simplicity itself and can be made with wires stretched across suitable insulating material if longer wavelengths are desired.

There are two ways of obtaining stable oscillators at H.F. ranges; one, by frequency doubling from a crystal oscillator or other stable type and the other, not quite so good, using a resonant line as a tuned circuit. There are numerous types of resonant line circuits and generally they are most effective, as using a "line" gives a much higher "Q" than a coil wound for the same frequency.

A Colpitts Circuit

Fig. 1 shows a Colpitts "resonant line" circuit for frequencies up to 500 mc/s, using an acorn tube. Tuning is accomplished by a shorting bar across the lines. Such a circuit is very tricky to build, as the positioning of the wires is very important.

Chokes for the frequency being generated are put in the heater leads, straight on to the valve pin. All condensers used are of very small capacity and of the ceramic "cup" type.

The "lines" themselves are best made out of copper tubing, silver plated. At these frequencies the "skin effect" comes into being, so the greatest possible use should be made of surfacing and plating. The chassis, for instance, should be copper and silver plated. If silver plating is too expensive, cadmium will do, but the chassis and screening cans ought to be made from copper sheet.

There are not really many tips one can give on this type of circuit as each one built has its own problems. To give some idea of the nature of these: I was once working with an oscillator which, on checking with a resonant line wavemeter, appeared not to be working. After arranging the circuit several times with no improvement I found that the oscillator was working all the time, but a pair of pliers left on the bench was absorbing all the radiation, as the length of the "legs" of these was exactly quarter wavelength of the oscillator frequency. Of course this is a rare case, but it just shows that even with the greatest care being taken you can be led astray quite easily at these frequencies.

I mentioned previously that by doubling on the frequency of a crystal oscillator you can get a V.H.F. frequency of the same stability as the fundamental.

If a high-frequency crystal is obtained, say, at about 20 Mc/s, it can be doubled to give 40 and then again to give 80 and so on. The only limitation which stops you carrying this on indefinitely is the strength of oscillations, and the instability of having a lot of tuned circuits, each one tuned to the harmonic of the other, in close proximity to each other.

If a strong output is obtainable it is quite possible to pick out the second or third harmonic at the first stage, thereby cutting out one or two stages of doubling. To "double" a frequency the plate of the oscillator should be tuned to the first harmonic of the fundamental. The doubling stage should have a small gain, and its grid tuned to the same frequency as the oscillator plate circuit. If a further stage is required the circuit is just the same, the plate

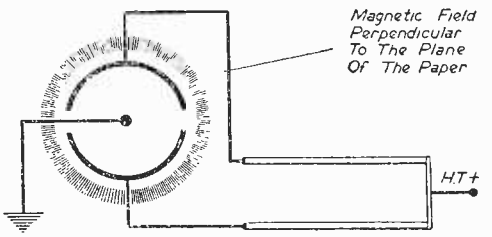


Fig. 2.—The Magnetron oscillator. A split-anode Magnetron circuit using resonant lines.

of the first stage tuned to the next harmonic, and the final tuned to the frequency desired.

By "doubling," frequencies are obtained which are not strictly in the H.F. ranges, but if care is taken, stage by stage, it is quite possible to get a very stable wave at quite a high frequency.

The Magnetron

Although the "Magnetron" tube is rather out of reach of the general amateur, I rather think that it is worth mention here, as it is the only practical way of producing centimetre wavelengths. The Magnetron consists of a filament surrounded by two semi-cylindrical anodes: this is the split anode type. Around the bulb itself is wound a coil so placed that the magnetic field generated is parallel to the filament.

The action of the Magnetron in an oscillatory circuit (Fig. 2) is that when the magnetic field is greater than the value required to prevent the electrons in the tube from reaching the anodes, the electrons follow a curved path and thus cause electron oscillations with a frequency determined by the time taken by the electron in its flight.

The efficiency of this type of electron oscillator is rather low, as is its output, but the frequencies obtainable compensate for this in many ways.

As I said at the beginning of this article, test gear for V.H.F. really relies on the ingenuity of the person wanting it, and as each circuit has its own problems there is not much to say for any set scheme of construction.

The only advice which can be given is: Use common sense and the best materials, and don't be surprised at any phenomena which crop up.

(To be continued.)

Antistatic Aerial Unit

A Novel Device Using the Cathode Follower Circuit.

By C. W. HAGE

THE neighbourhood in which I live is electrically very noisy and several types of commercial antistatic aerials have been tried with varying success. Normal faults were: high cost; loss of signal strength, often severe; variable efficiency on different wavelengths. As a result of this experience a few experiments succeeded in evolving the circuit which is given in this article. It is not claimed to be original—many cathode follower circuits quite similar have appeared before, but not so far as I know for just this purpose. The advantages claimed for it are: relatively low cost (30s. to £2 according to parts needing purchasing), high efficiency, wavelength as desired (as given 20-2,000 metres). Aerial length is not important but should be as high as possible, and a unit at set end is not necessary.

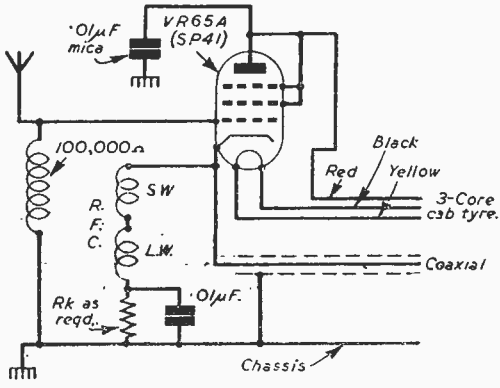


Fig. 2.—Theoretical Circuit of the aerial portion of the unit described here.

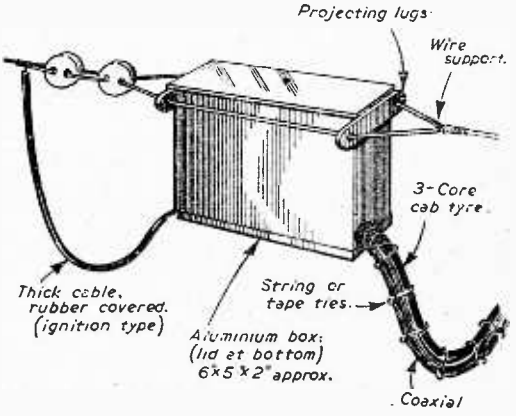


Fig. 1.—The completed Antistatic Aerial Unit shown mounted on the aerial.

Circuit

The circuit uses a Mazda SP41 (easily obtainable as ex-R.A.F. VR65A), connected as a triode (screen grid and suppressor grid to anode). The end of the aerial wire is taken direct to the grid (top cap). A low value of grid-leak (100,000Ω) is used to minimise risk of static voltage build-up on the aerial. The whole of the output load of the valve is in its cathode lead, and must fulfil two conditions: it must be aperiodic over the tuning range required, but must have a total resistance of 190Ω to give correct bias to the valve. To give a wide range a good S.W. choke and a good M. and L.W. choke are used in series. If of too low a resistance an additional resistor of correct value must be used to make up to this

value (190Ω) and *must* be bypassed by a .01 μF. mica condenser. The anode bypass to chassis is also a .01 μF. mica condenser. With 200 v. H.T., 4 v. heater (0.95A), anode current was approximately 10 mA. and bias 1.9 volts approx. At this rating the matching resistance across load is approximately 125Ω. Ordinary (ex-Government) a 3-core thick rubber-covered "cabtyre" type, carrying the necessary heater and H.T. current. H.T. voltage drop along the cable is unimportant, but as the heater current is 0.95 amp. it is necessary to feed it from a 6.3 v. source at set, using a small 2-3Ω variable resistance adjusted after erection to give correct current flow of 0.95 amps. (using A.C. meter) or, less satisfactory, to give an anode current of 10 mA. approximately. As this may vary from valve to valve, ascertain the value of heater current at 4 v. and anode current of unit before erection, and adjust to these afterwards. Other adjustments are small. The two matching condensers at set end of coaxial cable need to be adjusted as necessary. The 50-100 μμF. condenser is essential to avoid risk of shorting cathode circuit of valve to D.C. (and therefore no bias) if set has D.C. continuity between aerial and earth terminals. The other condenser, 300-500 μμF., may not be required. If set has large primary type of aerial transformer, occasionally met with, omit this condenser and increase small condenser experimentally until value is reached where trimming of aerial circuit is affected, then reduce slightly.

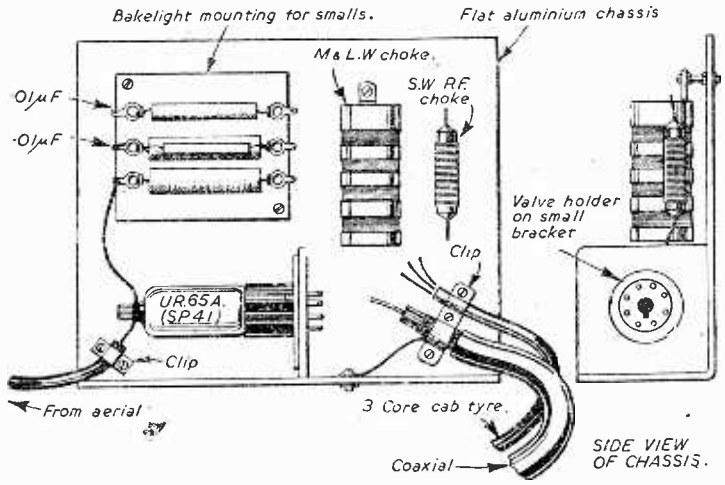


Fig. 3.—Layout of the component and an indication of the wiring of the aerial unit.

coaxial cable is connected across this load to take signals down to set. As this is, of course, screened (and screen is earthed at set end), pick-up on the down lead should be nil. Although the impedance of coaxial is taken as 60-80Ω the mismatch is small enough to be unimportant for reception purposes.

The Unit

This is mounted at the end of the aerial, takes signals direct from it and in effect acts as a transformer, stepping down from the high impedance of the aerial to the low impedance of the coaxial cable but with little or no loss of aerial voltage. From the unit down to the set inside the house run two cables, one, the coaxial feeder, the other

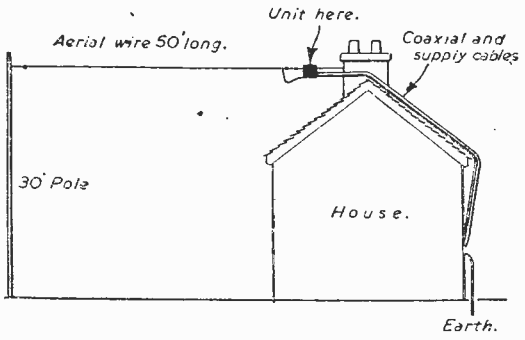


Fig. 5.—Diagram illustrating the complete Antistatic aerial layout.

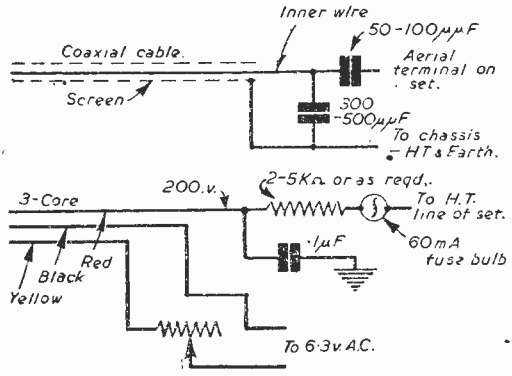


Fig. 4.—Circuit of the "house end" of the unit.

Reliability

As regards reliability, this unit has been in use nearly two years and still works O.K. It has not been necessary to dismantle for overhaul as yet, in spite of last year's terrible winter. Under heavy icing conditions the unit still continued to work. It is best, however, to make sure that the aluminium box in which unit is installed is watertight. The one actually used was an old ex-Government battery box used upside down, lid at base. Cables are taken in from underneath to minimise rain seepage and edges of lid and box were covered with waterproof tape.

1-valve Short-wave Receiver

An Unconventional Design for Phone Reception.

By R. L. GRAPER

NO extravagant claims are made as to results obtained by the receiver about to be described; in fact, the circuit used is quite a conventional one, and one from which excellent and stable reception can be generally looked for. It is, in fact, a simple detector with the throttle system of reaction. However, several

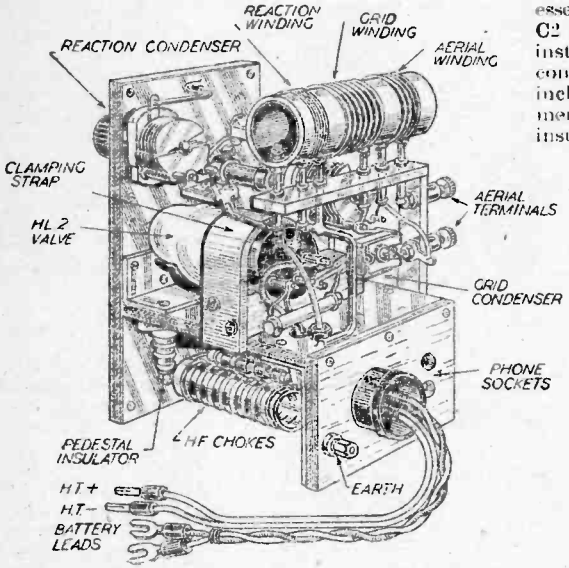


Fig. 1.—A general view of the completed receiver.

points have been taken into consideration in arranging the layout, and the resultant reduction in H.F. losses has tended to make this little receiver perhaps more efficient than some of the more conventional arrangements. The circuit is shown in Fig. 2 and a general view of the layout is shown in Fig. 1.

One of the main features is, of course, the mounting of the valve itself on a wooden block, and the soldering of the connections direct to the valve pins. The 1in. wide strap, used to fix the valve in position, is seen screwed to the side of the block. Another item is the specially made Perspex platform for the 6-pin coil. This has been so positioned that the connecting wires from its sockets are in most cases under ½in. long. Two of these sockets (which are from an old valveholder) are, in fact, soldered direct—one to an aerial terminal and another to a robust earth wire. This latter is thick gauge stuff, about ¼in. diameter, and extends from the rear of the front panel, to which it is soldered, to the rear of the baseboard. The coil platform was found by this method to be sufficiently firm to dispense with a support on the left-hand side. However, this might be added, of course, quite easily, and could be identical with the terminal strip on the right.

Mounting Details

The main tuning condenser has also been mounted on a Perspex strip, secured to the valve block by two screws. This tuning condenser has also been fitted with a 1½in. extension spindle. This is not essential, and in this circuit the small condenser C2 might be connected to the fixed vanes of C1, instead of to the moving ones, when this latter condenser could be directly earthed. However, its inclusion is useful in the event of possible experiments with super-regenerative systems. The insulation of the reaction condenser might then also be necessary according to the circuit used. Both these condensers, C1 and C4, are small trimmer type variables having capacities approximately of .0001 and .00005 μF respectively. The two series condensers C2 and C3 reduce these values appreciably. Other types can be used if they fit comfortably in the space available. It will be found that on the very high frequencies, the tuning and reaction may be too sharp. These two condensers should then be unscrewed to minimum capacity. C5 also acts as an H.T. safeguard should the vanes of condenser C4 short.

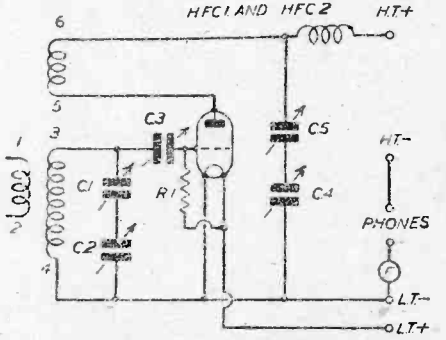


Fig. 2.—Theoretical circuit of the short-wave receiver.

Battery Connections

Connections to the accumulator and H.T. are made through a 4-pin plug, and for this the author made use of an old valve base. A chassis type 4-pin valveholder, screwed on the inside of the back chassis support, serves to make the necessary four connections from plug to set. The four clearance holes for the plug insertion can be seen in Fig. 4. A further two sockets (also part of an old valveholder) serve for phone connections. The hole on the left in Fig. 4 is for the earth terminal, which can go through the brass angle bracket or be connected thereto. No switch has been fitted,

the plug being merely pulled out to switch off. A L.T. switch could, of course, be easily fitted to the panel if desired.

Wiring

This can be clearly seen in the four views of Fig. 4. Note the main earth rod support, and the well insulated as it is connected via chokes to the H.T.+. The moving vanes of C4 may be soldered direct to the earth rod.

The two H.F. chokes are in series, and they are both mounted on pedestal insulators below chassis. The chokes may be home-made, using glass tubes and 40 s.w.g. enamelled wire. Both chokes have seven or eight sections of about 50 turns each section, the spacing of sections being about $\frac{1}{8}$in.

The construction of the chassis and the main supports is shown in Fig. 3. Much will depend upon the materials available, and although overall dimensions may be varied, it is advisable to keep to the heights for valve, coil platform, etc.

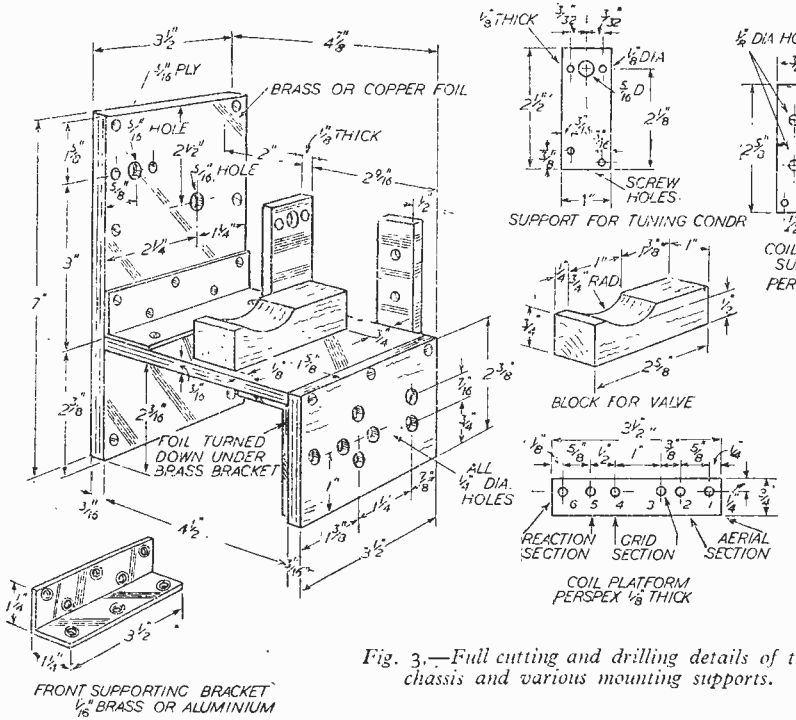


Fig. 3.—Full cutting and drilling details of the chassis and various mounting supports.

The Coil

This is seen in Fig. 5 and was home-made, has six pins and three separate windings. Accuracy in measuring and drilling both coil and platform is, of course, essential to give a nicely fitting coil. The pin centres were arrived at after some experiment with various windings for the three sections, and should be found about correct for spacing. The author used 22 s.w.g. enamelled wire for the windings, spacing one diameter of wire for both

very short connections to the grid and anode of the valve. In the under chassis view it will be noticed that the wire from the anode to the chokes passes through one of the fixing holes of the small insulating pillar. This is optional, but if fitted it should be

LIST OF COMPONENTS

C1. Variable tuning condenser. Trimmer type, on ceramic or porcelain base. Approx. .0001 μF. max.
C2. Series or padding cond. Pre-set type on ceramic base. 200 pF.
C3. Grid condenser. Pre-set type, ceramic base. 50/100 pF.
C4. Throttle reaction cond. Miniature trimmer type on ceramic base. Approx. 50 pF.
R1. Grid leak—4-7 megΩ
HFC1 and HFC2. Chokes. Eddystone No. 1,019, or home constructed on glass phials.
Chassis type valveholder, for battery plug.
One two-pin socket panel for phones.
One extension control spindle, 1½in.—Eddystone.
Two stand-off insulators for S.W. chokes.—Eddystone Cat. 1,019 or Cat. 916.
One fuseholder and fuse.
One valve—Osram HL2.
One tuning control knob, 2in. diam.
One reaction control knob, 1½in. diam.
Small sheet of Perspex, ⅛in. thick, size about 4½in. by 3in., for coil platform, aerial terminal panel and tuning condenser support.
1in or 1½in. paxolin tubes, 3½in. long for coils.
Split pins—Six for each coil.
Six sockets for coil platform.
3/16in. plywood or other suitable hardwood for chassis.
Brass or copper foil for chassis covering.
One piece stout sheet brass or aluminium, 3½in. by 2½in., for panel supporting bracket.
Small hardwood block, 2⅝in. by 1in. x ¾in., for valve support, and piece of 1in. strap.
8in. length of stout gauge copper or brass rod for earthed supporting rod (about 1in. diam.).
Three or four 1½in. by 1½in. brass angle brackets, and brass screws.
One earth terminal. Two aerial terminals.
20 s.w.g. tinned copper wire for connections and coils.
One old valve base, and flex for battery connector.

aerial and grid sections. The reaction winding was close wound. However, the winding of these coils is not difficult, and various gauges may be tried. The reaction winding goes in the opposite direction, but this is only because the anode of the valve was more conveniently situated for connection to pin five. If connected to pin six then the winding would go in the same direction as grid winding. The ends should be soldered to the pins.

The coil shown was found suitable for the 19-metre band.

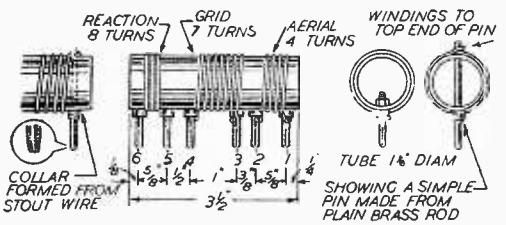


Fig. 5.—Full details of the coil unit.

However, as a basis for experiment the following might be tried, using 20 s.w.g. for the grid winding, with perhaps 24 s.w.g. for aerial and reaction windings. As the reaction is to be close wound, enamelled or silk-covered may be best.

Aerial winding	Grid winding	Reaction winding
3 turns	7 turns	6 turns
5 turns	10 turns	7/9 turns
7 turns	13 turns	12 turns

These three should cover a good range of frequencies. The last grid winding of 13 turns is about the limit that can be got on to the 1in. space, with spacing of one diameter of s.w.g., and if more turns are required then a lighter gauge of wire will be necessary. As the type of split pin shown is likely to be difficult to obtain these days, a simple substitute, made from plain brass rod, is illustrated. The rod must be of a suitable gauge, however, to give a tightish fit to the sockets on the coil platform.

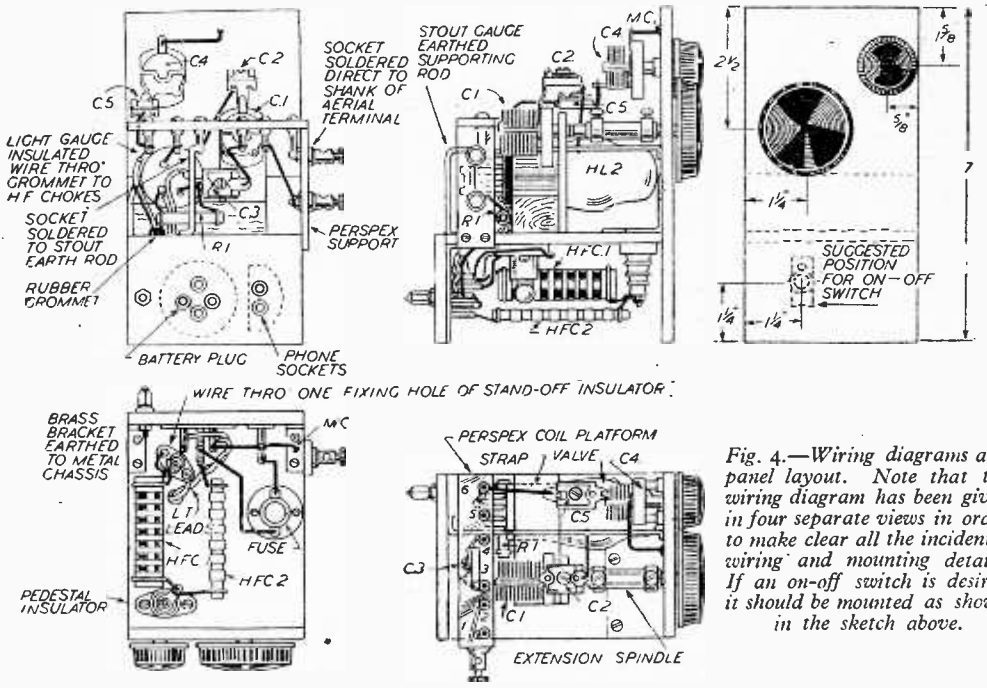


Fig. 4.—Wiring diagrams and panel layout. Note that the wiring diagram has been given in four separate views in order to make clear all the incidental wiring and mounting details. If an on-off switch is desired it should be mounted as shown in the sketch above.

Results

Results will depend to a large extent on the aerial used. The prototype gives quite good results on a small indoor dipole, each section being 6ft. long.

American stations have been received on this small aerial. Tuning is quite sharp, and a slow-motion drive would be advantageous, although careful tuning can be quickly acquired.

ON YOUR WAVELENGTH

By THERMION

Midget Radio

THERE has always been a fascination about the miniature, and I suppose that is one of the great attractions of model engineering.

During the past twenty years radio components and receivers have been produced in ever diminishing sizes, and a large number of satisfactory miniature receivers of battery and mains type are now available. We have described a fair number of miniatures in this journal. The problem of producing a genuine miniature battery-operated wireless set is almost insuperable, since the designer is tied by the size of the H.T. battery. Even with the all-dry portable where the accumulator is eliminated and the valve filaments are heated by means of a tapped-off section of the dry battery it will be noted that the size of the latter is almost that of the receiver itself.

There seems, therefore, little advantage in designing a really midget battery receiver, because if the set is designed to operate from a small size H.T. battery, either the latter must be of low voltage in order to retain sufficient ampere-hour capacity, or it must be made of a high voltage with a low ampere-hour capacity.

I therefore invite readers to send me details of any really satisfactory midget receivers which they have built, such receivers to be self-contained. I do not want details of a tiny receiver using enormous external H.T. cells and accumulators. The set must be portable and operable without an external aerial and earth.

The senders of those designs published will be paid for their work.

Death of "Torch"

IT is with deep regret that I have to record the death of my old colleague, "Torch," whose witty poems appeared for so many years at the foot of this page. "Torch" was the pen name of Mr. K. T. Hardman. He was 72 when he died of cardiac failure, following bronchitis of several weeks duration. He was the inventor some years ago of the "No-mast" aerial which has proved so popular and obviated the use of unsightly aerials and wireless poles. He was a contributor under his pen name to very many periodicals and his writings at times caused a great deal of controversy.

I shall miss the cynical touch which his verses provided. We often indulged in friendly but critical correspondence on a wide variety of topics.

Television Sets

AT the end of January, according to official statistics, 39,000 television receiving licences had been issued by the G.P.O. Thus, during January, 6,300 television receivers were in operation which were not so during December. At the end of January, too, the number of broadcast receiving licences in force was 11,195,800, and the number of prosecutions during January for operating sets without a licence was 278. On the other hand, in Australia over 250,000 people rushed to take out their £1 receiving licences after a Government announcement warning "free listeners" that action was to be taken.

Radiomobile Car Radio

I HAVE recently had installed on my car one of the new H.M.V. Radiomobile receivers, and I write in terms of high praise concerning it. The quality is superior to that of many receivers installed in the home, it has push-button tuning as well as manual control, and the installation is such that it is interference-free. It certainly cheers my travelling, and I can recommend it to any motorist who, like myself, is still enabled to use his car.

Servicing

APROPOS my recent notes on servicing rackets, I have received the following from a service engineer in Devon:

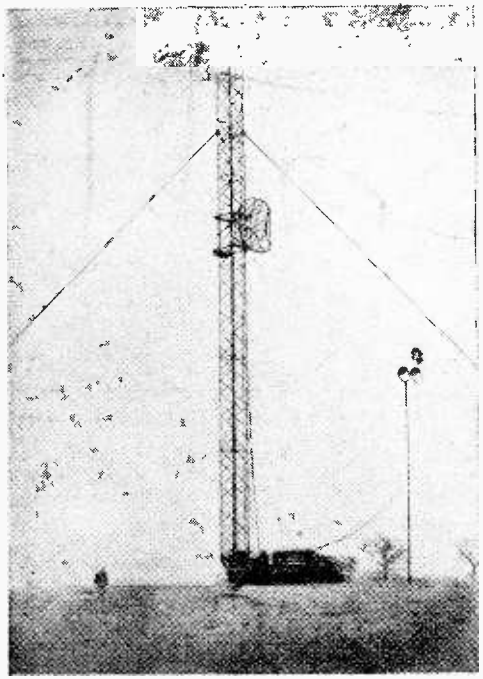
"First of all, may I say that my main object was to overcome the problem that all dealers face, perhaps, in the case of a repair being carried out which has necessitated replacing electrolytics and perhaps new rectifier. This has brought up the voltages throughout the set compared to what it has been working at. Other parts can be checked over in case the additional voltages have strained them, which would probably mean the set coming in again within a week or month or two or *only* those parts which are known to be faulty replaced. On the one hand you have the person who really values his set and would like it kept up to concert pitch with as little trouble as possible, and to fill this situation we have in operation our Class 'A' Repair. This covers the replacement of *all faulty* parts and the checking of *all* other parts in the set, and replacing any that vary from their original specifications by more than 25 per cent., in which case the set is returned to the customer in a state almost as good as new and the *whole* of the set is covered by a *three months* guarantee. This set can, at the same time, be covered by our all-in-maintenance offer, in which case we inspect the radio at regular intervals (not *less* than three) during the course of two years, and we undertake to replace any parts that might prove to be faulty, including valves, during the two years for the cost of approximately 8d. per week. The customer can request our calling if the set proves troublesome.

"The Class 'B' Repair covers the person who has perhaps a second set, or cannot afford a first-class repair. This offers only the replacement of any part fitted by us if it should prove to be faulty, but does not cover the replacement of any other parts which might prove to be faulty after a week or two."

Television Radio-relay Link

New G.E.C. Mobile Equipment Undergoing Field Trials

AN extensive series of field trials over the route of the London to Birmingham Television Radio-relay Link, which the G.E.C. is designing and supplying to the British Post Office, is now being carried out. Temporary masts, such



The temporary masts on which the paraboloid aerial can be raised or lowered. The smaller portable mast is used for contact between the two mobile laboratories.

as that illustrated above, have been erected on the sites selected for intermediate stations, and propagation tests are being conducted between them.

Each mast has been fitted with a suitable cradle to accommodate the special 14ft. diameter paraboloid aerial system, and the cradles are raised and lowered to investigate variations in receiver signal strength at different heights. The absence of multipath signals is also being confirmed by these trials, while studies of the signal strength stability and interference level at the various sites are being investigated. A close-up of one of the mobile installations is shown on page 181.

Mobile Laboratories

Two mobile laboratories, each equipped with C.W. and pulse transmitters for the appropriate frequency range, together with receivers, display systems and recorders, complete the equipment. The laboratories also contain signal generators, frequency meters and low- and high-power R.F. wattmeters, while each unit has its own mobile 240-volt A.C. 50 c/s power supply. An interesting feature of the system is that contact between the two mobile laboratories is maintained by decimetre-wave communications transmitters and receivers, the portable mast for which may be seen in the illustration on this page.

These trials are of particular importance in view of the present world-wide interest in radio-relay links, not only for television purposes, but also for such applications as multi-channel telephony. Such radio links would be of extreme value in countries where the terrain is difficult and the laying of cables virtually impossible. The information now being obtained will also be of special importance in the design of trunk radio systems for export to such countries.

The establishment of this pioneer development in Britain should show a long term benefit in this country's efforts to satisfy the communication needs of the export market.

Mercury Vapour Rectifiers

MEANS of mitigating the overburdened electricity supplies of the country are in great demand to-day and, since the change-over from direct to alternating current, due to the standardisation of the electricity supply to A.C., and the introduction of the grid, many consumers are faced with the problem of either adapting existing plant, or buying new equipment which is often very difficult and costly to obtain.

Of these two alternatives the easiest and quickest is adaptation and/or conversion, and to simplify conversion problems, Mercury Vapour Rectifiers are available, capable of providing a copious supply of steady, smoothed direct current. This rectifier can be used wherever a complex variability in drive speeds has to be catered for, and its installation is a simple and economical matter.

Mercury Vapour Rectifiers have been found invaluable where large banks of cells have to be charged or maintained.

For general industrial applications, the efficiency figure varies between 75 and 90 per cent., which depends on the uses to which the rectifier is put and the voltage used. Generally, it can be stated that the higher the voltage, the higher the efficiency. Specifically, for battery charging purposes, rectifier efficiency is between 60 and 70 per cent. which compares very favourably with motor generators and similar apparatus.

Circuit Switching

A Special Article for Beginners Showing How to Design Your Own Switching Schemes

By W. J. DELANEY (G2FMY)

THE beginner who examines the circuit of a commercial modern receiver for the first time is not a little impressed, and perhaps rather scared, by the very intricate switching arrangements which are generally employed. The circuits are usually drawn in such a way that the multitude of lines which run to the various switched sections render the circuit incomprehensible to the uninitiated, whereas they are actually quite simple and not difficult to design. In the very early days of radio the simple "push-pull" type of switch was practically the only type available, and consisted merely of a metal plunger which was drawn backwards or pushed forwards to bridge

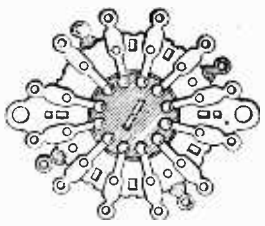


Fig. 1.—The arrangement adopted in one of the well-known British makes of multi-contact switch.

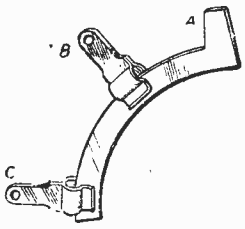


Fig. 2.—How the moving member picks up contacts successively.

two or more metal spring tips. Later, as sets of commercial coils became available, the makers included in the bases of the coils various ingenious switch assemblies in order to carry out the desired circuit switching. These generally consisted of a number of brass or copper fingers reaching across the underside of the coil base, and elaborate moulded or cut ebonite cams were rotated above the fingers by means of a rod extending through the coil unit. These cams depressed certain fingers and thus made connection, or released other fingers and opened circuits. In any case, there was no standardisation in the arrangements used. Shortly before the last war the wafer type of switch was seen in this country, imported from the U.S.A., and because of its particular trade name, known as the Yaxley, a name which is now generally used by many amateurs to refer to this particular type of switch irrespective of the individual make.

Wafer Switches

These switches have a multitude of uses and are available in dozens of different forms, from simple paxolin units with a single pole to multiple devices with ceramic bases suitable for use on very high frequencies. Before dealing with the working out of switching schemes let us examine this type of switch, for the benefit of those who have not yet attempted to delve into its apparent mysteries. In Fig. 1 is shown a single "wafer" as the individual units are called, and in Fig. 2 an indication of how they work. Of course, some makers have different ideas as to the mechanics of the unit, but the principle remains the same. As the central disc is rotated by the control spindle, a contact moves round to successive points, and this contact may be a segment of metal or an insert of metal which rubs against another disc or segment on the inner section. In Fig. 2 the moving part is lettered "A," and it will be seen that in its present position it is making contact with both B and C. Consequently, a connection could be taken to A, and this point in the circuit would then be taken successively from point B to C as the control was rotated. Alternatively, point B could be joined to point C or disconnected from it merely by turning the control knob. The former scheme could be illustrated as shown in Fig. 3, where two pre-set condensers are joined across a tuning coil, in one position the first trimmer being in circuit and when the switch is turned to position "C," both trimmers being connected in circuit. Actually, of course, for such a circuit one would use a single pole switch which would pass to successive points, leaving each one behind as it was advanced.

Nomenclature

These wafer types of switch are referred to as "so-many pole, so-many way" units, and each wafer is known as a "bank." A single inner contact which passes from one outside contact to another as it is rotated is a "single pole" unit. The inner disc may carry a number of such contacts and may thus be a double-pole, or even a 4-pole. The number of outer points to which it connects are known as the "ways": thus a single-pole 3-way would mean that there is a single contact point which makes successive contact with three outer points. A circuit illustrating the latter scheme is indicated at Fig. 4 which is part of a tone-control circuit, the anode of the valve being joined to one or other of the three resistors. Each of these wafers may be assembled on a length of rod to form any desired number of units, thus enabling one to make up, say, a 4-bank, double-pole 4-way switch unit, which means you have four separate double-pole switches each capable of

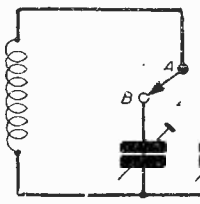


Fig. 3.—A simple circuit application of the multi-contact switch.

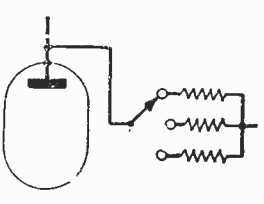


Fig. 4.—Another application of "stepped" or successive switching.

making four separate selections, and this could be shown theoretically by a diagram such as Fig. 5. In this illustration each wafer is shown more or less in its normal physical layout, but it could just as well be shown in a diagram as in Fig. 6.

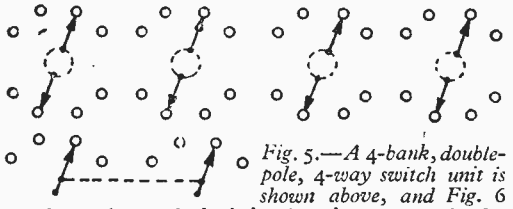


Fig. 5.—A 4-bank, double-pole, 4-way switch unit is shown above, and Fig. 6 an alternative method of showing the separate banks.

Designing a Circuit

The general idea should now be clear to the reader, and all that remains is to know how to work out what type of switch may be needed for any particular function. The simplest way of setting about this is as follows: Supposing one wishes to build an experimental amplifier in which the relative merits of transformer and R.C.C. units are to be judged. A rough sketch of the two schemes would be drawn as in Fig. 7. By using two colours for the separate circuits the scheme is easier to follow, but it is quite sufficient to draw

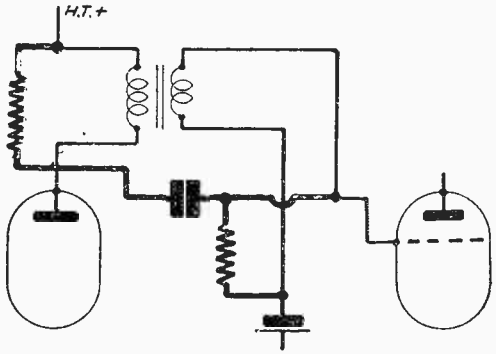


Fig. 7.—Diagram illustrating the changes necessary between L.F. transformer and resistance-capacity coupling, the latter indicated in heavy lines.

one part in heavy lines and one lightly, as shown, in order to follow out the idea. Now on examining this sketch it becomes obvious that some points need not be moved when making the change. For instance, the anode resistance and the transformer primary both have to go to H.T., and obviously if the lower end of either is not connected anywhere it can still be left joined to H.T. Similarly, the grid-bias battery shown could be left connected to the resistance and the transformer secondary without ill-effect for the same reason. It is necessary, however, to connect either the transformer secondary or the grid condenser and leak to the grid, and to connect the anode either to the transformer primary or the R.C.C. units. In its simplest form therefore, all that would be necessary would be a double-pole two-way switch, arranged as shown in Fig. 8. Actually, in practice, it might be found desirable to open the coupling condenser circuit. However, this gives an idea as to how simple it is to carry out most intricate circuit changes merely by operating a simple rotary switch. In my own receiver, which incorporates television, gramophone and radio, a simple three-bank ex-government switch is employed to give the Home or Light programmes, television or gramophone, in the latter position switching in a tone-compensated L.F. stage which is inoperative on the other circuits. For those who like working out switching schemes an interesting problem would be to work out how to arrange such a switch to make a set operative on batteries or mains, switching filament circuits to series or parallel, cutting out a mains-operated power output stage on battery, and using the first L.F. stage as output on battery operation, a scheme which is adopted in at least one American midget.

Novel Phototimer

IN a mass radiography apparatus, X-rays penetrate a patient and produce a visible image on a fluorescent screen which is photographed on a miniature film. Due to variations between patients it is sometimes difficult to estimate the exposure for a

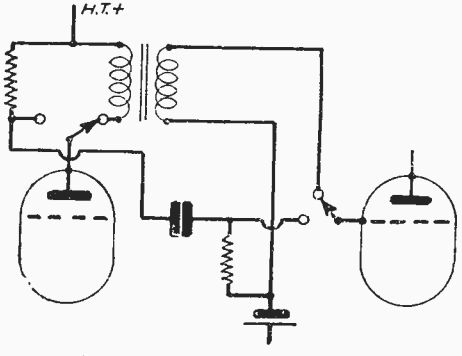


Fig. 8.—One method of carrying out the switching called for in Fig. 7.

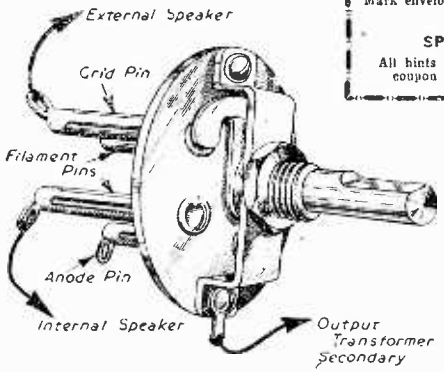
radiograph, and Philips have developed a phototimer designed to switch off the X-ray beam when the quantity of light which has fallen on the film has reached the correct exposure value. Light from a part of the fluorescent screen being photographed is focused by a lens on to the cathode of a multiplier photocell. The output current from the photocell discharges a condenser, and the condenser voltage, when it has fallen to a certain value, ignites a cold-cathode gas-triode valve, which in turn operates a relay which switches off the high-votage supply to the X-ray tube. The photocell output current is proportional to the incident light flux and hence the charge lost by the condenser, which is the time integral of the photocell current, and is proportional to the total quantity of light falling on the photocell. As the voltage drop of the condenser is constant, the light exposure of the photocell and film will also be constant.

Practical Hints

A Simple Extension Speaker Switch

THE simply-made switch shown below was mounted on the side of a receiver cabinet to give the choice of internal speaker only, internal and external speakers, or external speaker only, with a simple rotary movement.

The basis of the switch is a four-pin chassis-type valve-holder, of the type which has the sockets spun over the bakelite top plate, so that the moving arm makes good contact with the sockets.



Valveholder adapted for use as a switch.

The moving contact is of stiff brass, bent as shown, and soldered to the end of the spindle. It is long enough to make contact with two sockets at a time, so that at no time is the output transformer secondary open-circuited and the load removed from the output valve.

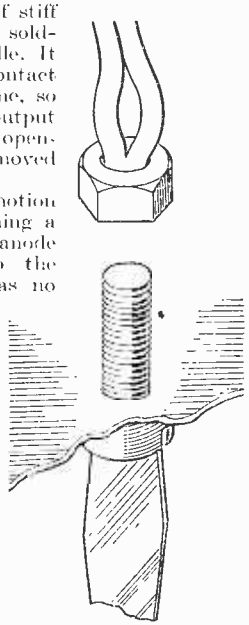
A stop for the rotary motion may be formed by punching a tight-fitting screw into the anode socket and another into the filament socket which has no connection taken from it.—H. J. R. TOWNSEND (Newport, Mon).

Fitting nuts in awkward places

THE following tip has helped me in the past and I pass it on in the hope that it may be of use to other readers.

Nuts must often go into positions in chassis which are very difficult to reach. Long-nosed pliers do not grip the nut tightly enough and also allow the nut to swivel so that it is impossible to run the nut on by giving the screw (which is often easily accessible) a few turns by means of a screwdriver. Tweezers fail in the same respects.

However, 4 and 6 B.A. nuts can be firmly held by twisting them on to a piece of 18 s.w.g. solder. The solder is bent in two as shown in the sketch and the nut turned on for a thread or two. In this way, the solder does not project through the nut, which can still go on to the screw.—A. MOUNTFORD (Norwich).



A useful idea for fitting nuts in awkward places.

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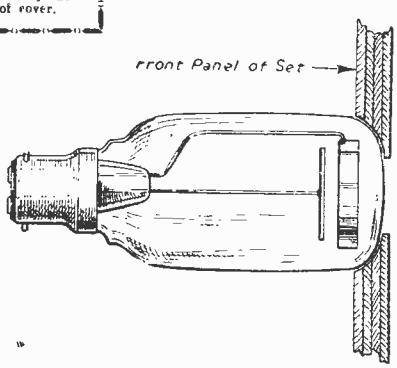


Using a Neon as a Polarity Indicator.

Polarity Indicator.

I HAD to devise a method to indicate whether my apparatus was connected to a D.C. supply with correct polarity or not.

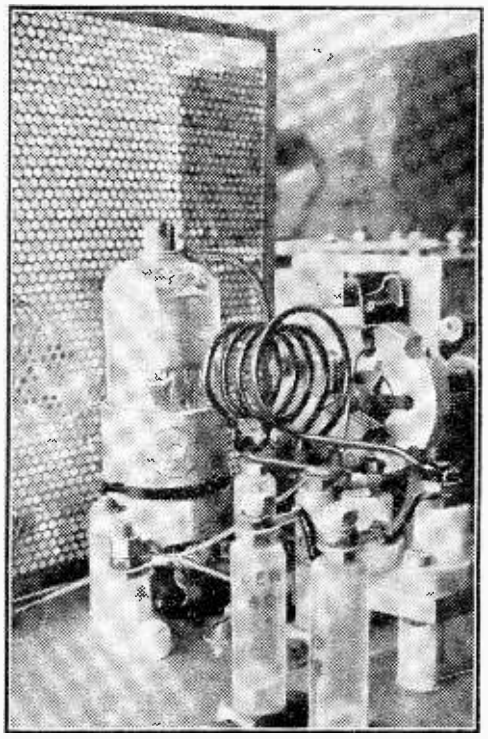
I used a 230 volt Neon bulb, with one electrode a circular disc and the other a narrow, cylindrical strip. I connected it directly across the mains input so that if the polarity was correct the circular disc was the electrode that glowed. I was using a plywood panel and drilled all but the front layer sufficiently for the glass bulb to fit, as shown.

The front layer was drilled only enough for the centre of the circular electrode to be seen.

When I then plugged in to different D.C. supplies I was able to see at a glance whether I had connected up the right way or not.—DONALD HUGHES (Merthyr Tydfil).

An Experimenta

A Novel Receiver for Battery Operatic



A view of the R.F. stage.

THIS receiver was designed mainly for those with some experience of short-wave receiver construction, but who had not previously attempted reception on frequencies above 30 Mc/s with battery-operated apparatus. The author's object was to provide himself with the necessary experience of the behaviour of circuits on V.H.F. and also of the peculiarities of wave propagation on these frequencies.

The valves being the most important part of any receiver, considerable thought was given to the choice of these, although, as special V.H.F. valves for battery circuits are practically unknown, it was necessary to use valves designed for normal purposes. Some of the more important requirements of a valve at V.H.F. are :

(1) Low lead inductance and small electrode assembly (midget construction) ;

(2) Small inter-electrode capacity ;

(3) Close spacing of electrodes (to minimise transit-time effects) ;

(4) High slope (for good amplification and signal-to-noise ratio).

All these are partially met in the 1.4 volt G.T. class of valve, and accordingly these valves were used.

The circuit can be employed as a straight 1-v-1 or 1-v-0 (for connection to an amplifier) or as a super-regenerative 1-v-0 or 1-v-1 (with self-quenching detector), or as a super-regenerative 1-v-0 (with separate quench valve). The last can also be connected to an amplifier, as for the straight 1-v-0. There is thus considerable scope for studying the performance of the various types of circuit.

The Circuit

The receiver circuit is shown in Fig. 1. Although the class of valves used is intended for operation from a 90-volt supply, the circuit has been designed for use on supplies up to about 135 volts, (e.g., from an eliminator) which gives improved performance. Circuit constants have been adjusted so that the valves do not pass excessive current. Commencing

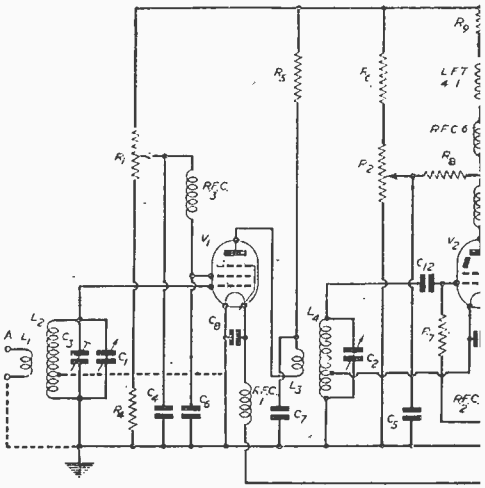


Fig. 1.—Theoretical circui

LIST OF CO

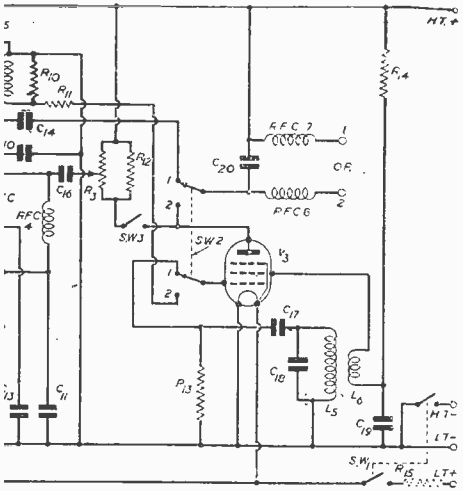
2 Ceramic variable condensers, midget type 20 pF. Cyldon (C1, C2).
1 Ceramic trimmer condenser, 40 or 60 pF. Eddystone (C3).
2 1μF. paper condensers (or 1+1μF. block), T.C.C. (C4, C5).
7 300 pF. mica condensers, T.C.C. or Dubilier (C6, 7, 8, 9, 10, 11, 20).
1 40pF. mica condenser (or ceramic), T.C.C. or Erie (C12).
1 0.001μF. mica condenser, T.C.C. or Dubilier (C13).
2 2μF. paper metal cased tubular condensers, T.C.C. (C14, C15).
1 0.005μF. paper condenser, T.C.C. (C16).
1 500pF. paper condenser, T.C.C. (C17).
1 0.002μF. paper condenser, T.C.C. (C18).
1 0.1μF. paper condenser, T.C.C. (C19).
Resistances, ½ watt, Erie : 2 47 kΩ (R4, R12) ; 1 22 kΩ (R8) ; 2 10 kΩ (R5, R6) ; 1 6,800 Ω (R9).
Resistances, ¼ watt, Erie : 1 47 kΩ (R13) ; 1 220 kΩ (R10) ; 1 5 mΩ (R7) ; 1 100 kΩ (R11).
Resistance R3 of 3 Ω, made from electric fire spiral.
Potentiometers : 2 100 kΩ (R1, R2), Centralab or Dubilier ; 1 250 kΩ with switch (R3), Centralab or Dubilier.
7 1½in. polystyrene pillar insulators with fixing feet, Denco SOI.2.
8 1in. frequentite stand-off insulators, Eddystone, No.1.619.

V.H.F. Receiver

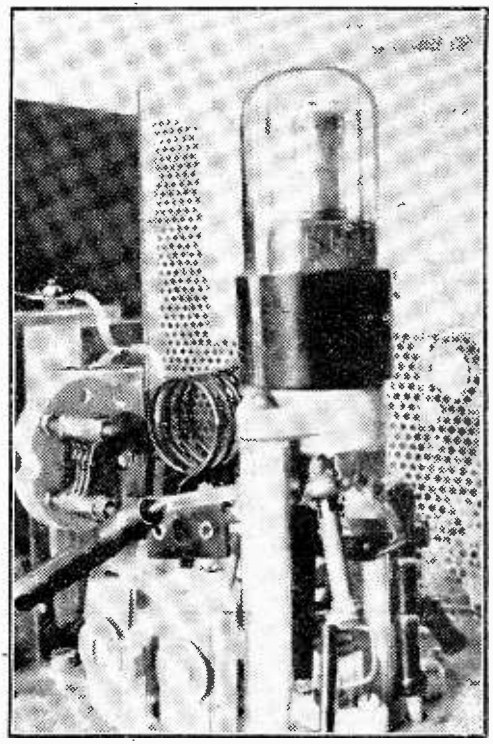
By G. ELLIOTT

with the R.F. stage, V1 is a 1N5GT G. The voltage drop across the decoupling resistor R5 will bring the anode voltage to about 100, and the screen voltage can be varied up to the maximum by the potentiometer R1. The best position for this control will be about three-quarters of maximum, and under these conditions the valve will have a better performance than at its rated voltages—the slope rising to about 1.2 mA./volt and the anode current being about 3 mA., which is not excessive.

The grid circuit makes provision for coupling to a dipole or end-on type of aerial. The filament choke RFC1 is included to enable experiments to be conducted on regenerative R.F. stages, where the filament can be tapped on to the grid coil, as shown by the dotted line. Regeneration is controlled by R1, but this type of circuit, while giving higher gain, is tricky to adjust, and in general the straight amplifier will be easier to handle. It will be noted that the filament circuits of both V1 and V2 are short-circuited by the condensers C8 and C9, to reduce the lead and filament inductance, which tends to impair performance on the higher frequencies of 60 Mc/s and above.



of the V.H.F. receiver.



A view of the detector stage.

The Detector Stage

H.F. transformer coupling is used from the R.F. to the detector stage. This stage uses the familiar electron-coupled circuit for regeneration, which is very satisfactory at V.H.F. V2 is a 1Q5GT/G, which is actually a beam-power amplifier, but in this circuit functions as a very sensitive detector and oscillates readily on high frequencies. Several valves were tried in the position of V2, such as 1N5, 1A5, 1C5, 1T5, but the 1Q5 was found to be superior both in gain and consistent oscillation, this being largely due to its beam construction.

Normal leaky grid detection is used and regeneration is controlled by the potentiometer R2. The condenser C5, and likewise C4 in the R.F. stage, is

IPONENTS

2 Ceramic octal valveholders, Raymart or Amphenol.
3 RF chokes, Eddystone, No. 1,011.
2 RF chokes, low resistance, home made (see text).
1 RF choke, Eddystone, No. 1,010.
1 Quench coil, home made (see text), or manufactured by Bulgin.
2 Steel mounting brackets, 2½in. high; 1 bracket, 2in. high.
1 Chassis, 12in.×9in.×2½in., in aluminium or steel.
1 Panel, 12in.×9in., in aluminium or steel.
2 Panel supporting brackets.
2 5:1 Epicyclic small reduction drives, Jackson Bros.
1 Switch D.P.S.T., 1 switch D.P.D.T., Bulgin.
1 Plain knob with small dial for R.F. tuning.
3 Knobs engraved with pointer.
1 100:1 ratio "Utility" Micro-dial, Wilkins & Wright.
Wooden dowel, ¾in., for valveholder supports, quench coil, etc.
46 S.W.G. enamelled copper wire for coils.
4 B.A. and 6 B.A. solder tags for coils, connections, etc.
20 S.W.G. wire and 1.5 mm. Systoflex for wiring up.
Coloured leads for battery supplies.
4 B.A. and 6 B.A. screws and nuts.
¼in. brass rod for extension controls or 2 Eddystone extension control outfits No. 1,008.
2 Eddystone flexible couplers, large, No. 50.
Valves: 1N5GT/G, 1Q5GT G, 1T5GT G, R.C.A., Sylvania, Brimar, etc.

used to ensure quiet operation of the potentiometer, and should not be less than the 1 μF specified. Feedback occurs via the condensers C11 and C13 in the screen and anode circuits, and the values given will provide the best results, although if it is desired to vary these values, ceramic trimmers can be substituted.

The screen circuit is unusual, as it handles D.C., R.F. and quench voltages, which are prevented from interacting. RFC4 filters off the R.F. currents via C11, but does not act as a barrier for D.C. or quench voltages. The resistor R8 acts as a load for the quench input, without making any serious drop in the D.C. voltage applied to the screen, while the condenser C16 allows the quench frequency to be applied to the screen, at the same time separating the D.C. voltages on the screen and the quench control R3. Injection of the quenching oscillation into the screen-grid was found to be the most satisfactory, and much superior to injection into the control-grid or anode. Transformer coupling is used in the anode circuit to give maximum L.F. gain, and it can be seen that efficient R.F. and L.F. decoupling are employed to avoid instability. The resistors R10 and R11 in the transformer secondary circuit help to eliminate stray R.F. currents, and any tendency towards "threshold howl," which is sometimes troublesome at high frequencies.

The Combined L.F. Amplifier/Quench Oscillator

It was found possible to use the same valve to act as either an L.F. amplifier, or a quench oscillator, by suitable switching. V3 is a IT5GT/G, a small power valve with ample output for headphone reception and low current consumption. SW2 is a D.P.D.T. switch; in position (1) the grid of V3 is connected to the quench tuned circuit L5-C18 via C17, and the output terminals O.P. are connected into the anode circuit of the detector valve. SW3, which can be integral with the potentiometer R3, switches in the quenching voltage to the detector screen-grid, the strength of the quench being controlled by R3. In V3, the screen-grid is acting as the oscillator anode. In position (2), V3 is connected as a straight L.F. amplifier and SW3 is switched to the off position. The valve is operated without bias in both cases, but R14 limits the screen voltage to produce the recommended maximum anode current of 8 mA., when operating as an amplifier. Further precautions against R.F. currents are taken in the anode output circuit by use of the chokes RFC7 and RFC8 and the by-pass condenser C20.

Construction

The use of the resistor R15 is optional and will enable the circuit to be run from a two-volt accumulator if desired, instead of a 1.5 volt dry cell.

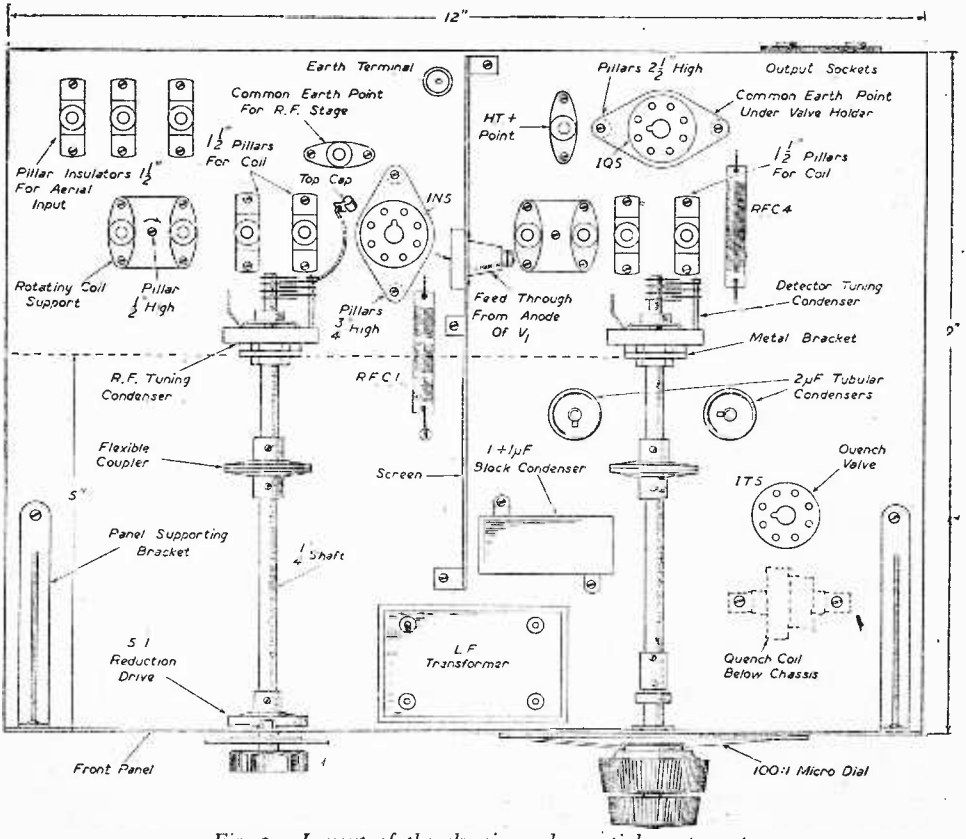


Fig. 2.—Layout of the chassis, and essential components.

The above describes the main points of the circuit and now the actual practical construction can be discussed.

The general layout of the circuit above the chassis is shown in Fig. 2 and the panel controls in Fig. 3. All the high-frequency circuits are above the chassis, the valves, coils and tuning condensers being supported on pillars or brackets. The low-frequency circuits are below the chassis, including the L.T. and H.T. supplies, quench and audio circuits, potentiometers and switches.

The wiring of the H.F. circuits should be very short and direct, and, if possible, tags should be soldered directly together between components with no connecting wires. Some careful work with a fine-pointed soldering iron will be well repaid by improved results and freedom from troubles resulting from stray inductance and capacity. Some idea of the compact layout can be seen from the illustrations on pages 198 and 199 which show the R.F. and detector stages.

Ceramic octal valveholders are used, together with polystyrene and ceramic stand-off insulators for the coils. Wooden dowel was used to support the valveholders at a suitable height, although ceramic pillars could be used if desired. The coils are self-supporting and wound from 16 s.w.g. enamelled copper wire. An example of a detector coil, with cathode tap soldered on, is seen on p. 199. The tag of the cathode tap fixes directly on to the valve cathode terminal by means of a nut, as shown on p. 199, and some careful work is needed to ensure that the tag locates itself correctly. This type of connection is superior to the use of a crocodile clip, for which there is no room in any case, and also gives better stability of calibration.

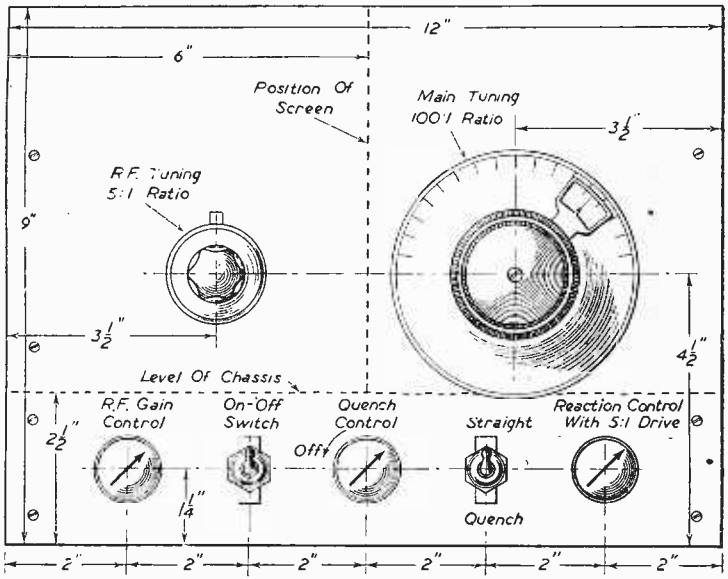


Fig. 3.—Layout and drilling dimensions of the panel.

The coupling coils to the R.F. and detector stages are mounted on small rotating bases, so that coupling can be varied. It will be found that the best coupling is obtained by employing coils of larger diameter than the tuned coils and bringing these up as close as possible to the "earthy" end of the tuned coil. Unless every precaution is taken to eliminate stray wiring and capacity in the coupling circuit to the detector valve, these, together with the inter-electrode capacity of V1, may resonate at the tuned frequency and so damp the circuit.

(To be continued.)

Frame Aerials and D/F-2

Interesting Details of the Directional Type of Aerial. By E. J. HARTLEY (G2FBI)

ANOTHER useful formula connected with frame aerial design is the effective E.M.F. induced in a loop, given by:

$E = \sqrt{2}\,\pi f n A H$

Where f = frequency of wave.
n = number of turns.
A = effective cross sectional area.
H = magnetic field intensity.

The effective current in a tuned circuit will be:

$I = \frac{E}{R}$ where R is the effective H.F. resistance.

As the detector is connected across the variable condenser employed to tune the frame to the frequency of the incoming wave, the factor that determines the strength of the signals received is the difference of potential Ec which is produced across the terminals of this condenser by the current induced in the loop. This is given by:

$$Ec = \frac{a\,n\,A\,L}{R\lambda^2}$$

where L is the inductance of the loop.
λ the wavelength.
a being a constant.

From this formula we might expect that the efficiency of any given loop should increase as the wavelength is reduced, and this is so up to a certain point; but, as the effective resistance R increases with the frequency and is, therefore, inversely

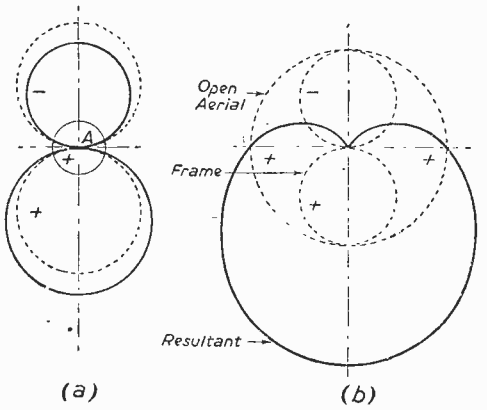


Fig. 4.—On the left are the combined open and frame aerial polar diagrams, and on the right the developed cardioid diagram.

proportional to the wavelength, a stage is reached at which the possible gain in efficiency, due to the reduction in wavelength, is more than offset by the increase of effective resistance; so that for any given loop there is one receiving wavelength at which it is most efficient. The turns should be well spaced in order to keep the effective resistance down to the lowest limit, but too wide a spacing on the other hand, by reducing the inductance per turn and necessitating more turns for the total value of *L* will not bring about the improvement required. The writer has found that maximum signal intensity usually occurs at a wavelength given which is not more than two or three times the natural wavelength given by the loop as a closed circuit: that is when the frequency of oscillation is solely determined by the self-inductance, self capacity and effective resistance of the frame aerial alone.

Determining Sense

It has been seen that two minima are obtained with the simple frame aerial so that, supposing a bearing of 20 degrees has been obtained, there will also be a further value for the bearing at 20 plus 180 degrees = 200 degrees, and it is quite impossible using the figure eight diagram alone, to decide which of the two is correct. In many cases such information is not necessary, but it is often of great value to have this information, and modern direction finding installations are usually equipped with a means of determining absolute direction or "*sense.*"

By combining the receiving properties of the open aerial and the frame, a new series of diagrams is obtained one of which is of great value for sense determination. In Fig. 4a, the two dotted circles are the frame figure eight and the smaller circle with its centre at *A* is the open aerial diagram. If we assume that the two E.M.F.s represented by these diagrams are combined in a single receiver, and are in phase, then the total E.M.F. induced in the circuit of the receiver will be given by the algebraic sum of the component E.M.F.s for any particular orientation of the frame, and the diagram of reception for the combination will similarly be given by the algebraic sum of the circle and figure eight diagrams. In Fig. 1, it was shown that the phase of the E.M.F. round the frame shifts abruptly through 180 degrees when the frame passes through minimum signal position, whilst no such shift in phase can occur in the case of an open aerial.

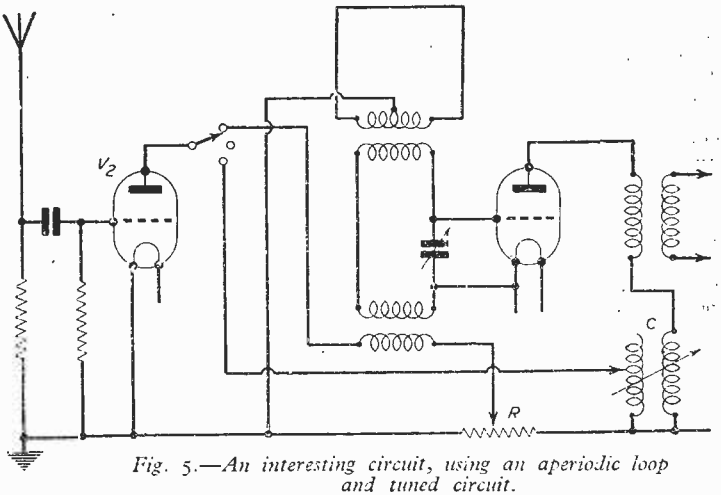


Fig. 5.—An interesting circuit, using an aperiodic loop and tuned circuit.

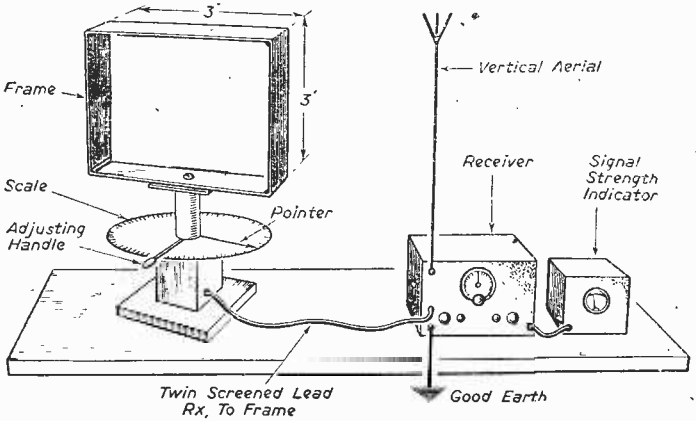


Fig. 6.—Layout for investigation of frame aerial properties. The pointer on the frame is set for cardioid working. The vertical aerial may be taken externally if the distance is not too great.

Therefore, when combining the diagrams one circle of the figure eight must be regarded as positive and the other as negative, the small open aerial circle being either sign. The choice of sign is, of course, purely arbitrary so long as they bear the same correct relation to one another. If now the polar ordinates are added, graphically, the complete diagram will be that shown by the full line. If the size of the circle diagram be gradually increased relative to the figure eight then, as seen in Fig. 4b, the positions of the minima become more and more distorted until at a critical position when the open aerial and frame E.M.F's. are equal in amplitude, they merge into one and we obtain what is called the *cardioid* diagram. Any further increase in the open aerial E.M.F's. gives a single impure minimum. It will be seen that the maximum is 180 degrees away from the minimum, so that if it be used for direction finding there is no longer any ambiguity as to the actual direction of the transmitting station. If the frame is rotated, only one point can be found on the scale where the signals vanish. It should be noted that the maximum of the heart-shaped diagram is twice the strength of the maximum of the frame aerial alone, and further, that the minimum of the heart-shape is in the plane of the frame and 90 degrees away from the minimum of the figure eight diagram alone.

An interesting circuit is shown in Fig. 5. The loop shown is aperiodic and is coupled to the tuned grid circuit of the first H.F. valve. A vertical aerial is coupled by *V2* and is arranged to perform by means of switching, three functions, zero cleaning, sense determination and all-round reception: In the upper position of the switch, the anode circuit of *V2* is coupled to the tuned circuit and obtains its anode supply from the potentiometer *R* across the H.T. supply. With *R* set to maximum the valve *V2* gives maximum amplification which swamps the frame effect and gives all round reception. As the H.T. is reduced the open aerial effect decreases and at a certain value will become comparable with that of the frame and cardioid polar diagram will result. In the middle position of the switch, the open aerial is not in use and the figure eight diagram may be had from the loop. In the lower position of the switch the anode circuit of *V2* is coupled to the output circuit of the first H.F. valve instead of its input circuit. Since there is a 90 degree change of phase between the current in the tuned grid circuit and the aperiodic anode circuit of an amplifier such as this, the open aerial effect, if coupled in at this point, will be in quadrature with the frame input, which is the condition wanted for zero cleaning.

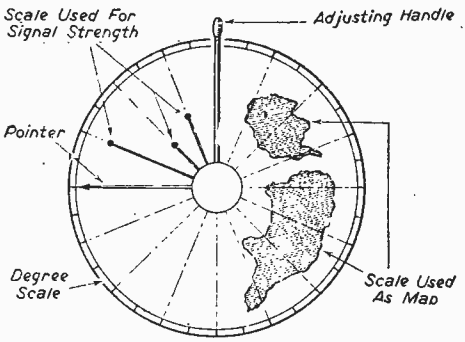


Fig. 7.—A plan of the Frame scale. This may be used for recording signal strengths on the inner portion. A map may be drawn centred on the frame and the relative distances marked off radially. The frame should be sited as high as possible and well away from earthed objects.

A New Chassis Design

A Simplified Construction Idea.

By N. DEAN

THE usual method of chassis construction employed nowadays for short wave receivers is as shown in Fig. 1.

It consists of a deck plate (*a*) which is bent down at the back to form the rear runner and at the front is a flange, to which is bolted the front panel (*b*), the ends of the deck plate are usually flanged for rigidity and strength, especially if made of aluminium. A panel bracket (*c*) supports the front panel, and a stay (*d*) joins the bottom corners of the panel to the rear runner. The whole chassis is then slid into a cabinet, sometimes of wood, but usually of sheet metal.

This construction is good, but suffers from a few disadvantages. Firstly, it is expensive if bought ready-made, and unless one is an accomplished tinsmith, it is rather difficult to construct.

Secondly, the large amount of metal used makes it heavy, especially if a set built on it is often moved about.

Thirdly, unless the connections are made on the front panel it is necessary to disconnect the leads whenever the set is removed from its cabinet.

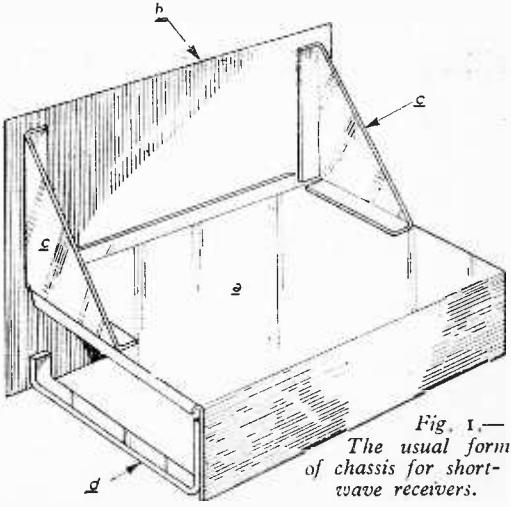


Fig. 1.—The usual form of chassis for short-wave receivers.

A New Idea

The construction now to be described eliminates all these difficulties, and is within the scope of the average amateur. Let us assume that the finished chassis is to measure 12in. x 8in. x 2½in., with a front panel 7½in. high. The deck plate is shown in Fig. 2. It will be seen that it is the same as the deck plate in Fig. 1, with the addition of a ¼in. flange along the bottom edge of the rear runner. The original was made from 16 s.w.g. mild steel. A little care will be needed in getting the ends parallel, but no difficulty should be experienced if a little patience is used.

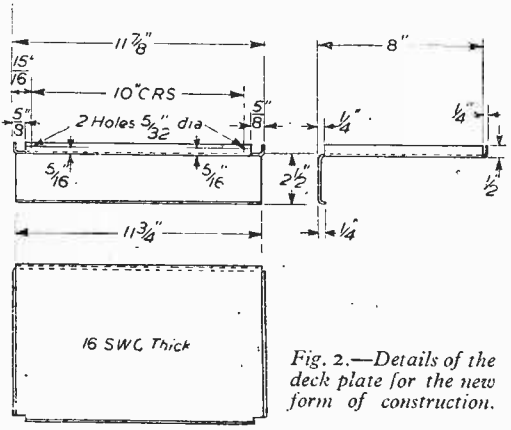


Fig. 2.—Details of the deck plate for the new form of construction.

The front panel is the same length as the deck plate, but has a ¼in. flange along top and bottom edges (see Fig. 3).

So far we have departed little from usual practice, but now the main difference appears. Instead of the panel bracket and stay as in Fig. 1, we have an end plate (Fig. 4). This is made with a ¼in.

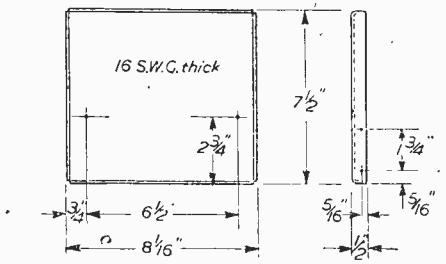


Fig. 4.—Details of the end plates. Two are required, one left-hand and one right-hand.

flange on each edge, in the form of a shallow tray, 7½in. x 8 1/16in. over flanges, and can be made of the same material as the other two members, i.e., 16 s.w.g. In the original the end plates were made of 18 s.w.g. because nothing else was available, but they were quite strong enough. Two end plates are required, one at each end, and care must be taken to see that they are made exactly the same as each other.

Assembly

Now for the assembly. Drill two holes in the panel 5/32in. diameter at 10in. centres, as shown in Fig. 3, 15/16in. from the L.H. end, and 2¾in. from the bottom edge. Next drill two corresponding holes in the front flange of the deck plate as shown

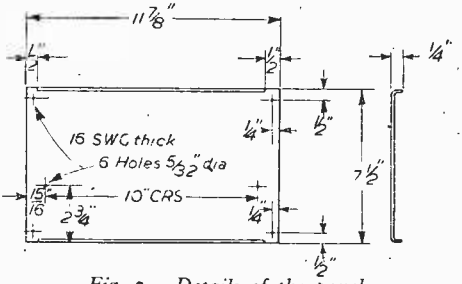


Fig. 3.—Details of the panel.

in Fig. 2; note that they are 5/16in. from the *underside*.

Next drill a 5/32in. hole in each corner of the panel as shown, ¼in. from top and bottom, and ¾in. from the ends. With a couple of 4 B.A. screws fasten the panel to the deck plate and with this in position put one of the end plates in place. The

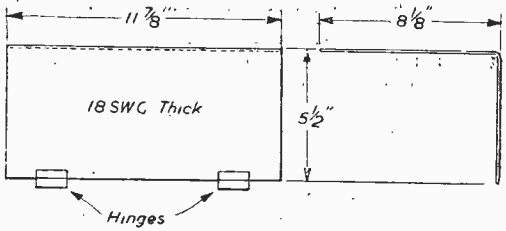


Fig. 5.—Top cover details.

near runner must be inside the flange, and the bottom of the rear runner must be level with the bottom of the end plate. The top and bottom of the panel must be level with the top and bottom of the end plates. With a scriber mark off from the panel the positions of the four corner holes on each end plate and drill these holes.

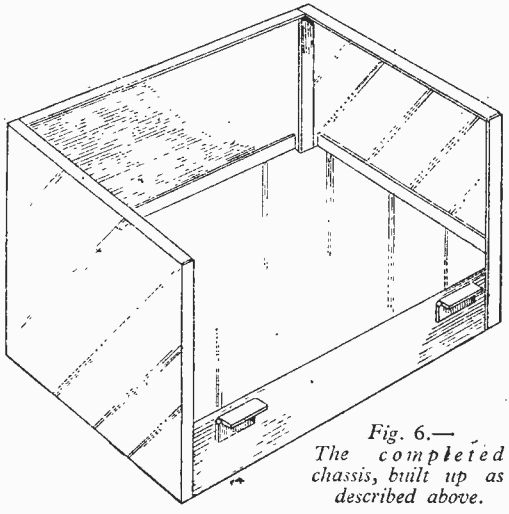


Fig. 6.—The completed chassis, built up as described above.

Next, drill two holes in the end plates on the faces, and two holes in the rear flanges as shown in Fig. 4. Bolt the end plates to the panel and hold the deck plate in position. Mark through the holes in the rear flange into the rear runner, and drill one in each end. Put a 4 B.A. bolt and nut in these, and drill through the remaining holes into the deck plate. When these are bolted up the chassis should stand up straight and the bottom should be level. The remaining holes can then be drilled through the panel and the rear runner and bolted up. The chassis is now ready to take the covers.

Fitting the Covers

The bottom cover is a flat sheet of steel or aluminium (about 18 s.w.g.) and measures 11⅞in. x 7⅞in. This is hinged to the rear runner and fastened by two clips to the panel. The edges rest on the flanged edges of the chassis. The top cover, Fig. 5, is also hinged to the rear runner and clipped to the top of the panel. The top cover is bent so that it covers the back and top of the chassis.

The completed chassis is shown in Fig. 6. If the plates are carefully flanged and the simple method of assembly used, no snags will be encountered. Avoid the temptation of drilling all the holes at once—this is where constructors go astray as all the holes do not line up when assembled.

A little extra care will be needed in positioning the components, but this will be amply repaid in compactness and accessibility. Another good point is, that when servicing the set will lie "on its back" just as firmly as when it is upright and this is a decided advantage when one is doing any intricate work "below deck."

If desired the end flanges of the deck plate can be dispensed with and two pieces of ⅛in. x ½in. x 1/16in. angle used. This can easily be made from a bit of 16 s.w.g. plate. The beginner would perhaps be best advised to use this method even at the expense of more drilling.

F.M. versus A.M.

An Explanation of the Differences, Simply Set Out. By F. THORNELOE

FOLLOWING the recent announcement by the B.B.C. of the future use of frequency modulation for transmissions of the Third, and, ultimately, of the Home programmes, the following notes may be of interest to readers.

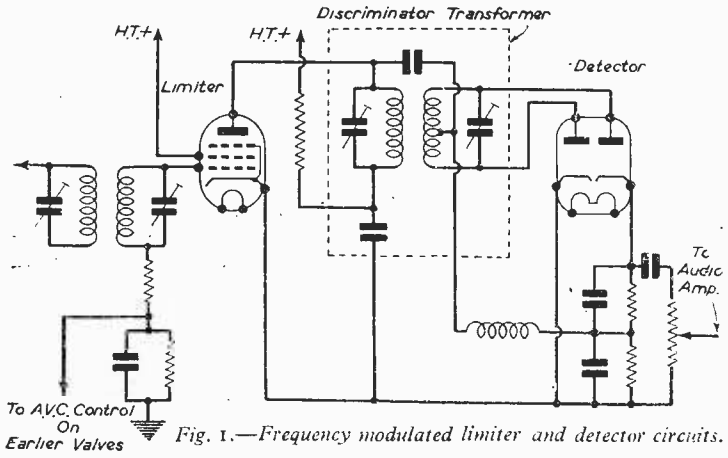


Fig. 1.—Frequency modulated limiter and detector circuits.

Briefly, the F.M. receiver has an R.F. amplifier passing a broad frequency band and wide-band high-frequency I.F.s, followed by a limiter circuit, similar to rapid action A.V.C., the function of which is to keep signal amplitude constant. Then comes a detector and conventional audio-amplifier. Fig. 1 is a skeleton circuit diagram.

The following comparisons from a F.M./A.M. set being developed in U.S.A. about 1940 may serve to illustrate the main differences in coils and I.F. arrangements. F.M. (first)—I.F. passing 300 kc/s wide frequency band, centred at 2.1 Mc/s. A.M. —I.F. passing 10 kc/s band, centred at 455 kc/s. Naturally, the R.F. stage(s) must have the same characteristics as the I.F.s as regards band spread, etc.

Fig. 3a shows a simple switching arrangement for F.M. or A.M. reception (I.F.s). This is possible because the wide difference in frequency ensures that the I.F. coils have negligible effect on each other. At high frequencies the tuning condensers of the I.F. transformers act as by-pass condensers. While at low frequencies the choke effect of the H.F. coils is practically nil (Fig. 3b).

The detector outputs can be similarly switched to the audio amplifier, provision being made, if desired, for cutting out the valve(s) not in use, but in a combined set the switching for R.F. and oscillator circuits is

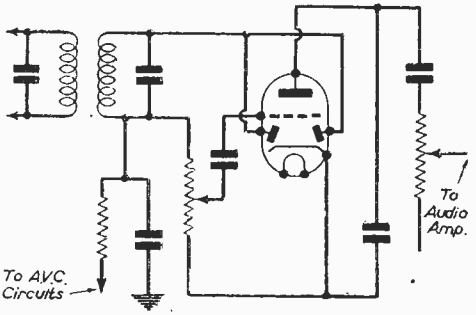


Fig. 2.—Conventional amplitude-modulated detector circuit which can be compared with Fig. 1.

somewhat more complicated but not by any means insurmountable.

The F.M. broadcasts will certainly be on ultra-short wavelengths, and as the area to be covered by each transmitter will be over a radius of some 10 to 15 miles, the F.M. coils can be designed for the appropriate wave range.

A.M. tuner and oscillator systems follow conventional lines and if a 4-bank switch is obtainable, having four or more positions, it would be possible to cover three A.M. bands and one F.M. band, allowing for one stage of R.F. amplification.

This is, however, looking into the future, and it is possible that other circuits may develop before transmission of F.M. signals is an everyday occurrence, and listeners can be sure it will be a long time before present sets will be considered obsolete.

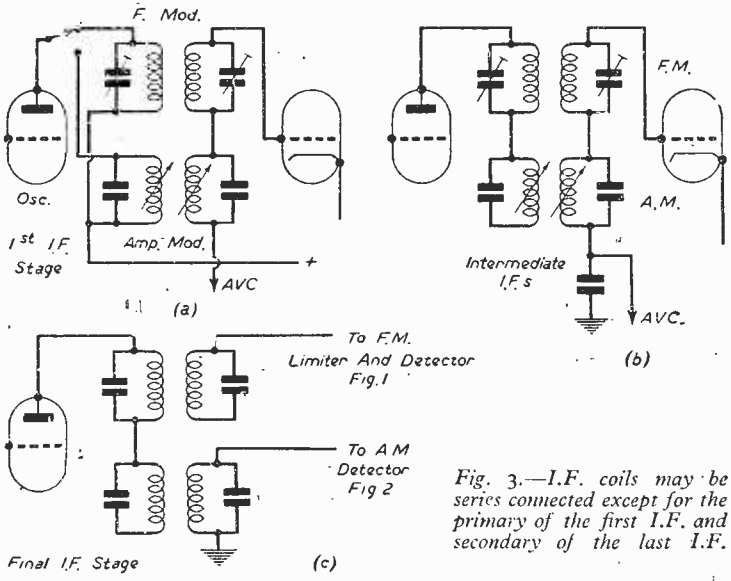


Fig. 3.—I.F. coils may be series connected except for the primary of the first I.F. and secondary of the last I.F.

Note.—The B.B.C. announcement mentioned Wrotham (some 25 miles from London) as the site of the first station: the power, 25 kW.; the opening, sometime before next winter. But meanwhile these suggestions may give rise to newer ideas and designs.

"Radar Harbour" at B.I.F.

A FACSIMILE of the world's first radar harbour —recently opened at Douglas, I.O.M.—will be seen by visitors to the British Industries Fair at Olympia, London, when it opens on May 3rd. The exhibit will demonstrate the lead that British radar manufacturers have established in making harbours safe for shipping in all kinds of weather, including fog. From a control-room on land the harbour master can see, on a radar screen, a complete picture of the approaches to the harbour, including all vessels in it. By means of radio-telephone, or the "Loud Hailer"—the super megaphone with the two-mile audibility—he can send messages to "fog-blinded" captains and pilots enabling them to bring their vessels in with safety, fog or no fog.

This new installation is believed to be the first of its kind in operation anywhere in the world.

The B.I.F. exhibit will consist of a facsimile of the radar control room, duplicates of the various component parts, and a film of the installation showing a radar picture of a ship entering the harbour.

The actual equipment at Douglas consists of a 60ft. tower carrying the revolving scanner which picks up a sound-echo picture of the harbour, which is then converted into a picture on the control-room screen. The set gives a "close-up" working picture with a radius of .8 mile, together with a broader view picture having a range of 1.2 miles, and lastly a 3-mile radius scale so that the harbour master can see all the approaches. The exhibit will be in the Music and Radio Group at the Fair.

European Band Plan

THE following Band Plan drawn up by the Codes of Practice Committee of the Radio Society of Great Britain, and approved by the Council of that body, has been submitted for consideration to all I.A.R.U. societies in Europe. Copies of the plan have been forwarded to I.A.R.U. Headquarters and to the W.I.A. (Australia), N.Z.A.R.T. (New Zealand), and S.A.R.L. (South Africa) for information.

The council of the society recognises that any form of band planning will fail unless it is introduced into the licence and enforced by the respective licensing authorities. For this reason the European societies have been asked, when commenting on the plan, to indicate whether they consider that their licensing authority will agree to make the plan mandatory if it is finally adopted. Details of the plan are set out below:

Band	*Frequencies*	*Proposed Occupancy*
1.7 Mc/s	—	Telephone and C.W. (no sub-division considered necessary).
3.5 Mc/s	3500— 3550	C.W. only
	3550— 3750	Telephony and C.W.
	3750— 3800	Telephony only
7 Mc/s	7000— 7050	C.W. only
	7050— 7100	C.W. and telephony
	7100— 7150	Telephony only
14 Mc/s	14000—14050	C.W. only
	14050—14200	C.W. and telephony
	14200—14250	Telephony only
	14250—14350	C.W. and telephony
21 Mc/s	21000—21100	C.W. only
	21100—21150	C.W. and telephony
	21150—21250	Telephony only
	21250—21450	C.W. and telephony
28 Mc/s	28000—28100	C.W. only
	28100—28400	C.W. and telephony
	28400—28500	Telephony only
	28500—29700	C.W. and telephony
Above 28 Mc/s	No sub-division between telephony and C.W.	

Underneath the Dipole

Television Pick-ups and Reflections. By "THE SCANNER"

WHAT a Gilbertian situation! Slowly and steadily the standards of living in Britain get worse in every respect—except in television. The traditionally tired and harassed business man, basically car-less, wends his way home on state-owned (loss-making) transport, calls at the "local" for cigarettes and a drink (cost 5s. 4d., of which about 4s. represents tax), arrives home to a guttering fire (25 per cent. slate), and sits down to eat a few morsels obtained at great expense. after queueing, by his wife. The meal over, he turns his television receiver and—behold—he escapes for a few minutes from the frustrations of this modern age. Television seems to be the only product of modern times in which we appear to be leading the world, though its progress is sadly hampered by material shortages at the factories and the vicious purchase tax. No wonder the aforesaid tired business man is touchy about the type of television entertainment presented, and is sometimes roused into writing wrathful letters to the B.B.C. Documentary items are the main "hate" of viewers, and I am glad to note that the B.B.C. have now deleted most of these features, including the notorious "Searchlight."

The Dictatorial Touch

It is a peculiar fact that many documentary programmes, tolerable on the "old-fashioned" sound radio, become thoroughly objectionable on television. Perhaps this is because most regular listeners leave their receivers switched on hour after hour while they continue playing cards, doing fretwork or chastising their children, and only vaguely conscious of the spoken word and the music. Possibly the only items which are treated with respect are ITMA, some of the variety shows, and the news bulletins. But, as I have remarked before, the concentration which television forces upon viewers is insistent, possessive and—it must be said—time wasting. You may be able to knit, play billiards or mend a puncture while you "listen" to the radio, but you can't do it with television. Consequently, lights are turned off in about 25,000 houses in the London area when brilliant revues like Binnie and Sonny Hale's *One, Two, Three* are televised, and the home audiences must number at least 150,000 persons. On the other hand, the lights all go on again when the less popular items come on, and the puncture mending and billiards are resumed. I have heard the tale of a lecturer, an economist, who tried in vain to find a viewer who had seen him "do his stuff." He must have had an audience of about four, and he hasn't found any of them yet.

The Picture Hood

Is it really necessary to turn all the lights off for television viewing? That depends, to a large extent, upon your set. If the picture is a brilliant one, a good image may still be seen if the rays of light from the room illumination are screened from falling directly upon the face of the cathode-ray tube. On my own set, two doors normally conceal the tube and control knobs when not in use. Opened halfway and with a sheet of cardboard resting on the tops of the doors, like a lens hood, the picture can be viewed with the room fully lighted. I commend to manufacturers the suggestion that a simple adjustable light hood would be a valuable and inexpensive addition to television receivers. I understand that many American television receivers possess this feature. With a device of this kind, the room lights can remain fully up, enabling the tired business man's wife to mend his socks while her lord and master soothes his nerves by watching the Windmill Girls on the television screen.

The Television Newsreel

I feel quite embarrassed now when I refer to the B.B.C.'s own Television Newsreel. My early comments on it were cool, to say the least; but the Alexandra Palace boys producing it have improved the style, make-up, editing and sound to such a degree that it is now far superior to all the cinema newsreels—except one. The B.B.C. cameramen have learned to use tripods, resulting in steadier pictures, and the sound men have taken greater care of the recording and play-off speeds, with consequent improvement in the pitch of speech and music. The items reported remain rather of the "magazine" type, but they are interesting, and the editing is much smoother. It is in this last aspect that the television boys have an opportunity to show the cinema people a thing or two. Smooth and yet forceful editing of newsreel material is dependent upon the correct co-ordination of sound and vision, of commentary, actuality background noise and musical accompaniment in their relation to the pictorial content. Since very little direct sound is recorded at the same time as the picture is shot, the "mute" picture is usually edited first and the music and commentary are added later. I thought that the special Swiss Olympic Games editions were brilliant and truly merited the two or three showings. The cinema newsreels will definitely have to look to their laurels.

Interference

Television aerials seem to be sprouting up all over the London suburbs, and many of them are badly sited from the interference point of view. It is all very well to fix the aerial in the highest possible position, but if the signal strength from the Alexandra Palace is good, it is often preferable to lose a little height and "hide" it from the road and the interference radiated from motor-car ignition systems. So often can dipoles be seen fixed in positions which obviously must pick up bad traffic interference, that one is forced to doubt the ability of the dealers who carried out the installations. On the other hand, one sees interesting aerial arrays of multiple reflectors now and again which arouse considerable curiosity as to results. Sometimes, when double images are received, these are due to pick-up from the A.P. direct and from reflections off a nearby metallic structure (such as a

gasholder). I have heard of one case in which the indirect signal was better than the direct one, and the double image was entirely eliminated by rotating the dipole and its reflector. The best results in this case were obtained when the aerial reflector was nearest the "A.P.," thus completely screening it, and the signal was entirely received via the gas-works! This may give hope to would-be television viewers who live in situations where the normal aerial set-up is useless, even if they are not so lucky as to live near a gas-works. Of course, the man who lives 60 miles from the Alexandra Palace, next to a radar station on one side and a diathermic clinic on the other, with a few busy main roads adjacent, must be a bit of an optimist to try television reception at all. Nevertheless, sharply directional aerials of two or three types are now available, which give quite surprising results in the most difficult situations. Radio dealers are always willing to allow would-be customers a trial, but they don't always have the time to experiment with unconventional aerial arrays. This is the kind of thing which interests the local Radio Society, who can usually produce a member willing and eager to assist. And if he evolves a weird and wonderful network of aerials resembling an elaborate spider-web, he is not necessarily crazy. It's probably just a case of heredity; his grandpop used balanced aerials and scratched his Hertzite crystal with a cat's-whisker of cunningly-twirled platinum wire!

Trade Notes

ADVANCE COMPONENTS, LTD.

TWO new instruments are announced by the above company—a signal generator (type B.4) and an audio generator (type F).

Signal generator type B.4 is an entirely new sub-standard signal generator designed to cover two frequency ranges: Model A, 100 kc/s to 70 Mc/s, and Model B, 30 kc/s to 30 Mc/s. These ranges are covered in six bands and the high-quality slow motion dial is directly calibrated in frequency to an accuracy of ±1 per cent. Both the modulation depth and the carrier

The new advance audio generator, type F.

output of the instrument are monitored by a crystal voltmeter. The standard Advance attenuator is used, giving an output accuracy of ±½ db up to the highest frequencies.

The internal 400 cycle tone has been made available for audio testing.

The type F audio generator has been designed to allow engineers to obtain a first-class instrument at a price within their financial scope. It is in the same style as the well-known signal generator type E.

This instrument is a particularly flexible power source at audio frequencies for measurements on the frequency characteristics of transformers, filters, transmission lines, amplifiers and loudspeakers. In the laboratory its generous power output, 1 watt, will be found sufficient for externally modulating signal generators and its attenuated ranges will be found particularly useful.

The use of a well-designed negative feedback network gives the instrument an almost level response over the complete range 100 cycles to 10,000 cycles.

MAIL ORDER SUPPLY CO.

DUE to expansion of business the above company have opened a new mail order office at 3, Robert Street, Hampstead Road, N.W.1. Will clients please note that all *post orders* should in future be sent to this address. All other inquiries should be addressed to 24, New Road, E.1, as before.

GARRARD ENGINEERING & MANUFACTURING CO., LTD.

AS from February the following changes took place in the above organisation.

Mr. A. C. Marshall, London sales representative has now moved from the company's registered office in Grafton Street to new offices at 68-70, Finsbury Pavement (Telephone No. MET 8927), to which inquiries normally dealt with at Grafton Street should be addressed.

The Service and Spares Department has been moved from the factory in Newcastle Street, Swindon, to Okus Road, Swindon (Telephone No. Swindon 3405), where all inquiries concerning spares and service should be addressed.

SULPHURIC ACID PRICE INCREASE

THE Board of Trade have made an Order, which came into force on March 1st, increasing by 7s. 6d. per ton the maximum selling prices of sulphuric acid.

The permitted addition to the basic price of battery accumulator or reagent acid is an amount equivalent to 50 per cent. of the basic price as compared with 33⅓ per cent. hitherto allowed.

Copies of the Order, the Control of Sulphuric Acid (No. 4) Order, 1948 (S.I. 1948, No. 294), which amends the Control of Sulphuric Acid (No. 2) Order, 1940, are obtainable, price 1d. through any bookseller or direct from the sales offices of H.M. Stationery Office.

THE EKCO SWITCH-CLOCK

E. K. COLE announce the general release of their Ekco switch-clock (model CC65), of which advance information was given at Radiolympia last year. Supplies began in March and will be evenly distributed to all 200-250 volt 50 cycle areas throughout the country. This moderately priced unit has a time switching mechanism similar to that in the famous Ekco Radiotime.

The switch-clock is a self-starting electric clock, with on-and-off time switch mechanism for automatic pre-set control of radio or other apparatus of up to 300 watts consumption. The "clock" is a 24-hour Smith's Sectric movement for 50 cycle mains. The setting dials are simple and a central AM/PM checking dial is provided. An on/off timer switch enables the unit to be used as an electric clock only, or as a switch-clock, as desired. Connecting leads are supplied. The unit has a pleasingly designed walnut finished case with silvered clock dial. Price £6 13s. (inc. £1 13s. purchase tax).

THE LONDON TELEVISION COMPANY, LTD.

IN future all A.I.S. products (formerly manufactured by Aligned Instrument Services, of 1, Colworth Road, Leytonstone, E.11) will be made and distributed by the above company. Their registered address is: 694, Lea Bridge Road, Leyton, E.10.

Programme Pointers

This Month MAURICE REEVE Goes Into the Question of What is a "Classic"?

TO the unmusical there is no more terrifying threat than the one which portends the compulsory submission to "classical" music. The very names "Brahms" or "Bach," "Quartet" or "Fugue"—all synonymous—convey to the unfortunate victim a period of unutterable boredom, containing nothing that is in the slightest degree comprehensible to him, whilst frequently it reaches degrees of sound unpleasantness which are positively unbearable. Coupled with even the thoughts of a journey, the expenditure of some money, an uncomfortable seat, compulsory non-smoking, scowls from one's neighbours if you so much as turn over the leaves of your programme, and many other cramping restrictions on freedom and unpleasant restraints which "listening-in" has abolished, and all "classical" music can go to the devil.

Yet what is "classical music"? Not that, surely! Nor can it be as a lady summed it up when asked if she liked classical music: "No thanks. I prefer something with a tune in it." In heaven's name where do all the great tunes come from if not from the great classic masterpieces of Handel, Mozart, Beethoven, Schubert, etc. etc.? I'm afraid Bach and Brahms are the villains of the piece, the former with his contrapuntal mathematical approach to music, and the latter who is probably the most austere and uncompromising of all the great composers. They are admittedly terrors to listen to if the ascetic of music passes you by. It was certainly Bach who gave origin to the definition of a fugue as being a piece where the parts come in one by one whilst the people go out one by one.

The word, in music, is probably used in more senses than are given it in most of the other arts. Strictly speaking, it refers to works written, (a) to a definite plan, i.e., symphony, sonata, opera, etc., forms which were established by the end of the eighteenth century, (b) written as what we now term "absolute" music; that is to say, for its own sake and, apart from such trifles as Haydn's clock or Beethoven's coucou, to no programme, story or major outside influence. And, (c) the most important point of all, the term is used to distinguish and separate it from the entire romantic movement which, beginning with Berlioz—1803-1869—had as its avowed object the deriving of inspiration from those very sources which the "classicists," apart from in opera, so abhored. It divides music into the two great worlds of "absolute" and "programme," "classical" and "romantic."

Chopin and Schumann

Where it falls down is in its failure sufficiently to recognise the "classical-romantic" or the "romantic classic." Chopin, for example, was the very soul and incarnation of the romantic movement, yet never wrote one single work to a programme. It was the spirit and essence of his music that was romantic, together with his invention of new and masterly forms to encase his thoughts. Schumann, too, the creator of the "Carnaval" and innumerable beautiful pieces of pure fantasy and programme, must obviously belong to both schools as he also wrote excellent symphonies, sonatas, chamber music and one of the finest of all piano concertos.

Another definition, good up to a point, is Riemann's, "a term applied to a work of art against which the destroying hand of time has proved powerless. Since only in the course of time a work can be shown to possess the power of resistance, there can be no living classics." This line of reasoning at least tries to label as classical only what is good, whereas the more orthodox interpretation rather scorns its quality and thinks more of its pattern, type and content. It is similar to yet another definition—I forget whose coinage—which says it is "a work that has stood the test of time." Here, clearly, the old classical—Bach—is lumped together with the new romantic—Berlioz—and is used synonymously with "good," inferring that all art which gets constantly repeated throughout the years is classical.

I suppose this is right, but we are still left with the problem of whether we poor mortals are to be allowed to pass this judgement, or whether it is something of a crime to be alive and that we must leave the verdict to our fathers or even grandfathers to decide.

Modern Writers

What is "good" music, and, therefore, likely to become a classic and stand the test of time? It seems obvious that to fulfill these requirements it must first of all pass the test of those who know. Debussy, Strauss and Sibelius did this, to name only three fairly modern masters. In addition, they won the plaudits of the concert-going public almost from the word go. Therefore, that surely leaves us, their contemporaries, with full right to pronounce them to be classics and to feel reasonably certain that our descendants unto the third and fourth generation will bestow on them no less admiration and applause than we ourselves do. Works like these contain qualities of both orthodox and original thought of such outstanding merit that there can be no question of our competence to pronounce them classics. If, in some quite unforeseeable way, our descendents should not agree with us, and the concert programmes of 2048 should be without these names, will it prove us wrong? Surely not! After all, it was the people who accepted Beethoven and Wagner for what they have proved to be who were right, not those who booed them. Whether that will apply to those contemporary composers who are booed to-day, I wouldn't like to say! It will probably depend on who is doing the booing.

Another Angle

There is the question of the "minor" classic, the music which is excellent "of its type," and which is not like that of Schubert or Mozart for the best of reasons—it never set out to be. If a classic be a piece which a certain public demands to hear

continuously throughout the ages, then Grieg and Sullivan must be stamped with this insignia. True that concert audiences accept about 20 per cent. of Grieg's output and absolutely none of Sullivan's, but their music has enormous sales and a very wide public. Much of it deserves its fame, and that it is not suitable for the conventional symphony concert layout is probably as much the symphony concerts' fault as theirs.

To conclude by returning to the remark of the no doubt attractive lady who didn't think classical music had enough "tune" in it. What she mistook for "tune" was, of course, the sort of thing that writers like Grieg and Sullivan abound in: page after page of melody, very often beautiful, but making every other ingredient in the work subordinate to it, an accompaniment, in fact. Tschaikowsky often errs this way but to nothing like the same extent, whilst his many other qualities assure him of a secure place in the symphonic hierarchy.

It is the body of the work that will always determine whether it shall become a classic. By body I mean the amalgam of all the materials or components of music: harmony, counterpoint, rhythm, architecture, character and tune. It is the combining of all these where a composer proves whether he has genius or not, and whether he is worthy of becoming a classic. Naturally, a great work must have great tunes. It is on the latter point that our little friend went so hopelessly astray. I am touching on this again next month.

News from the Clubs

SUTTON AND CHEAM RADIO SOCIETY

THE last two meetings were devoted to a film-strip lecture on valve theory, and discussion on the Radio Society of Great Britain National Field Day to be held in June.

In this event local societies compete for a national cup awarded to the station obtaining the most two-way radio contacts. Each station must be operated from a tent, and only dry batteries can be used for power. The contest is for 24 hours' continuous operation.

By fostering such a competition the radio societies assure the country of an immediately available emergency communication network. In America such a network is invariably put to very good use when a hurricane or flood occurs.

Last year the society was placed 26th out of more than 100 competitors.

Meetings are held at Ye Olde Red Lion, Cheam Village.

BURNHAM AND HIGHBRIDGE AMATEUR RADIO SOCIETY

Hon. Sec.: T. N. Carter, c/o Post Office Radio Station, Highbridge, Somerset.

AT the inaugural meeting of the above society on February 18th, 15 members attended and the following officers were elected: President, Mr. P. H. Green, BRS.4820; secretary, Mr. T. N. Carter, G3BPV; treasurer: Mr. A. D. Taylor, G8PG.

Future meetings are to be held at the "Ring o' Bells" Hotel, Burnham-on-Sea, on the first and third Mondays of each month, and will include morse classes and lectures designed to cover the Amateur Radio examination. Slow morse transmissions in the 3.5 Mc/s band are to be commenced shortly.

Anyone interested in the society is invited to contact the secretary.

NIEDERSACHSEN BRITISH RADIO CLUB

Acting Sec.: E. H. Styles, D2GC, P. & T. Branch (TZA), 120 H.Q., CCG, B.A.O.R., 11.

THE inaugural meeting of the Niedersachsen British Radio Club was held at Wesley House (Forces Study Centre), Hanover, on Saturday, January 24th and Sunday, January 25th, 1948. Those present at this meeting were: Sgt. Shaw, D2CU; Mr. Brammer, D2GB; Mr. Styles, D2GC; R.A.C. Training Wing Radio Club, D2IL; Mr. Oxley, D2MW; Signalman Hill. Apologies for absence were received from D2IC, D2GV, D2GS, D2GF and D2IJ owing to duties.

Several other British amateurs have intimated their desire to join, but were prevented from attending the inaugural meeting.

Among those present the following points were discussed: (a) That the club should be formed for British radio amateurs in the British Zone and should be based on Hanover, covering all points of the British Zone within travelling distance of Hanover; (b) it should be called "The Niedersachsen British Radio Club"; (c) meetings should be held monthly over the third week-end (i.e., the third Saturday and Sunday of each month); (d) the following suggestion for programmes was put forward and discussed: "That the Saturday meeting should be in the form of a short business discussion followed by a general 'get together' and talks on items of mutual interest, and that the Sunday morning meeting should be short lectures on items required for a British G.P.O. licence and demonstrations of equipment."

It is stressed that this club is open to membership of any British amateur in the Zone, and it is hoped that all who are interested will contact the acting secretary.

THE BIRMINGHAM AND DISTRICT SHORT-WAVE SOCIETY

Hon. Sec.: N. Shirley, 14, Manor Road, Stechford, Birmingham, 9.

AT the last meeting members heard the first part of a talk on radar; this talk will be concluded at the next meeting. The chairman gave a few hints on the best way to compile a log-book for the benefit of new listeners. Later, there will be a talk on the principles of oscilloscopes, to be followed by a description of some suitable circuits.

THE WEST BROMWICH AND DISTRICT RADIO SOCIETY

Hon. Sec.: R. G. Cousens, 38, Collier Road, Wednesbury, Staffs.

THE society now meet at Charlemont Schools, West Bromwich, at 7.30 p.m., each alternate Monday.

Morse classes are held at each meeting, and the technical library is available to all.

New members are welcome, and there are no conditions of membership. Further particulars may be had on request from the hon. sec.

READING AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: A. Mercer, 23, Oakley Road, Caversham, Reading.

AT a recent meeting a discussion was held on the course of action to be taken, in preparation for the R.S.G.B. Field Day Contest in June.

The discussion was followed by a talk and demonstration by Mr. Ruddle, on modifications, additions and general methods of increase of circuit efficiency, to the two most common ex-Service Communications receivers—the R1155 and BC348.

RETFORD AND DISTRICT AMATEUR RADIO CLUB

Hon. Sec.: H. White (G3BTU), 39, Trent Street, Retford, Notts.

THE inaugural meeting of the above club was held recently. Membership to date includes three full calls—G3AGF, BTU, CQQ. Meetings are to be held at 7.30 p.m. on Mondays at the Community Centre, St. Swithin's Place, Chapelgate, Retford. New members will be welcome.

BASINGSTOKE-DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: L. S. Adams (BSWL565), "Roslen," 16, Bramblys Drive, Basingstoke, Hants.

A RECENT talk at the Small Room, Town Hall, by D. R. Willis, Assoc. I.R.Eng. and Marconi Instruments, dealt with transformer output meter, audio frequency meter, measurement of modulation depth suitable for Ham use, also measurement of velocity of bullet, etc. Local amateurs who are interested should communicate with the hon. sec.

THE WORCESTER AND DISTRICT AMATEUR RADIO CLUB

THE following change of address should be noted by all interested in the above club.

The secretary is now: J. Morris-Casey (G8JC), c/o Brookhill Farm, Ladywood, Droitwich, Worcester.

Impressions on the Wax

Review of the Latest Gramophone Records

AFTER the Lucerne Festival last year His Master's Voice made the first post-war records of Dr. Wilhelm Furtwangler, with Menuhin and the Lucerne Festival Orchestra. It is a recording of Beethoven's violin concerto, Concerto in D, Op. 61—11 parts on six 12in. records (one single sided), *H.M.V. DB*6574-79. Highlights in this new recording are the first entry of the soloist at the close of the initial tutti; the meditative passages in the development of the first movement; the soloist's embroidery to the solemn theme of the larghetto; Menuhin's tone in the second main theme of the same movement: and the buoyant, dancing rondo at the end of it all. Hitherto Dr. Furtwangler has made few records. This new recording is the beginning of a series which will include the major 19th century classics—Beethoven, Brahms, Schubert and Wagner.

For pianoforte lovers there is Jose Iturbi's Granados—Spanish Dance No. 5 and No. 10, recorded on *H.M.V. DB*6573. Jose Iturbi's personal appearances in this country have endorsed the very real affection which British audiences have felt for his fine work in a number of films in which he has been featured. His tours have been phenomenally successful, and before he goes abroad to fulfil a most strenuous list of commitments he is completing a number of engagements in Great Britain.

The overture to Zampa is the surviving relic of an opera once popular, produced in Paris in 1831. Its libretto is based on the old tale of the "State Bride," a marble statue of a young girl which comes to life to seek revenge on her former lover. The Zampa Overture needs vigour, and this it gets in its latest recording by Sir Malcolm Sargent conducting the Liverpool Philharmonic Orchestra on *Columbia DX*1467.

The Loewenguth Quartet make their debut for His Master's Voice this month with a recording of Beethoven's Quartet in F, Op. 135, No. 16, on *H.M.V. C*3712-5. The Loewenguth Quartet have for some years been established in Paris, and gave their first recital in London at the Wigmore Hall, in 1946, the opening concert of a series embracing the complete cycle of Beethoven quartets. The Quartet in F was the last complete work from Beethoven's pen, for after having finished it at the end of October, 1826, he wrote no more save a new finale to the B Flat Quartet, Op. 130.

Vocal

Among settings of the "Ave Maria" there are, as we know, two which stand out from the others in popular esteem: Gounod's melody (which is something of a red rag to lovers of Bach) and Schubert's lovely song which has now been recorded by Beniamino Gigli on *H.M.V. DB*6619. Gigli is accompanied by Herbert Dawson at the organ, with strings and harp, a background which makes an admirable foil for the tenor's golden tone.

Of interest is the reappearance of the "Nun's Chorus" and "Spanish Romance," from "Casanova," sung by Anni Frind on *H.M.V. C*3711. This remarkable record is re-issued entirely owing to public demand. The B.B.C. broadcast the record a few weeks ago and they were inundated with requests to repeat the broadcast.

Robert Wilson continues his delightful recordings of Scotch songs with another example from Marjory Kennedy-Fraser's "Songs of the Hebrides." Wilson sings the one he has chosen, "Land of Heart's Desire," with great charm and authority, as he does its companion, "If I Can Help Somebody," which reveals the singer's feelings for different styles.

Light Music

This month André Kostelanetz provides two numbers for Sigmund Romberg enthusiasts. This eminent composer of light operetta and musical comedy was born in Austria, and he and the late Jerome Kern were the wealthiest composers in America. At one time no less than three shows of his were playing simultaneously: "Blossom Time," "The Student Prince" and "Desert Song." The recordings are "Deep In My Heart, Dear," from the "Student Prince," and "Desert Song," on *Columbia DB*2382.

Hans Andersen's fairy tale "The Tinder Box" has recently been made the subject of a film which is shortly to come to us from Denmark. The music is delightful, and Albert Sandler's selection on *Columbia DB*2379 gives an exhilarating foretaste of what we may expect when the Danish picture reaches Britain.

As Richard Addinsell has said, the "Warsaw Concerto" was written as just "a job to be done" for the film "Dangerous Moonlight." It was written in the country, in a cottage near Oxford after Addinsell's London flat had been bombed. Perhaps the bitterness of having his home wrecked added fuel to the tragic fire in the piece. Many film scores die when their picture is taken off, but Addinsell's work has endured. It responds magnificently to the strong, dramatic treatment given to it by the Melachrino Orchestra on *H.M.V. C*3710.

Dance Music

Following the phenomenal success of their first records, "Laura" and "When Your Lover Has Gone," released last month, Vic Lewis and His Orchestra have now recorded "Come Back to Sorrento" and "Artistry in Percussion" on *Parlophone R*3097.

Whatever the tune Geraldo will give it appropriate treatment. Couple this point to a polished performance and you have the reason why the Geraldo Orchestra is firmly entrenched in public favour as Britain's No. 1 broadcasting and recording band. This month he has recorded "Golden Earrings," arranged by Denny Vaughan, and "South America, Take It Away," scored by Geraldo's alto saxophonist, Wally Stott, on *Parlophone F*2279.

Open to Discussion

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).

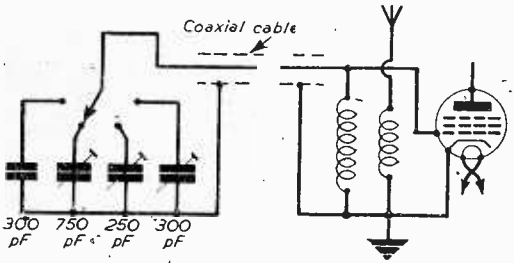
M.C.R.1 Receiver

SIR,—I should appreciate it if through the medium of your excellent paper I could get into contact with readers who have had experience of the M.C.R.1 receiver. I have had three of these sets pass through my hands and I have experienced the same trouble with all three, this being a second channel whistle on stations whilst the receiver is being used on Range 1. Despite accurate alignment and the checking of all circuits, the whistles cannot be suppressed on this band.

I also understand that the recommended aerial length is 30ft., but from experience find that this is not practical on Range 1 owing to B.B.C. swamping. I know this should not happen in this location with a receiver of this type. On ranges 2-3-4 the set is quite normal. If there is any reader who can supply me with the answer to this trouble, and also the makers of these sets, I should be very thankful.—F. H. LADD (46, Sandford Road, Chelmsford).

Remote Circuit Switching

SIR,—I recently constructed a receiver with switched pre-set tuning, operated at a control box about 5ft. away. Only the Home, Light and Third were wanted. It would be possible to arrange this by means of a relay, but for this a D.C. supply would be needed for energising the relay, which is rather a nuisance.



The scheme described in Mr. Shilston's letter.

I devised a method for controlling the circuits by having pre-set condensers in the control box, and a fixed inductance in the set itself. The pre-sets were connected to the set by co-axial cable, which effectively screened the tuned circuits from each other. In my set, one R.F. stage was used, hence two tuned circuits were used.

I estimated that the capacity of each 5ft. length of co-axial was about 80 pF. With ordinary medium-wave coils I found that the set would not tune down to 261 m., so I cut out one of the four sections of the secondary winding of each coil, giving an inductance of about 120 μH. Wearite PA2 and PHF2 coils were used.

The pre-sets used were 250 pF. for Light, 300 pF. for Home, and 750 pF. with a 300 pF. fixed condenser across it for Third (514 m.). A double pre-set of 250 x 750 pF. was used for Light and Third, economising in space.

The R.F. valve was a Mazda SP61 (same as VR65), as this gives a very high gain. Some trouble was experienced due to instability on 261 m., but this was not troublesome, and on 514 m. the circuit is sufficiently stable for the gain of the valve to be fully utilised; the Third comes in at good volume although the signal is rather weak in London.

The detector was a Westector WX1, and this has been very satisfactory; the amplifier is of the usual type. Also in the control box is a constant impedance volume control, and a mains switch. The set has been in operation for some weeks and has proved very satisfactory and simple to operate. —P. D. SHILSTON (Staines).

Ex-R.A.F. Equipment

SIR,—I note from the March issue of PRACTICAL WIRELESS that in a reply by Mr. A. W. Mann to a letter published the previous month by Mr. K. A. Roosenburk, Mr. Mann has confused our two names and appears to think that I wrote the letter. The confusion probably arose as a result of a letter by myself being printed directly underneath the one to which Mr. Mann is referring.—B. E. HARRIS (Harpenden).

Time Base and Amplifier

SIR,—I was very interested in the description of a time base and amplifier in the issue of PRACTICAL WIRELESS of December last, and since then I have tried out this design with good results.

I have in recent months tried out quite a number of different time bases with varying success, but this one of yours has so far proved the most satisfactory.

I have been thinking of building a frequency modulated oscillator to provide visual results of the aligning of intermediate frequency transformers and the like.

If you could see your way to publish a short article giving the advantages and disadvantages of the various forms of this type of oscillator, I, for one, and probably many other readers, would be very much interested.—GEO. E. S. WEBSTER (Carlisle).

German Valve Details

SIR,—Occasionally my relatives in England have sent me a copy of your paper, as I am an enthusiast of wireless and specialise on short-waves and valve technique.

Several times I have found on the page "Open to Discussion" inquiries about German valves or receivers. As I have or can easily get details of practically every German valve or civil broadcasting receiver, I am willing to help any reader who has troubles in this line. In exchange details of British valves (especially commercial and obsolete) are highly welcome.—WERNER MAASS (24a Hamburg 13, Hochallee 43, British Zone, Germany)

French Amateur's Generous Offer

SIR,—As an overseas reader, I wish to thank you for the ever interesting matters printed in your magazine, and for the useful items so lavishly provided. I never regret the subscription, and do my best for lending the review to as many friends I know. . . .

I'd appreciate to make the acquaintance with a British "ham," directly or through the channel of your magazine, in order to exchange mail, literature and records. Incidentally, I'd be glad to welcome home any English visitor passing by Paris and interested in radio. I regret the high rate of exchange makes nearly impossible the trip to London, which I liked so much. I'm 27 and a licensed "ham" since the beginning of 1948.—BERNARD MALANDAIN. (11 avenue du Maine, Paris 15ème, France).

Receiver 1147B

SIR,—With reference to 1147 B. receiver circuit, I have duplicated 50 copies. I will gladly supply to readers on receipt of a stamped, addressed envelope.—J. E. BERRY, (School House, Grange-over-Sands, Lancs).

D.X. Television Results

SIR,—I have to report that I am getting good "television" (sound and pictures) reception at my address. I have been getting television for eight months now. I have found the summer is the best time for reception. I would be very pleased to know of any more readers who get long-distance television. I am using a H.M.V. model 1804 with one stage pre-amp and dipole. I am getting good results with a 50ft. mast, but I am now putting up a 100ft. mast, so I can get an even better signal. I think you would like to know of what we are doing in Lincoln. Thanks for PRACTICAL WIRELESS—very helpful indeed.—H. L. WALTERS (Lincoln).

QSL for "Ken of Nottingham"

SIR,—I am a keen short-wave listener. My receiver is a R107, and I am a listener only, having no transmitter.

However, this evening (February 22nd), approximately 7.30 p.m., I picked up an amateur on 40 metre band. He was congratulating his pal, "Ken" by name, on his excellent modulation, also a fairly strong signal from a "Walkie Talkie." Much to my surprise, when No. 1 transmitter closed down I got No. 2. This was the Walkie Talkie fairly strong and clear, but I'm sorry to say that before he signed off there was a strong signal which almost blotted him out, and I failed to get his call signs. But what I do know is his name was Ken, he referred to his Walkie Talkie having approximately 2.5 watt output and he lived in the outskirts of Nottingham.

Now, I live in the north-east of Scotland, and I am sure he would like to know this.

I trust you will publish this as I cannot get in touch with him having failed to get his call.—I. MASSIE (Fraserburgh).

Army No. 18Rx

SIR,—I have noted the recent correspondence concerning the ex-W.D. No. 18 receiver, and would like to point out that the performance of this little set may be tremendously increased with the addition of a tuned R.F. stage and a suitable A.F. stage. Thus equipped, the set makes an excellent standby receiver for the 40-metre band.

I would like to report a curious fault which developed in such a receiver. During the initial testing the set performed very well as long as the chassis remained in its normal attitude, but upon tilting it forward signals immediately ceased. It was not until the set was tilted backwards off its normal position that signals were restored and these persisted until the set was again tilted forward.

A loose connection was immediately suspected, but none could be found and all components were firmly anchored and appeared to be above suspicion. The possibility of a sagging filament was ruled out after replacing the valves in turn. After much head-scratching the blame was finally laid at the door of an I.F. transformer. It was found that the powdered iron core had become detached from its threaded plastic plug (by which it could be screwed in or out for adjustment) and when the receiver was tilted forwards this core slid to the end of the coil in which it was contained, thus throwing the transformer off-tune, and causing a break in reception. On tilting the set backwards the core slid back against the threaded plug into its normal position and reception was restored.

A drop of glue soon laid the bogy!

I am very anxious to contact someone who has constructed the Shoulder-strap Five in accordance with the recent article appearing in these pages, since after making the conversion my M.C.R.1 steadfastly refuses to work despite all my efforts, and I am now at my wits' end to know how to get it going again. Any advice on this subject will be very warmly welcomed.—M. N. PERRINS, (12, Conington Grove, Harborne, Birmingham, 17).

Control-box Connection

SIR,—In the "Open to Discussion" page of the January, 1948, issue of PRACTICAL WIRELESS there is a query by Mr. T. Coats, of 4, Kirkliston Gardens, Belfast, regarding diagram or control-box connections for American Service Receiver, type C.R.V.46151 unit of model A.R.B.

As I possess a similar receiver, I am also in doubt about the connections. I shall be glad if some reader would kindly forward to me the necessary details.—J. A. KHARAS ("Electric House," Ormiston Road, Post Fort, Bombay).

Correspondent Wanted

SIR,—I would be pleased to correspond with any reader who has purchased an Army 109 receiver, and who could help me on the following:

(1) Details of mains power pack and/or details of more efficient accumulator power pack.

(2) Details of fitting "S" meter.

(3) Details of fitting plug-in coils.

I would also like to correspond with any reader who could give me details of a test meter using a "magic eye" valve (Y63 available).—O. W. KEMP, (2, Upper East Street, Sudbury, Suffolk.)

CLASSIFIED ADVERTISEMENTS

RATES : 3/- per line or part thereof, average five words to line, minimum 2 lines. Box No. 6d. extra. Advertisements must be prepaid and addressed to Advertisement Manager, "Practical Wireless," Tower House, Southampton St., Strand, London, W.C.2.

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R.S.G.B. BULLETIN
Monthly publication of the R.S.G.B., 1.6 post free. (Free to Members.)
RADIO SOCIETY OF GREAT BRITAIN, 28, Little Russell Street, London, W.C.1

RECEIVERS & COMPONENTS

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