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Electrical Measuring Instrument
A 22-range precision moving-coil instrument for all A.C. and D.C. testing. All readings direct. Total resistance of meter 200,000 ohms.

D.C. VOLTS.

<table>
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<tr>
<th>Range</th>
<th>Resistance</th>
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A.C. VOLTS.

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<td>0–500 V</td>
<td>0–1,000,000 ohms</td>
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Complete with instruction booklet, leads, interchangeable testing probes and crocodile clips. 

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Electrical Measuring Instrument
An accurate 13-range moving-coil instrument for all normal radio tests, including H.T., L.T. and G.R. Batteries, D.C. Mains and Eliminator Voltages: Valves and valve circuits, etc.

CURRENT

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<td>0–5 m.A.</td>
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RESISTANCE

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<tr>
<td>0–120,000 ohms</td>
<td>0–240,000 ohms</td>
</tr>
</tbody>
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Complete in case with instruction booklet, leads and interchangeable testing probes and crocodile clips. 

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TECHNICAL INFORMATION

The new 1939 edition of "The All Metal Way" includes a special chapter on television rectifiers, as well as up-to-date information on all rectification problems.

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Practical and Amateur Wireless

ADD-ON TUNING UNITS

See Page 62.

Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J. Barton Chappell, W. Sch.,

VOL. XIII, No. 316. October 1st, 1938.

ROUND THE WORLD OF WIRELESS

Push-button Tuning

Many constructors still feel uncertain regarding the efficiency of push-button tuning systems, and think that the conventional D.F. tuning unit was the best. We recently heard of a case of a shopkeeper who stocked a certain make of push-button tuning, and every day before he opened the shop he had to readjust the condenser so that the set could stand on the counter to be operated by his customers. Condensers now in use are, however, much more reliable than some which were used in the early sets or which may be included in some import receivers, and provided that economy is not attempted by obtaining cheap condensers the arrangement may be relied upon. It should be remembered that modern superhet utilises trimmers of a similar type in the i.f. transformers, and one does not have to do much adjusting to these from day to day to keep the set in condition. It is quite true that they may gradually drift due to vibration or climatic changes, but they are sufficiently reliable to warrant the use of unsealed caps, and therefore the push-button tuner can be built with confidence. In response to many requests we give in this issue some brief details of various forms in which push-button tuning may be added to existing receivers.

German Licence Figures

The latest returns of licences issued in Germany show that the total now runs to 9,514,000, of which 6,380,000 were issued free. Great Britain is second in the list of totals with 8,550,000, of which 59,000 are free (issued to the blind). Next on the list is France with a total of 4,391,000.

More Novel Uses

To add to the number of novel uses to which radio has been put is that of wheel decoration. During the last few years some difficulty is sometimes experienced, after a whale has been harpooned, in getting the whale aboard. The first wireless officer of the Norwegian whaler Komorius has built a miniature short-wave transmitter mounted in the harpoon shaft, and this transmits a signal which can be located on the whaler and thus the movements of the whale may be followed with suitable D.F. apparatus and the whale easily landed.

World's Greatest Showman

Baron, an American born in Connecticut, in 1910, was regarded as the world's greatest showman, and a programme in commemoration of his exploits is to be broadcast by the B.B.C. in the Regional programme on October 2nd. The programme has been prepared by Herbert Kendrick and Harold Scott, and will be produced by Lawrence Gillam.

Records from the Stage

Modern recording systems demand high quality background effects, and recently the Columbia Company have been making popular records of bands on various stages. Debroy Somers was recorded at the Variety Theatre, Henry Hall in a Brindley Theatre, and Carel Giobbe and the Savoy Opheus in a Nottingham theatre.

Mains Change-over

The Elland (Yorkshire) Council have considered the difficulties met with by listeners when mains supplies are changed from D.C. to A.C. and in lieu of making regulations or fitting rectifiers have decided to offer consumers 54 lbs. per set with which they can make the necessary modifications.

Radio in the Modern Home

A 4.5 watt set, which closes on Saturday, a flat furnished on the unit system may be seen. This includes a sound-proof air-conditioned radio study, designed to enable the listener to indulge in late or early listening without disturbing his neighbours.
ROUND the WORLD of WIRELESS (Continued)

Information in Foreign Languages

A new innovation recently introduced in the Budapest telephone system enables foreign visitors to obtain information in English, French, German, Italian, or Esperanto. All they have to do is to dial a certain specified number for each language.

Pitcairn Island

The new petrol generator provided by American subscribers for Pitcairn Island is evidently in operation, as reception in this country of VR6AY on 20 metres was recently reported.

president of the Crosley Radio Corporation in charge of broadcasting.

Effective on October 1st, the most comprehensive farm service yet attempted by the Nation's station will be offered during every 15-minute unit of the "Top o' the Morning" programme, 6 to 8.15 a.m., E.S.T., daily except Sunday.

City of Birmingham Orchestra

The first of the City of Birmingham Orchestra's concerts for the season will be given on October 8th from Birmingham Town Hall, when the first part will be "broadcast." This will include Smetana's "Ulliva," conducted by Lionel Hearn, and "Introduction and Allegro" by Arthur Bliss, conducted by the composer.

Facilities for Esperanto-speaking Travellers in France

France is now taking up the idea, customary throughout Holland, for the more important railway stations to have a plate in the entrance hall showing the name and address of the local "consul," whose duty it is to help Esperanto-speaking travellers. In France the first two stations to adopt the scheme are in Dunkerque.

Exhibition Dates

MANCHESTER: Evening Chronicle Northern National Radio Exhibition, September 27th to October 8th, City Hall, Scottish Empire Exhibition. Open until October 29th, Bellahouston Park, Glasgow.

Canada's New Transmitter

Work has commenced on the third of Canada's 50-kW transmitters, CBA, at Sackville, New Brunswick. This station, which is to cover the New England coast provinces of New Brunswick, Nova Scotia, and Prince Edward Island, will operate on 1,000 kcs (285.7 metres).

Sir Henry J. Wood's Jubilee Concert

We are informed by the B.B.C. that Sir Henry J. Wood, has decided to devote the entire programme of his Jubilee concert in the Albert Hall on October 5, to endowing beds for orchestral musicians in London Hospitals.

SOLVE THIS!

Problem No. 315

Atkinson's four-valve set was not giving signals sufficiently loud for his full enjoyment. He used an H.F. pentode, R.O. detector, triode first L.F. stage feeding a period- output stage, with 130 volts H.T. As the set was fairly well-made he decided that the best way of obtaining improved volume was to use transformer coupling between the last two stages instead of R.C. coupling and he accordingly obtained a 5 to 1 L.F. transformer. When he fitted this, however, results were much inferior to those originally obtained and were accompanied by serious distortion. Why was this? If you can solve the problem you will be awarded the first three correct solutions opened. Address your envelope to: The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The winners must be named Problem No. 315 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, October 3rd, 1938.

Solution to Problem No. 314

As the elements of the valves remained alright after one had been removed this would indicate that the trouble was probably in the coupling transformers. If the transformers were short-circuited—the valves in an A.C./D.C. set being wired in series. The short-circuiting of the other of the two valves was the cause of his failure to get results. The following three readers successfully solved Problem No. 314 and books have accordingly been forwarded:

J. H. Ward, 41, Brefwen Road, Steelhead, West Leblanc; F. Milton, 12, Rampont Road, Sharrow, Sheffield; T. H. C. Adams, 10, Shannon Road, London, H.7.
My New Set

By F. J. Camm

In our issue dated October 15th we shall present a blueprint of my latest receiver. Each year since the publication of this journal I have signalled our birthday in this way, but this year I have purposely delayed an announcement concerning it as I wished first to analyse the readers’ views which annually I gather at Radiolympia.

For many years past I have made the subject of our Birthday Blueprint a battery receiver, and I wanted this year to ascertain what percentage of my readers would be interested in a mains set. I have carefully analysed the queries I have received during the past year, and I find that approximately 50 per cent. of my readers are interested in battery sets, and the remainder in mains sets; thus, whatever section of readers I cater for in the matter of a design leaves 50 per cent. of them interested only to the extent of reading about this new set.

I therefore decided to take the opinion of as many readers as possible at Radiolympia. I was able to converse with two or three hundred of them during the show, and although these represent but a very small fraction of our total sales the law of average must apply. I was somewhat astonished at the result, for whilst most of the readers had mains facilities, nearly 60% of them urged me to produce a blueprint for a battery set. Although most of them have been on the mains for many years, they still prefer battery receivers. They are mostly using the mains set for experimental use, but for family use require a battery receiver.

Many of the readers were kind enough to make suggestions regarding the circuit features of the new receiver. For obvious reasons I cannot adopt all of them, but I believe that in the new set, which will be revealed in detail in our issue dated October 15th, but concerning which circuit details will be given next week, together with a list of components, I have produced the set which the majority of my readers will welcome. I can say at once that it will incorporate an ingenious new mechanical system of push-button tuning. This form of tuning, although criticised by some, is of great value to the normal members of the household. The experimenter prefers to have a set with as many controls as possible, and finds that his greatest interest is in obtaining that happy balance of various controls which enables a station to be received clearly and at maximum volume free from interference. The more controls, therefore, the merrier he feels, but whilst this is very good from his point of view, the housewife or other members of the household who wish to listen at various times are unable to make the necessary adjustments, and accordingly the set is not regarded with favour.

Auto-tuning

On the other hand, a receiver fitted with push-buttons or other devices for tuning may still incorporate all the knobs and controls that delight the heart of the experimenter, but at the same time, by setting one or two of them at a given point, all tuning may be carried out by any inexperienced person—merely by pushing a button. Even the volume control may be dispensed with if A.V.C. is fitted, as most stations will then be received at a level which may be pre-arranged by suitable controls. Wave-change switching may be carried out automatically, and with clear station names above each button the receiver becomes quite automatic. I have therefore followed the modern design and fitted this system to the new receiver, and it should be emphasised that although an automatic tuner of the mechanical type may in some cases be criticised owing to inter-station noise as it passes from one station to another, this does not apply to all receivers, and provided that the mechanism is so chosen that the condenser is moved rapidly the noises as stations are passed are so brief that they cause no inconvenience. Manual control is, however, also arranged for, so that readers can tune to stations other than those indicated on the buttons.

A mechanical system also removes the difficulties of adjusting a series of trimming or tuning condensers, and the initial setting-up of a receiver so fitted is not more difficult than an ordinary manual receiver, and the button mechanism may be adjusted without the aid of any tools. It may be emphasised that the construction of the receiver is no more difficult than that of any of the receivers which have been described in this journal. A fully detailed list of components will be given, and the free blueprint will enable the constructional work to be carried out immediately you have been able to obtain the parts. An important feature of the receiver, which I am sure will appeal to the vast majority of readers, is that it will include the short waves, and I am arranging for a large station-name dial to be supplied by Messrs. Petos Scott, so that tuning will be reduced to the simplest possible process.

A COMPLETE WIRELESS LIBRARY!

Wireless Constructor's Encyclopedia, 5/- (post 5/6)
Everyman's Wireless Book, 3/- (post 3/10)
Wireless Transmission for Amateurs, 2/6 (post 2/10)
Television and Short-wave Handbook, 3/- (post 3/10)
Practical Wireless Service Manual, 5/- (post 5/6)
Sixty Tested Wireless Circuits, 2/6 (post 2/10)
Wireless Coils, Chokes and Transformers, 2/6
(post 2/10)

Obtainable through all newsagents, or from the Publisher, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.
Curing Pre-Detector Instability

Brief Notes on Some of the Causes of H.F. and I.F. Instability and on Methods of Testing For, and Rectifying the Faults

Instability in the H.F., frequency-changer or I.F. stages can be due to bad design, but for the purposes of these notes it will be assumed that the receiver is not a newly-made one, and that it has previously operated satisfactorily. The first difficulty is in recognising the instability and in isolating it, so that tests can be made with a view to its cure. Sometimes, of course, instability is clearly evident due to the fact that reception is accompanied by a high-pitched whistle or screech; alternatively, a much lower-pitched noise might be heard at certain wavelength settings or when receiving particular transmitters. This particular indication, by the way, is often mistaken for low-frequency instability with the result that initial tests might be misleading.

Lack of Sensitivity

But there are other indications of lack of stability in the pre-detector (or pre-first-detector) stages. For example, it might be found that the receiver is almost "dead" toward the lower or upper end of one waveband or that, when tuning in some transmissions, the signal strength gradually increases as the exact tuning point is approached, and then suddenly falls off. Instead, a whistle might be heard when tuning, despite the fact that the reaction control, when provided, is set full back. Should the set burst into inaudible oscillation at certain condenser settings, this would probably be suggested by a "plopping" or "clicking" noise as the tuning control is operated.

Screen and Earth Connections

By no means an unusual cause of the trouble is the breaking away of an earth-return connection to a screen—which might be a sheet of aluminium or a length of braid used to shield a connecting lead. It is wise, therefore, to make a careful check for this trouble, tightening any earthings that appear to have worked loose. It is also worth while in many instances to try the effect of making additional earth connections from screening materials, also ascertaining that the earth lead itself, as well as its connection within the receiver, is perfectly sound. A point that can easily be overlooked when making this preliminary examination is a loose screening can on a coil or condenser; see that any such screens are pressed well into their bezels and that they fit tightly. If it appears desirable, scrape clean the parts which are intended to be in contact. It is sometimes a good plan to wind a strip of tinfoil round the base of a screening can used for a coil to ensure that the contact is good and that the joint is "sealed."

In testing for good earth connections, do not overlook those from the lower ends of the coils, testing the coils for continuity between pairs of terminals if necessary. If the suppressor grid is brought out to a separate socket on the valveholder, see that this is suitably earth-connected, or joined to the cathode pin, according to the method employed by the maker of the set.

Meter Tests

If it is thought that the set is bursting into oscillation at certain tuning points, a check can be made by inserting a milliammeter in the place of the valves, at the points shown in the accompanying diagram. Notice that the meter is connected on the "H.T." side of the coupling components; if it were joined directly to the anode it might cause additional trouble, or introduce an apparent fault which was otherwise absent. A 1-turn, tubular condenser should be joined in parallel with the meter as a test by-pass.

steady over shows a drop in current at certain condenser settings it will be a fairly sure sign that the valve is falling into self-oscillation. By this means it will be generally possible to find which of the valves is at the root of the trouble, so that the corresponding circuit can be tested more thoroughly. When making the test it will be best to turn the variable-mu volume control, when fitted, to its maximum position, although tests can be repeated with the control at different settings. It will be appreciated, of course, that the current reading will be lower at lower settings; it should, nevertheless, remain steady over the tuning range. This assumes that A.V.C. is not provided or, alternatively, that the aerial lead has been removed. It is, in fact, often desirable to disconnect the aerial before making the test. It might be argued that a receiver whose aerial is attached could well become unstable when it is removed. That is so, but any modern set should remain stable without the slight additional damping provided by the aerial.

Faulty Decoupling Components

When the valve concerned has been traced the anode decoupling resistor and condenser may be suspected and tested by replacement. If the resistor has developed a short-circuit or the condenser an open circuit the decoupling will no longer be effective. The same checks should then be made for the screen grid resistor and grid leak, which can produce similar effects. If a new valve has been fitted it might be found that additional decoupling is required; this will generally apply only when an old-type valve has been changed for a more efficient modern counterpart.

Next check the bias resistor or resistors if the set is mains operated. If one of these is short-circuited, the valve can easily become unstable since the bias would be reduced appreciably if not removed entirely. In the same way a bias-resistor 'by-pass condenser which had developed a short-circuit could produce the same result. Substitution is the simplest method of testing. It will be appreciated, however, that if the bias circuit were shorted the reading obtained on an anode-circuit milliammeter would be higher than normal for the particular valve in use, so that the initial give a "lead" in this direction.

Coil or Grid Circuit "Open"

In the case of a frequency-changer serious instability is sometimes traced to a break in the grid circuit of the first-detector portion; the fault might be in the leads from the coil to the valveholder and earth, or A.V.C. line, or in the grid winding itself. After checking externally, therefore, test the coil for continuity. Trouble in this direction would generally be suggested by flattened tuning and lack of sensitivity. Continued on page 63)
The ABC of Transformers

A Practical Article Explaining the Whys and Wherefores of Transformation

It has been said of the electrical epoch that it is the "Age of Wasted Energy," and the statement has considerable justification. The efficiency of any generating plant, expressed as a ratio of input to output, is sufficiently appalling to give all but the most hardened engineers occasional twinges of conscience.

In the present scheme of things generation losses are accepted as part of the price we pay for power. Distribution losses, on the other hand, constitute a waste factor and are to be avoided. It is here that alternating current has the advantage over direct current, for the transformation losses are negligible with the former, a large transformer being probably the most efficient machine ever made.

**Comparative Efficiency**

The smaller types used in radio receivers have an efficiency of 60 to 80 per cent, while power transformers handling over 5 kilovolts are rated at 95 to 97 per cent. efficiency. Compared with the 45-50 per cent. efficiency of a motor-generator arrangement it is evident that efficiency alone is not the factor which interests the designer of wireless equipment. He is more concerned with the operation of which the domestic supply of 240 volts can be safely reduced to 4 volts for valve heaters, or stepped up to 8,000 volts or so for cathode-ray equipment.

The theory underlying the principles of electro-magnetic induction is too involved for discussion in an article of this nature. We are all familiar with induced magnetism, and from there to induced electro-motive force we have gone into the way of taking things for granted. We may, however, digress for a moment to consider the major points of inductive action.

**Inductive Action**

A transformer consists in essentials of two insulated windings which are wound over a closed magnetic circuit, generally of iron. Alternating current is fed into the primary winding, say 50 cycles per second, and the alternating voltage induced in the secondary winding is 90° out of phase with the primary. The voltage applied to the primary causes an alternating current to flow in the winding which induces by electro-magnetic action an alternating flux in the iron circuit.

If we take the elementary transformer (Fig. 1) and plot the voltage and current values against a basis of time, we get a series of curves showing the relationships of the two quantities. Curve 1 (Fig. 2) represents the wave form of the voltage applied to the primary. Curve 2 is the current wave, lagging on the voltage by 90°, the common phenomenon of inductive circuits. The magnetic flux induced by the current in the primary is in phase with it and is shown by curve 3.

This alternating flux induces a voltage in the windings that is lagging by 90°, shown by curve 4. This back-voltage, lagging by 180° on the applied primary voltage, is known as the counter E.M.F., or back E.M.F., of self-induction.

It will be seen, therefore, that the initial primary voltage has to perform two functions—to force a current through the D.C. resistance of the windings and to balance the counter E.M.F. produced by that current.

With a well-designed transformer the primary inductance is high, being of the order of several henries. The reactance at the excitation frequency is given by 2πfLp, so that the effect of D.C. resistance of the order of 10 ohms is negligible.

**Fig. 1.—Diagrammatic sketch of an elementary transformer, indicating the magnetic flux.**

**The primary current with the secondary open circuit is determined by**

\[ I_p = \sqrt{R^2 + (2\pi f L_p)^2} \]

and has been seen to be lagging 90° on the primary voltage. It will be seen that the power absorbed by the primary over the period 0° to 180° is given back to the alternator over the period 180° to 360°. Hence over the whole cycle of alternation no power has been absorbed, and the primary magnetising current is said to be "idle," or "watts-less." In dealing with the theoretical case, no allowance is made for losses incurred with magnetisation or resistance. Actually, small losses do occur, and will be dealt with at a later stage.

**Fig. 2.—Voltage, current and flux curves in a mains transformer. I = Applied primary volts; II = Magnetising current; III = Flux; IV = Back E.M.F. of self-induction.**

If the transformer is soundly designed, practically all the magnetic flux induced by the magnetising current will cut all the turns of both primary and secondary windings as it changes direction. Thus it follows that the voltage induced in each turn of the secondary is equal to that induced in each turn of the primary. Therefore, on open circuit, the ratio of primary to secondary E.M.F. is equal to the ratio of primary to secondary turns, and is known as the transformation ratio.

Also, since the secondary E.M.F. lags 90° on the flux producing it, it is 180° out of phase with the voltage applied to the primary winding.

Before passing on to the consideration of the secondary circuit under load, it should be noted that a transformer should never be used on a frequency lower than that for which it was designed.

**Counter E.M.F.**

The counter E.M.F. of self-induction, which as we have seen, limits the magnetising current, is determined by the equation

\[ \psi = 2 \pi f L_p I_p \]

Therefore, since f is lower, the primary current must be greater to increase the counter E.M.F. The increased value of primary current in turn reduces the inducance of the primary and hence the counter is again increased. The effect of a lower frequency is therefore to increase the heat losses in the primary, and in the iron circuit, due to the increased flux density. A higher frequency of excitation is permissible.

The previous discussion has dealt with transformers with open-circuit secondaries. When the secondary circuit is closed by a resistance, such as a valve heater circuit, the secondary E.M.F. gives rise to secondary current in phase with the voltage.

The secondary current will in turn set up an alternating flux in the transformer core proportional to itself and the turns of the winding. Furthermore this secondary flux is in opposition to the flux produced by the primary current. Part of the latter is therefore cancelled and the primary inductance decreased.

**"Load Component"**

An increased current will flow through the primary winding to restore the flux to its original level and so preserve the balance of the applied voltage in the E.M.F. of self-induction. This additional current is termed the "load component" of the total primary current.

The complications involved when part of the secondary load is reactive—as in the case of the H.T. secondary winding, are of technical rather than general interest, and will not be discussed at this point.

In a future article, transformers under test conditions will be dealt with, and a design for a power transformer for home construction will also be given.
In 1936 we described a very efficient three-valve for short-wave use, in which the bandspread system of tuning was employed. The circuit is given below, from which it will be seen that an H.F. stage is employed, with the bandspread tuning in the detector stage. R.C. coupling is employed between the detector and output valve, and pentodes are employed in all three stages.

The wiring is so simple that no difficulty whatever should be experienced, but care should be taken to keep the under-chassis components clear of the metal surface. Resistances R1 and R3 have long connecting leads and therefore if there is a tendency for them to touch the metal chassis it will be advisable to place a piece of insulating material, such as empire cloth, underneath these components. Alternatively, their free ends may be secured to the nearest M.C. bolt by means of insulated wire. The only other point that needs mentioning is the volume control. The spindle of the specified control is insulated from the centre tag, and therefore it will not be necessary to use an insulating bush. If a non-specified control is used, however, it will be advisable to insulate the spindle from the metal panel.

Battery Leads

After the wiring has been carefully inspected, the battery leads may be joined up. H.T.3 should be plugged into the 120-volt socket of the H.T. battery, H.T.2 into a socket between 90 and 120 volts; greater volume should be obtained when this lead is plugged into the 120-volt socket, but the H.T. consumption will be greater than with the 90 socket in use. The voltage applicable to H.T.1 is governed by that applied to H.T.3. With 120 volts on the latter, H.T.1 should have approximately 36 volts, but the last socket can only be found by experiment. The H.T. — lead should, of course, be plugged into the — socket of the H.T. battery and the G.B. — lead into the — socket of the G.B. battery, with the L.T. — and H.T. — leads connected to the — and — terminals of the accumulator respectively. G.B. — lead must be plugged into the — socket of the G.B. battery, and G.B. — into the — socket of the H.T. battery. As the H.T. battery is running down, it will be necessary gradually to lower the setting of G.B. —, however. When the battery voltage has dropped to 80 volts, about —3 volts bias will be unsuitable.

Aerial Series Condenser

When the battery leads have been correctly wired, the aerial-earth and loudspeaker leads may be joined to their respective sockets and the set switched on by means of the three-point on-off switch. If a very long aerial is used the aerial series condenser C1 should be adjusted so that the moving vanes are nearly out of mesh. Reducing the setting of this condenser has the effect of reducing the effective length of the aerial. In most cases it will be found the best results will be obtained by keeping the volume control at maximum.

Tank Unit

As some constructors may not have used the 120-volt tank unit, a few notes will be given concerning this. Condenser C3 is the tank, having a maximum capacity of 140 mfd, variable in ten steps by means of the control knob. Condenser C2 has a maximum capacity of approximately 20 mfd, and is connected in parallel with the tank C3, thereby enabling the operator to increase the effective capacity across the coil by this value. The specified coil has a wave-range of 24.6 to 31 metres when tuned by means of a .00016 mfd condenser, and therefore when stations between 24.6 and approximately 27 metres are to be tuned in, the tank condenser control should be set at the first stop. If, on the other hand, stations between 49 and approximately 43 metres are to be picked up, stop 5 should be used.
ON YOUR WAVELENGTH

The Radio and War

With war clouds hanging over Europe we have had a foretaste of the service which radio would yield should war break out. I trust, however, that this calamity will not happen, and that by the time you read these notes, which must necessarily be written some days before you read them, the world has reverted to normality.

During the last war we had to rely upon the newspapers, for broadcasting had not started. 'To-day it is being used more and more by foreign Governments as an instrument of propaganda to further political interests and to foster national hates. In the event of war we should rely upon the radio for accurate news, for it would be the mouthpiece of the Government. During the last war such wireless telegraphy receiving and transmitting sets as were in existence were confiscated, and I have no doubt that in the event of another war amateur transmitting sets would be similarly confiscated. I do not think, however, that receiving sets will be interfered with.

During the recent crisis many announcements of the latest position were made by radio, but the one which seemed to have given rise to the greatest consternation was the announcement that the Premier was flying to see Herr Hitler. Never has my post bag bulged so much with a mixture of letters of appreciation and contempt. The letters vary from extreme shame that a British Premier should humiliate the British race and destroy what shreds of British prestige were left, to extreme approval that he should have the courage to have sought a solution by personal contact. Most of the letters state that the writers feel that such a meeting should have been kept secret, and nearly all of them ask for my views on the announcement. Sorry that I cannot oblige, for this is a non-political journal, and as I do not possess any particular brand of politics, preferring to believe that all parties are right and wrong sometimes, and to pin my particular belief on the particular party which I think to be right on a particular occasion, nothing I could say could add anything to the discussion. I will however, express the opinion which I have so often given that I think the wireless should be used solely for entertainment purposes.

Dealers' Replies

I published a reader's letter in the other week which quoted the foolish reply of a radio dealer who, when asked why television was radiated on such short wavelengths, said that the pictures won't stretch more than 5 or 6 metres! A trade paper commenting on this says: "If Thermion is the fair-minded bloke I expect, Editor F. J. Camm will not object to a lively radio dealer coming back with some of the foolish things that customers say. Or are these so frequent that they are not news?"

The paragraphist who wrote this serves a trade paper, and if he is the alert bloke I have the right to expect him to be. He ought to know by this time that the customers who buy wireless sets and components, in 90 per cent. of the cases, know far more about radio than the dealer ever will. I have not a very high opinion of wireless dealers, and most of the comic stories which come to me have their genesis on the dealer's side of the counter. I fairly publish most of the stories I receive, and if you search through the files you will find that the funniest stories have been at the dealer's expense. I have no doubt that when some of the "lively" radio dealers "come back with some of the foolish things that customers say" those statements will have originated from letters which I have published in these columns. It will thus definitely not be news.

Great Increase in Wireless Licences

The Post Office issued 374,002 wireless receiving licences during August, 1938. This figure represents a net increase of 32,147 in the number of licence-holders during the month after making allowance for expired licences and renewals. This is 65 per cent. greater than the increase established in July.

The total number of licences in force at the end of August, 1938, was 8,686,850, as compared with 8,295,950 at the end of August, 1937, an increase during the year of 383,900.

During the month there were 491 successful wireless prosecutions.

French Television

I hear that television transmission characteristics which will not be changed before July 1st, 1941, have been announced by the French radio minister, M. Julien. They include: Vision wavelength - 15.02 m. (48 Mc/s). Sound wavelength - 7.14 m. (42 Mc/s). Polarity of transmission.. Positive. Number of pictures... 50 interlaced per sec. Number of lines... Between 440 and 445. Picture proportion... 5.4 (width/height). Duration of line synch. signals... 18 per cent. Duration of frame synch. signals... 15 lines per interlaced section (about 7 per cent.).

More About Crooners

Sir Edward Bairstow, who presided at the Glasgow Congress of the Incorporated Association of Organists, ran his eye down the Agenda to be discussed. He came to crooning, and I understand that his face contorted and his nostrils distended like a Heath Robinson cartoon of a crab-apple. This is what he said: "There is no necessity to discuss crooning, it is a damned ugly thing."

Television at 5s. a Week

I am informed by the G.E.C. that two important additions to their range of popular-price television sets have just been announced.

The first of these is a vision-unit giving the standard picture of 7½in. by 5½in. at 23 guineas. The other is a sound and vision console model priced at 37 guineas which gives almost double the picture size with a 10in. by 8in. screen.

Other G.E.C. models announced include a combined television and all-wave radio floor model with mirror viewing at 60 guineas which
also gives a 10in. by 8in. picture, and a de luxe model of the same set at 70 guineas with a 13in. by 11in. picture—the largest screen obtainable to-day without the use of projection technique. All these models are available on hire-purchase terms, from 5s. a week.

Inventors

HERE is another letter from K. T. H., of Birkenhead, on the vexed question of inventors and their ways:

"As one of the army of crank inventors who are so dear (?) to the heart of Mr. Camm, I suppose it is too bad of me to poke fun at a brother genius, but I can't wonder at Mr. Camm's excitement when the word inventor is mentioned in his hearing after reading the letter of Mr. McC. about his diamagnetic high-tension spring-adjusted indoor aerial, which he has now boiled down so that it can be put on the market at 3s. 6d. to 4s. 6d."

"Something will be boiled down, I have no doubt. What a shame it is that no one at the Patent Office, or anywhere else, will point out the obvious snags in this keen reader's idea, if only for his own sake. He seems to have got all mixed up very badly. Since he keeps his diamagnetic wires in a state of high tension by means of spring adjusters, obviously the tension will vary constantly as temperature varies, and at no time will all the various wires be under the same degree of tension, since no two springs ever made are exactly alike. I think myself that he would be well advised to ask a slightly higher price so that he could include a tuning fork to get all his wires on the same note. Or are they tuned on a musical scale? If the B.B.C. Military Band is broadcasting something written in A flat minor, what happens to reception if the aerial is tuned to D sharp? Does the tuning of the aerial automatically adjust itself, or is some form of manual tuning provided, all for 3s. 6d.? Who knows what this may lead to? No doubt, the day will arrive when we shall need no 'push buttons' or other tuning arrangements in the set itself. In place of these we shall have some form of remote control, one end of which will be connected to the adjustable diamagnetic spring-controlled aerial, and the other to a small dial showing all the different wave-lengths, and all we shall need to do is make the aerial tighten up or slacken off till it will only respond to the wavelength of the particular station we wish to listen to. Of course, I can't say what that will be of course, I can't say what that will make anything actually 'boil over'—Editors, for instance! I used to think Mr. Camm was a little hard on we poor mutts. Now I can see how much I misjudged him. I appreciate what good reasons he has for looking on inventors as just a pain in the neck. Taking we inventors as a whole, the only valuable service we render to the world at large is to add to its gaiety and amusement. We are the funniest ever. The god we worship, is definitely, Heath Robinson!

Inventor McC—tuned his aerial to G

Then transmission is made on A flat.

Say—Inventor McC—that don't matter to me, my tension springs soon alter that. When sopranos would sing—you just tighten a string

Then their top notes come through like a bell,

And for Rachmaninoff—you just slacken off,

And for basso profundo as well.

So with wires 'out' or 'in' this invention must win,

It is easy and simple to fix.

You'll never be lost—to provide its small cost,

When "boiled down" it's just three-and-six.

"From which you will easily see that I am a particularly vile specimen myself—I am not only an inventor, I am also a poet? ? ? ? And I don't think even Mr. Camm could survive that combination of evils for any considerable period without giving up the ghost."

"Best respects and good wishes. Keep your page bright and snappy with the latest information about all these new and wonderful inventions."

Woman's Fair at Olympia

THE Marconiphone Company inform me that they have secured the contract for the Public Address installation at the Woman's Fair and Exhibition which is to be held at Olympia from November 2nd to 26th. The equipment to be employed will consist of a series of high-fidelity high-power amplifiers operating several giant 4-unit loudspeakers in the Main Hall and the National Hall, besides a large number of units of smaller power in other parts of the building. The music will be provided from gramophone records and also from the band, and S.O.S.'s and announcements of importance will be made throughout the system as and when required.
The Amateur Transmitter

Planning and Building the Station: Operating Procedure: The Log-book and QSL Cards

By L. O. SPARKS

Station layout is a very important matter. Nothing is more detrimental to good work than a collection of apparatus piled haphazardly together without any thought of efficiency, system or ease of working.

A shipshod layout does not indicate great care of equipment; every amateur worthy of the name is not only rather particular about his apparatus but also takes a pride in its appearance and the overall efficiency of his station. To achieve and maintain a reasonable standard it is absolutely essential to adopt some system of layout and working, but as these requirements are governed by individual conditions it is impossible to give hard and fast details. However, here are some general points to be observed.

When the question of the location of the station is being discussed, bear in mind that a station is being designed, not a living room. It is both annoying and troublesome to select an ideal spot as regards space and other facilities and then to find that it is practically impossible to make contact with the aerial and an efficient earth. If a choice has to be made, select the site most favourably placed for the last two items.

Planning the Layout

Once again space will rule over ideas and plans. Whether a table, bench, rack or shelves is to be used depends on local conditions; therefore suggestions are given below for all these.

A table to carry all the gear is very satisfactory, provided it is such that fixtures can be screwed to it and, if the necessity arises, additions made without the fear of spoiling its appearance. A good stout kitchen table, with drawer, is ideal, as its top can be covered with baize or linoleum and books, screws, switches and any other requirements can be fitted to the sides or leg tops without the feeling of damaging a good piece of furniture. It is usually possible to pick up a table of this type for a very reasonable figure at a second-hand dealer’s or a furniture sale.

With a table, however, it is often difficult to lay out all the gear in a satisfactory manner. The set or transmitter might be placed in an ideal position for operation, but, it is then found that the monitor, wattmeter or other meters are awkwardly placed for easy manipulation or, on the other hand, no space is available for speaker, batteries or mains unit, or the jottings down of observations in the log-book.

The suggestion outlined in Fig. 1 is the result of using a table for some time and getting fed-up with balancing one item on top of another during moments of check testing. The shelves, fittings and placing of the items can be varied to suit own requirements. One item calls for special mention: see that adequate lighting is provided, and that it is so arranged that inspection of the interior of the set or transmitter can be easily carried out. The small inspection lamp shown is operated off an old bell transformer, i.e., low voltage.

Fig. 1. —A suggested layout for a table; note the additional shelf to increase useful area.

Racks

Racks can be divided into three classes, as shown in Figs. 2 to 4. They provide an ideal method of construction when

(Continued overleaf)
space is limited or when a compact assembly is required.

The box type is the most rigid and protected of the three arrangements; the open type (Fig. 3) allows quick observation and testing, but provision must be made for covering all parts at high potential, to prevent the possibility of shocks to the operator and any other member of the household who might come in contact with it. Domestic pets must not be overlooked.

The third method (Fig. 4) is very similar to Fig. 3 with the exception of the shelves being reversed and no panels used, the controls being mounted on brackets. This system was devised for use in a narrow recess and for experimental purposes, but it could be adapted to satisfy many requirements.

For home construction, wood is the best material, although, if the workshop is equipped for simple metal work, some very neat and sturdy racks can be made by anyone with a little experience.

Station Operation

Causal listening is no way to gain the true amateur status; it does not follow that one has to become a slave to a receiver or ignore all other objects, but to gain a thorough knowledge of short-wave communications the whole matter must be treated with a certain seriousness prompted by genuine enthusiasm and interest in the subject.

Worth-while records should be kept, and for this purpose a log-book should be maintained and used during listening periods. Suitable books can be purchased or made from stiff-covered exercise books, the pages being ruled off in the manner indicated by Fig. 5 which, incidentally, is a copy of the log sheets obtainable by members of the B.L.D.L.C.

Stations operating under an A.A. or full transmitting license are bound, by the I.M.G.'s regulations, to keep an accurate log-book in which has to be recorded full details of all operating periods.

Old-time Minstrels Revived from WLW

"GENTLEMEN, be seated!"

It's the old-time minstrel show interspersed with pleasant memories of the late Al. G. Fields, Lou Dockstader, McIntyre and Heath, and, in more recent years, Lasses White, Neil O'Brien and others of burnt cork fame, that one hears over WLW, 9:30 to 10 p.m., EST, on Mondays.

When Owen Vinson, WLW programme director, sought to revamp "The Minstrel Man," he drew from the staff some veterans of the old minstrels. Charles Lammers of the production staff, himself an old minstrel, is in charge of production. Hamilton Carr is featured as Colonel Merryweather, the interlocutor.

Playing the Dick Dick first starred on the air in the old WLW "Cotton Queen" minstrels, are featured end men, as are Ray Shannon and Charlie Dameron. Shannon's stage career began more than a quarter of a century ago as a blackface comedian, and Dameron did his time with Lasses White before entering radio.

Joo Lugar and His Dixieland Dandies, the band that made the "Cotton Queen" famous for its old-time minstrel tunes, provide the music interludes and background for the new "Colonel Merryweather's Minstrels" over the Nation's Station on Monday nights.

LISTENING TIME AND FREQUENCY

The amateur transmitting stations will be heard on the following bands: 5 to 5.3 metres, 10 to 10.71 metres, 20.83 to 21.45 metres, 41.12 to 41.64 metres, 130.0 to 130.4 and 150.4 to 151.4 metres approximately.

The beginner will do well to start off on the 40-metre band as this does not require the same fine touch as the higher frequencies, and there is usually someone on the air during most of the day. During the week-ends they are easily picked up.

The next bands, 20 metres, will usually provide the best bag of distant stations during late afternoon and evening, but when sitting in on a listening period it is advisable to explore all the bands in turn and then settle down on one section, according to prevailing conditions.

Time and weather play peculiar pranks with the reception of S.W. signals, and it will soon be found that one band may become more-or-less useless during an hour, while another band will start coming in at a strength far beyond that which it was received, say, two or three hours earlier.

South African Music Scholarship

The musical composition scholarship offered by the Performing Rights Society to South African composers to enable them to study in this country has been awarded to Mr. Arnold Van der Wyk, a 22-year-old student at the Stellenbosch University, who has written the music for the forthcoming Voortrekkers Centenary Celebrations at Pretoria. The scholarship, which has a value of R200 per annum, is available for a minimum period of two years. Mr. Van der Wyk is expected to take up his studies shortly at the Royal Academy of Music in London.

The offer of the scholarship by the Performing Rights Society was made at the beginning of this year following a visit to South Africa by the General Manager, Mr. C. F. James. He discussed the project with General Smuts and other prominent South Africans during his visit and it was held unanimously that it would help very materially in encouraging the latent talent among the composers of South Africa.

Wide interest was attracted throughout the Union by the competition, and a considerable number of entries were received.
A Page of Practical Hints

**Readers Wrinkles**

**提交你的想法**

An Inter-house 'Phone System

I CARRY out my experiments in a shed at the end of my garden, and when anybody wants me they invariably have to come down to the shed, as when the door is closed I cannot hear them when they pass by. 

I have been experimenting with a simple inter-house 'phone system using parts from the junk box. As will be seen from the sketches, the use of standard Home Office bayonet socket protection fittings enabled me to improve the use of an ordinary earphone for the transmitter, whilst giving each unit a distinguished appearance. It will be noticed from the circuit diagram that there is no battery boosting in the phone circuit, the reproduction with the simple series circuit being ample as there is seldom any noise to drown the speech.

The H.O. fitting is secured to the earphone by an aluminium disc, a 6 B.A. bolt passing through the centre and clamping the "mouthpiece" against its internal ridge, and with a spring washer on the underside of the phone cap. It was, of course, necessary to drill a number of screw holes not only in the disc, but in the phone cap itself, as shown.—L. G. Hegg.

**Special Notice**

All wrinkles in future must be accompanied by the coupon cut from the edge of the 'phone coil.

**Method of improving the tone of a moving-coil speaker.**

Improving a Moving-coil Speaker

The accompanying sketch illustrates an idea for improving the tone of the cheaper type of moving-coil speakers. I have a paraphase push-pull amplifier, and I decided to try and improve my 1937 loudspeaker. I snared the whole cone, by drilling and glued a piece of thin wire, about 1/16 in. from the speech-coil to the back of the cone. By drilling a number of holes in the cone, I then cut away that part of the cone which acts as a hinge for the cone to the chassis, and suspended the cone by means of pieces of insulating tape, stuck one end to the edge of the cone and the other to the chassis, thus allowing for free movement of the cone. I have since substituted this by felt. The resulting change in tone after this modification is remarkable. The bass response is completely free from bass resonance, and also responds to the lower bass frequencies much better. The high note response is much better, and is free from annoying resonance and there does not appear to be any loss in transient response. Reproduction as a whole is more forward and clearer.—J. Rogers (Erith).

**Simple Conduit for Extension Leads**

Simple Conduit for Extension Leads

I have just made very good use of two old cone speaker magnets, and the accompanying sketch shows the method I have adopted for the novel construction of two low-voltage relay working on the solenoid principle. These magnets already had clamping holes in each pole piece, and by shaping a stout brass clamping bracket as illustrated, and with the aid of a further support at the rear, a rigid fixture was simply attained. The armature "A" comprises a piece of thin springy copper, about 20 S.W.G., and by fitting a long B.A. screw, and soldering this to the commoning contact piece, the circuit for the two copper contacts was kept independent. For the solenoid coil I wound 50 turns of No. 30 B.S.W.G. enamelled wire round a cardboard former, and in constructing this former I left an air gap of 3/32 in. to permit a reasonable clearance.—F. G. Letwood (Stratham).
TELEVISION: LATEST

Details of Some of the New Season's Receivers

In our issue dated September 10th we gave the main picture sizes of the majority of television receivers now available. We have now had an opportunity of examining the various types of receiver which employ the magnetic system. The illustrations on this page show the interior of two well-known television receivers, one a Bush and the other an H.M.V. receiver, and the Bush illustration clearly shows the magnetic coils round the cathode-ray tube. These illustrations serve to show the general method of building the modern television receiver, where each section is built up separately on its own chassis, although in one or two cases the entire apparatus has been built on a single chassis. A good instance of this is the new Marcophone and H.M.V. table receivers, where the makers have succeeded in crowding on to a single small chassis a 6-valve radio chassis and the 10-valve cathode-ray tube apparatus, whilst the small cabinet also houses the speaker and cathode-ray tube.

Circuit Design

The radio side of most modern television sets is of the superhet type, the separate vision and sound signals being picked off by suitably adjusted circuits from a single frequency-changing stage, but in the Marcophone and H.M.V. receivers the straight (T.R.F.) circuit is retained. The intermediate-frequency adopted in the superhet types of receivers varies and some value

A typical television unit providing only the television, sound and picture, are on sale, and it is interesting to note that considerable changes have been made in some of the receivers which were formerly on the market. At one time there was only one, for instance, which utilized magnetic

The Bush television chassis is

light might be seen on the screen. In the receiver mentioned, which is a Tannoy set, a whistle starts up when the transmitter switches off and thus the user knows that the set should be switched off.

Another point of interest is that the standard resistance-capacity method of coupling, which has hitherto been thought to be the only satisfactory system for the

TELEVISION

Special Electrodes

Originally, the cathode-ray tube electrode system consisted of a directly-heated cathode surrounded by a Wehnelt cylinder, while in front of this combination was a simple orifice diaphragm. This arrangement served to meet the needs of early experimental work, but the demands of television brought about radical changes. It was noted that at this year's Radiolustria the majority of the cathode-ray tubes used in the television receivers were operated electro-magnetically, and from the point of view of the tube manufacture itself this has simplified matters very considerably. On the other hand, the design of the actual electrodes themselves has been the subject of very important research. This is usually of the indirectly-heated and according to both make.
T DEVELOPMENTS

TUBE SIZES

There is still considerable controversy regarding the size of picture which should be adopted for normal domestic purposes. A 5in. tube is employed in a number of sets, and the picture size varies according to the particular mask employed. In some cases the maximum area is utilised in spite of the curvature of the tube end, whilst in others the mask has been reduced so that a more or less flat picture is obtained. Sixteen inches is the size of the largest tube employed in the domestic receivers, and, again, this is masked to provide slight variations in size by different makers. The practice of utilising a lens to magnify the size of the picture appears to have fallen out of favour, although several receivers are still available with the cathode-ray tube in a vertical position and the picture viewed by reflection in a mirror. Glass protecting screens, either of plain or safety material, are also incorporated in some receivers, whilst others have the tube end directly exposed.

The very small type of tube, providing a picture about 2ins. or so in length, is employed in the projection model receivers, such as are supplied by H.M.V., Philips, Baird, Pye and other firms. In these the tube is placed at the lower end of the cabinet, directed upwards, and a lens is used to project the picture on to a mirror from which it is thrown on to a screen. In the Baird receiver two screen sizes are adopted, and it is possible to change the screens in a very short space of time so that the desired size of picture may be obtained. The two screens measure 18in. by 15in. and 24in. by 18in., and fold inside the lid of the cabinet when not in use. The usual trouble with the projection type of receiver is that the picture must be viewed from a position as near as possible directly in front of the screen, and as the angle of vision increases the brilliancy of the picture rapidly falls off.

CONTROLS

In some receivers a single control is adopted for contrast, and a single one for volume on the sound programme, whilst in others it is possible to control from the panel the brilliancy, contrast, frame and other apparatus is so reliable that picture shift,

IN NEWS

Special manner. This has been done with a view to securing the best possible control of the electron stream in its passage to the front fluorescent screen. In one case the control grid is shaped like a hollow cone with its apex close to the cathode and wide end facing the anode. It is claimed that in this way the distribution of the electrostatic lines of force between the cone mouth and the anode is such that the electron stream is constrained to keep to the centre axis and this increases the number of electrons passing through the anode aperture on the way to the screen. Furthermore, the signals applied to the grid electrode, when shaped in this manner, do exercise a more decisive action on the electric field inside the tube and the anode is almost.
Add-on Tuning Units

How Push-button Tuning may be Incorporated in Any Existing Type of Receiver — By W. J. DELANEY

Many listeners are anxious to fit push-button tuning but do not wish to alter their existing receiver. It is, fortunately, quite a simple matter to add this form of tuning, and the only difficulty which presents itself is what form the additional unit shall take.

You can build a simple push-button unit with condensers which may be inserted into the receiver cabinet and wired to the existing circuit; you may build a complete separate tuner with valve or valves to add before the receiver, or in an advanced form you may build a complete remote-control unit which will enable push-button tuning for a number of stations to be carried out from a distance.

In Figs. 1 and 2 are shown the elements of a simple add-on unit, and all that is required for this is the necessary push-button mechanism, a strip of paxolin and a set of condensers. As reliability is important the latter must be of a type which will retain their capacity under all conditions met with in the normal home and good quality components should be obtained. The push-button mechanism may be obtained for a single circuit, two circuits or three circuits, and the number of condensers needed will thus depend upon the circuit with which the unit is to be employed. The complete assembly will be very compact, and may be included in most receivers without altering the layout or otherwise modifying the receiver.

Simple Units

It will probably be found in most cases that the most convenient position is immediately above the ganged condenser, the valves or coils generally calling for a rather higher panel than is needed for the condenser alone. This is the best place for the unit as it should be wired to the condenser so that in the "manual" position the condenser is brought into circuit for tuning in the normal way. There will thus be a single lead for connection to earth, and one lead for each grid circuit in the position on the dial of the various stations a reasonable idea of the capacity required may be obtained.

Superhet Unit

A more useful add-on unit is that wherein a complete superhet converter is employed, and this may be of the mains or battery type. If a mains unit is used, it is desirable to include an ordinary mains unit with it for the supply of the necessary L.F. and H.T. The circuit may utilise the modern triode-hexode or similar combination valve to reduce the over-all size, and by mounting this and the rectifier on their sides the overall dimensions of the unit may be lowered considerably. When a unit of this type is employed the receiver may, by mounting the various stages, and thus the output (Continued on following page)
the unit is connected to the serial terminal of the receiver and the latter is tuned to a long-wave setting—according to the I.F. which is desired. With this scheme, therefore, only one connecting lead need be employed, although for the sake of efficiency it is desirable to use an earth link between the two units.

The unit may be assembled on sheets of paxolin bolted to the framework of the push-button unit and a general idea of the scheme is shown in Figs. 3 and 4. Modern small iron-core coils should be used and there is a wide range from which these may be selected. Care should be taken if the coils or the unit are not screened, that interaction does not take place with coils or wiring in the receiver.

Remote Controls

A more ambitious and interesting scheme is to devise push-button tuning units as a remote control device so that any number of stations may be selected from a distant point without having to go to the receiver to change the station. There are various ideas which may be adopted to enable this to be done, but probably the simplest is to use ordinary relay systems. Each component is joined to a contact as in the case of the push-button arrangement, but the circuits are arranged in such a way that a small relay-modified bell-magnets, or built-up telephone magnets may be used. Each magnet is wired to a contact so that a lead may be connected for instant operation, and thus the extension lead will consist of a number of cables, one for each push-button, plus a battery and voltage source which will suffice, and many schemes offer themselves for the automatic resetting of each relay when a new station is tuned.

The main idea is outlined in Fig. 5, and variations will present themselves to the keen experimenter. At the present time there are on the market a number of very good relays and associated contact apparatus which are in the nature of G.C.H.D. items, and obtained from manual telephone exchanges and gear upon the changeover to automatic. The main idea is put to good use in the making equipment such as that above indicated, but owing to the variations in apparatus and in individual preferences it is not possible to give a detailed description of automatic tuning as this lends itself most readily to the modification, but systems in which the main tuning condenser is moved for each station may also be employed, provided that means of carrying out the condenser movement may easily be added to an existing set. In most cases it will be found that this is not possible without considerable modification to the receiver design.

WIRELESS COILS, CHokes AND TRANSFORMERS, AND HOW TO MAKE THEM.

Edited by F.J. CANN.

B.B.C. MUSIC PROGRAMMES, AUTUMN, 1938

A NEW issue of the B.B.C. Music Programmes Pamphlet contains details of advance music programmes and other general information concerning music to be broadcast during the fourth quarter of 1938. The pamphlet includes details of the new series of Symphony Concerts; the Sunday Evening Concerts which will be devoted to oratorio and chamber music; and the most important "outside broadcasts," such as those of the Royal Philharmonic Society, City of Birmingham Orchestra and the Halle Society.

"B.B.C. Music Programmes, Autumn, 1938," may be obtained for 3½d. post free, on application by post to the B.B.C. Publications Department, 35, High Street, Marylebone, London, W.1, or for 2d. on personal application at retail post offices, London and provincial Post Offices; London, W.1, or any B.B.C. Regional Offices. Envelopes and postcards should be marked "Pamphlet." In the top left-hand corner.
Television Improvements

The usual form taken by an electron microscope is familiar to most readers of PRACTICAL AND AMATEUR WIRELESS. An image of the object to be magnified is focused on a photo-electric cathode, and the electron image so formed is focused electronically on to a fluorescent screen, and the circuits employed enable the resultant image to be enlarged several diameters. This is satisfactory for many purposes, but occasions arise when the degree of illumination is insufficient, this being particularly so when very high magnification is essential. To meet this, the electron microscope has its fluorescent screen replaced by a mosaic screen very similar in character to an Iconoscope. The electron image directed on to this brings about the normal dislocation of condenser charge effect. This screen is then scanned by an electron beam, and the resultant signal output produced is fed to the control electrode of a standard cathode-ray tube. This produces a picture of the object under examination, and since the scanning beams are deflected by pulses generated by a single time-base, there are no synchronising difficulties.

Provincial Requirements

Addressing a gathering of various representatives of the radio trade in Nottingham recently, a well-known television engineer, as a result of the questions he was asked, formed a fairly accurate idea of the requirements of the provinces in so far as television is concerned. Although looking forward anxiously to the day when the promised chain of provincial stations is opened, the general feeling of the meeting was that they were glad that London and the home counties had had all the teething troubles associated with the initiation of the B.B.C. service. On the other hand, little effort had been made to ascertain whether it was possible to secure signals of adequate strength in that district from the present London station. This is to be regretted, for whilst the connection must inevitably bring about a close study of the subject of television, and the knowledge acquired would be of great service in providing against the time when signals beyond more generally available. It was also pointed out that whereas in London there are so many counter attractions to home viewing, this is not the case in the provinces. It should follow logically, therefore, that the sales of receivers would be more substantial well outside London than in the Metropolis itself, and the truth of this will, no doubt, be substantiated when the second B.B.C. station is built and in operation.

Compact Sets

The desire to make television receivers as compact as possible has manifested itself on the continent as well as in this country. Many of the new British designs are astounding.

A modern Continental television receiver giving radio, as well as television, in a compact form with only a single vision control.

base give control of sound volume and picture contrast. The brightness control is coupled with the contrast control, and is individually adjusted for each receiver, while the modulation control is quite automatic. There is a gain of amplification provided, and it is claimed that an input voltage of half a millivolt from the television tube is sufficient to produce a satisfactory picture measuring 9in. by 9in. The output stage coupled to the control electrode of the cathode-ray tube is so designed that it is always possible to work the set at maximum brightness, and yet secure an adequate range of contrast in the picture. As a result of the short length of the C.R. tube, focus is good, and although the radio tuning is fixed for the broadcast band, it is possible to change the tuning coils. When used for sound only, the consumption is 100 watts, this being increased to 180 watts for combined sound and vision.

BARGAINS BY ELECTRADIX

H.T. Transformers. 26 watts, open type for tubes to 5 x 20. Low cost, 41. 2000 volts, 250 kva, 18. 5,000 volts, 18. 7,500 volts, 18. 10,000 volts, 18. 12,000 volts, 18. 15,000 volts, 18. 20,000 volts, 18. 25,000 volts, 18. 30,000 volts, 18. 35,000 volts, 18. 40,000 volts, 18. 50,000 volts, 18. 60,000 volts, 18. 70,000 volts, 18. 80,000 volts, 18. 90,000 volts, 18. 100,000 volts, 18.

W R A R A S s . A n  im a g e  o f  t h e  o b j e c t  t o  b e e n l a r g e d s e v e r a l d i a m e t e r s .  T h i s  i s  c o n c e r n e d .  A l t h o u g h  l o o k i n g  f o r  w a r a r a s  t o  m e e t  t h i s ,  t h e  e l e c t r o n  m i c r o s c o p e  h a s  e l e c t r i c  c a t h o d e ,  a n d  t h e  e l e c t r o n  i m a g e  W r a r a s s s .
OUR FREE CATALOGUE SERVICE

To save readers trouble, we undertake to send on request catalogues of various manufacturers. Merely state, on a postcard, the name of the firm from whom you require the book and it will be sent free. PRACTICAL AND AMATEUR WIRELESS, Goo, New, Ltd., 102-103 Wardour St., W.1. Where addressers make a charge, or require prepayment, this is always stated clearly in the catalogue descriptions. No other correspondence whatever should be sent to this address.

GOODMAN'S LOUDSPEAKERS

The new booklet issued by Goodman Industries, Ltd., contains more than a catalogue, as it gives in detail the various processes involved in the production of a high-class speaker. The title of the booklet is "The "Goodman" Speaker", and it explains many of the mysteries of the modern speaker from the point of view of reception and production. Several of the firm's model speakers are listed, and a set of curves is included showing the performance of speakers and receivers. A copy of the booklet will be forwarded to readers on receipt of 1s., to cover cost of postage. The address is Goodman Industries, Ltd., Wembley, Middlesex.

BULGIN SERVICE MANUAL

The 1939 edition of the Radio Service Manual has now been received, and it may be obtained by readers price 3s. This has 70 pages devoted to all aspects of modern practice and includes 26 circuits and diagrams. The first two pages are devoted to useful tables and lists. Most of the terminology of the book has each pair of pages devoted to a separate subject, one pair of each subject, and in this respect, the book is of illustrated format. The subjects covered range from transmitters to test equipment and automatic volume control. Prices, decoupling, extension speakers, meters, switchers, and similar details are fully covered and every known detail should be covered to obtain a copy of this interesting manual.

VARLEY

There are 25 pages in the new Varley catalogue, which is in addition to the many valuable comments which two new items may be noted. Amongst these may be mentioned that the new T.E.J. transformers designed for 450 µw and available in three patterns at 6s. 6d. 6d., the catalogue details of coils, filters, power potentiometers, I.F. and P.E. chokes, power resistances, volume controls, I.F. and mains transformers.

CURING PRE-DETECTOR INSTABILITY

(Continued from page 52)

Instability in an I.F. stage can, similarly, be caused by unsatisfactory connections between the dials and the associated circuits, so similar tests should be instituted. Pay particular attention, however, to the screening cables of the I.F., coils, since perfect shielding is especially important in this part of the circuit. It might occasionally be found that the windings have slipped, or become loose, so that the coupling between primary and secondary windings is too tight; that will produce serious instability in an otherwise perfectly stable receiver.

Alignment

Should it be suspected that the trimming of the receiver's dials has been altered, careful re-setting should be carried out. In some cases the alignment should not be perfectly accurate on all of the tuning circuits, a slight discrepancy in one of them being intentionally allowed. Thus, it will often be found that stability can be completely restored by loss of quality or sensitivity, by the simple process of moving one trimming screw—preferably that of the aerial coil—when this proves effective through a small angle.

With a superhet, instability in the I.F. circuits might indicate that the I.F. transformer is in fault. They should be checked carefully, and preferably with the aid of a tuned modulated oscillator. Another useful and comparatively expensive instrument for this purpose is the Bulgin I.F. line, which consists of a neon oscillator fed from the A.C. mains and designed to give a steady signal which can be fed into the primary of the first I.F. transformer. Alignment is carried out in the usual manner, preferably with the aid of a visual tuning indicator or output meter.

A.V.C. Line

When A.V.C. is provided, the feed resistors and by-pass condensers should be tested, whilst the action of the automatic volume control circuit can be checked by means of the visual tuning indicator when fitted, or by a milliammeter connected in the anode circuit of one of the controlled valves. In this case, the anode should be short-circuited and the receiver tuned to a few of the more powerful transmissions to see that the anode current actually does drop as a signal is tuned in. If an A.V.C. feed resistor were open-circuited it would generally mean that the grid circuit of the corresponding controlled valve would be isolated from earth and therefore that the bias provided by the cathode resistor could not be applied to the valve. The result would be identical with that caused by a short-circuited bias resistor or condenser.

TELEVISION IN THE U.S.A.

ACCORDING to the latest reports from the United States it seems quite certain that the television picture standard which will be the initial television service in that country will be a line definition of 441 lines, 60 frames per second interlaced to give 30 complete pictures per second. The radio sets manufactured have not yet gone into production until certain improvements in the experimental transmissions have been carried out, but the engineers concerned are now busily engaged on this task. The new series of tests being undertaken by the National Broadcasting Co. at New York are expected to produce satisfactory reception within a 40 to 60-mile radius, but there seems little hope of going beyond this because of the very nature of the New York buildings themselves, and the configuration of the surrounding country. In addition to the New York stations, the N.B.C., the Columbia system has announced its plans to install an ultra-short-wave radio transmitter in the Chrysler Building tower of New York, which will be yet another part of the city. If this materializes, the inhabitants of New York will have the choice of an alternative television programme, and this should make a material difference in the market for home sets.

“AND NOW”

The R.B.C. recently issued a pictorial booklet of 32 pages dealing with television in a way it has never been dealt with before. The book is full of interesting pictures which tell the complete story of television to-day. "Television is obviously impossible"—runs the foreword, "but it is happening every day," and in the spirit of this lively statement, "And Now" shows page after page of express pictures taken at the camera man's elbow. We see the King and Queen as viewers saw them in the Coronation Programme, and we see on stage and screen personalities in the studio ; television plays with the cameras in action. The book is obtainable, price 6d., post free, from R.B.C., 33, Mary bone High Street, London, W.1. It can also be obtained at local R.B.C. offices.

NEW TIMES SALES EST. 1924

AVOID DISAPPOINTMENT, SECURE THIS WONDERFUL BARGAIN NOW!

ALL-MAINS AC/DC 5 VALVE SUPERNET R/GRAM CHASSIS

Complete set with 5-moving-coil speaker.

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ALL WAVES, 16,000 metres. Easy listening station name illuminated dial. Amazingly efficient 6-stage circuit with iron-cored J.F. transformers. Period valve, in last stage providing over 4 watts undistorted output. A.V.C. and control. A thermal resistance valve automatically controls supply voltage. Chassis size 12ins. wide, 7ins. deep, 8ins. high. Supplied complete with specially matched Cleton speaker with ft. cone, giving wonderfully natural reproduction up to the full output. Despatched with all valves, knobs and escutcheons. Guaranteed, fully tested. Yours for 5s./down and 18 monthly payments of 2s.

NEW 3-VALVE SHORT WAVE KIT COMPLETE WITH COILS: 12-95 Metres

Bandswitched tuning in one of the outstanding features on this excellent receiver, which receives short-wave reception as easily as that in the familiar bands. COMPLETE KIT, comprising high-grade components only, 2 9-valve British battery valves, Det. E.R. and Valves free to U.K. and Eire. Delivered by post, ready made, 29/6. Bargain in 6s. 0d. and 12 monthly payments of 6d.

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PRACTICAL AND AMATEUR WIRELESS

A REVIEW OF THE LATEST GRAMOPHONE RECORDS

H.M.V.

The first complete recording of Schubert’s Impromptus has this month been made. The man who shares with Artur Schnabel the distinction of being a first-class interpreter of this composer’s music—H. M. V. B 584—there is another delightful record by Kreisler of his famous “Liebesleid,” coupled with another of his compositions, “La Gitana” (B 1628).

A record that without doubt will be very popular is that by Anton and the Para-.

RAD. COMM., General Education.

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Greatest, largest and most famous of all institutions devoted to spare-time training by the postal method. Branches in 30 countries, students in 90.

Impressions on the Wax

What’s the Matter with Me — H. M. V. B 8744. "The Girls Who Work Where I Work" and "Happy School Days" are the titles with which Max Miller continues his series of riotous records—H. M. V. B 585. The Comedy Harmonists, whose records have so much appeal, have recorded two attractive light German numbers, "Now we’ll Drink just one More" and "Die Der Flussmusik" (The Village Band), the latter being very popular in Germany—H. M. V. B 5789.

Brunswick

This month the Brunswick Company introduce a rather unusual type of disc known as Calypso records. Calypso singing is a feature of the West Indies and can perhaps be explained by likening the singers to the old Elizabethan Troubadours. The lyrics are based on everyday occurrences, and improvised to a simple melody, more or less impromptu. Thus a visit of a notability, the winning of a Test Match, a record-breaking flight will form inspiration for a new Calypso record. The first record is now issued—Brunswick 2829—with the Caribbean Senakers supplying the orchestra accompaniment. At first hearing you will find these Calypso records a little strange and perhaps uncouth, but they leave a lasting impression and eventually you will be entirely captivated by their originality.

Decca

Two albums are supplied by the Decca Company in their "Permanent Music" series, the first being the recording of the Britten Variations on a Theme of Frank Bridge, played by the Boyd Nel String Orchestra on Decca X 229. These three records are supplied in an album with a note by Henry Lydon. The same band also play Handel’s Concerti Grossi Nos. 7, 8 and 9 on Decca X 132 to 57, contained in an album with a note by Walter Yeomans.

The big hit tune of the moment, "The Lambeth Walk," which is an hilarious item in the stage show "Me and My Girl," has been recorded by Eddie Cantor with Ambrose and his Orchestra on Decca F 6741. On the reverse side are two popular tunes, "Little Lady Make Believe" and "Says My Heart." Eddie Cantor has also recorded "Making the Best of Each Day" and "That’s the Kind of Baby for Me" on Decca F 6748.

The vocalists have "The Street Singer" singing "Somebody’s Thinking of You Tonight" coupled with "My Heaven in the Pines," on Decca F 6730. "So Little Time" (So Much to Do) and "You Leave Me Breathless," from the film "Coconut Grove," sung by Greta Keller with orchestra accompaniment, on Decca F 6750 and finally that popular radio comedianess, Tessie O’Shea, singing two humorous numbers, "Don’t Kiss Her in the Daylight" and "Ur-a-la-tie-aw," on Decca F 6751.

[Image 0x0 to 612x836]
Leaves from a Short-wave Log

The Maxim Memorial Station

To commemorate the memory of Hiram P. Maxim, first President of the American Radio Relay League, a station has been opened at Newington (Conn.) which comprises five separate radio transmitters on short waves. Its cost, defrayed by voluntary donations and grants, has been roughly $18,000 dollars. It is to be used as the official mouthpiece of the A.R.R.L. for communications with all members of this association.

More Spanish Stations in 40-Metre Band

F.E.T. No. 5 is the call of a Nationalist transmitter at Burgos (Spain) working nightly on 40.8 m. (7.335 me) from G.M.T. 18.00. A news bulletin in the English language is given towards G.M.T. 19.00. At 21.00 a relay is carried out regularly of the programme broadcast by the Radio Nacional studio at Salamanca, but the station does not close down before midnight. The address announced for reception reports is: 22, Avenue de la Grande Armée, Paris (17), France. On 41.15 m. (7.295 me) a station with the call-sign EA3F1, styling itself Radio Republica Española, works nightly between G.M.T. 18.30-18.30, and occasionally at other times during the evening.

Madrid Again on Two Channels

In addition to the regular programme broadcast through E.A.Q. on 30.13 m. (9.86 me) through the Aranjuez transmitter, a programme may also now again be picked up on 31.65 m. (9.48 me) emanating from the Vallecas station E.A.R. in the neighbourhood of the old Spanish capital. Nightly news bulletins given in various European languages are interspersed with a musical broadcast composed of gramophone records.

NOTES FROM THE TRADE

Hum-Metrohm Tester

A NEW type of test instrument has been produced by Messrs. Everett, Edgware and Co., for insulation testing without the need of turning a handle. This is based on the vibrator-generator, using a small battery feeding an interrupter and transformer, whereby an output of 500 volts is obtained. This is rectified and smoothed, and a 3in. scale meter gives suitable indications of insulation and resistance, with a neon lamp as an indicator that the apparatus is functioning properly. The price is £7, and a special leather carrying case is available at £8. The instrument weighs 31lb. and measures 7in. by 51in. by 31in.

New Car Aerials

The Ward under-chassis and roof type car aerials are now available in improved forms at 10s. 6d. each. The new models have been designed to avoid troubles which might arise from vibration, and a high degree of signal input is claimed for the new under-chassis type. These are supplied by Microphone Equipment, Ltd., of 8, Charing Cross Road, London, W.C.2.

A series of aerials is also now available from R. Shipper and Co., of 18, Corporation Street, Manchester, 4, one being of the telescopic type for clipping on a bumper, and one of the under-chassis type. A further model is of the roof type, kept in position by suction cups. The telescopic type is chrome plated and can be extended from 3ft. 3in. to 5ft. 9in., and an 8ft. screened lead is supplied at the increased price of 22s. 6d. The undershelf model is built into a pocket provided with straps and brackets for clipping on to the chassis, and this costs 17s. 6d. The roof model is also finished in chrome, and costs 22s. 6d.

“GOOD AND BAD SETS WILL BE IMPROVED BY IT,” says MR. F. J. CAMM

Whether used as a rejuvenator of receivers, or just for extension speaker purposes, the current Stentorians will be a joy to their proud new owners for many years to come. Even if only as a matter of interest, hear one at your local dealer’s. You will agree with Mr. Camm that “listeners are fortunate in having at their command a speaker so sensitively responsive.”

Chassis from 17½. Cabinet models from 24½, complete. “Long Arm” extension remote control, 15½.

Paris and Algiers

For the relay of radio programmes from the Radio Alger (Algiers) studio to the French state broadcasting stations T1Z and TP22, two transmitters situated at Alger-Eucalyptus are used; they operate on 24.75 m. (12.12 me) and 33.48 m. (9.96 me) respectively. On the other hand, broadcasts of the Paris P.T.T. news bulletin made to Algerian listeners through the local medium-wave station are transmitted through TP22, Paris, on 33.19 m. (9.04 me).

English Talks from Prague

For news bulletins in the English language broadcast from Prague (Czechoslovakia), turn to the Podebrady transmitters, OLR11, on 25.34 m. (11.84 me) and OLR11, 25.51 m. (11.76 me). Special transmissions are made at G.M.T. 20.20 and 21.30 nightly.
IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, September 28th.—Hand concert.
Thursday, September 29th.—Promenade Concert from Queen's Hall, London.
Friday, September 30th.—No. 47298. Aresman Harry Swift, feature programme.
Saturday, October 1st.—Sing Song, variety programme.

REGIONAL (342.1 m.)
Wednesday, September 28th.—The Golden Wedding, a variety programme.
Thursday, September 29th.—Insurance Money, a comedy by George Stiles, from Northern Ireland.
Friday, September 30th.—Royalty Inquest, variety programme.
Saturday, October 1st.—Promenade Concert (Last Night of the Forty-Fourth Season), from Queen's Hall, London.

MIDLAND (297.2 m.)
Wednesday, September 28th.—Landmarks in English Music: 3—John Field, 1794.
Thursday, September 29th.—Music from the Gilbert and Sullivan Operas: orchestral programme.
Friday, September 30th.—Socialite Songs. Saturday, October 1st.—Ploughing competition at Moreton-in-March: recorded commentaries.

WEST OF ENGLAND (285.7 m.)
Wednesday, September 28th.—Agricultural Bees: Gloo, C. Wills.
Thursday, September 29th.—Melody Out of the Sky: dance band programme, from Regional.
Friday, September 30th.—Dance Concert from the Grand Hotel, Torquay.
Saturday, October 1st.—Eastward Ho!: a talk.

WELSH (373.1 m.)
Wednesday, September 28th.—Our Very Own: The Humour of the Welsh, a talk.

TELEVISION PROGRAMMES
“London Wall”
A CROSS section of life in a solicitor's office, together with the hopes and fears of those who work there, will be portrayed in the presentation of "London Wall" to be televised in the evening of October 8th and the afternoon of October 12th. Production is by Michael Barry.

The play chiefly centres on Pat Milligan, the "baby" of the solicitor's firm, whose boy friend, "Hec," has been working on the floor above. Trouble arises for "Hec" in the person of Eric Rizer, the assistant who has set his cap at Pat Milligan. The persisting genius of the play is Breakfast, the office boy, a type whose work is drudgery, but whose outlook on life is butterflies and to the point.

Crystal Palace—Motor Racing
CRYSTAL PALACE will again provide a thrilling outside feature for viewers on October 8th.

On that Saturday afternoon a stern struggle will be fought out between the well-known motor racing "aces": Arthur Dobson and B. Born, from course to course. Prince Kintbomong of Siam, the Imperial Trophy Race will also be staged for British and Continental drivers. In both these events comment will follow the progress of the cars as they hurtle round the track, and an effects microphone will be placed at such a vantage point as to pick up the roar of the cars and convey the exciting atmosphere of such contests.

NORTHERN (449.1 m.)
Wednesday, September 28th.—An excerpt from the Ardenian Folies, from the South Pier, Blackpool.
Thursday, September 29th.—Between Houses, a variety programme.
Friday, September 30th.—Variety from the Manchester Evening Chronicle Radio Exhibition.
Saturday, October 1st.—Water Polo: an eye-witness account of the English Final at Rochdale.

SCOTTISH (391.1 m.)
Wednesday, September 28th.—My Old Shake, 1888-1938, feature programme.
Thursday, September 29th.—The National Med. of the Highland Association, from Chemin Concert Hall, Glasgow.
Friday, September 30th.—An orchestral concert.
Saturday, October 1st.—Folk-songs of the North-East.

NORTHERN IRELAND (307.1 m.)
Wednesday, September 28th.—Variety from the Grand Opera House, Belfast.
Thursday, September 29th.—Insurance Money, a comedy by George Stiles.
Friday, September 30th.—Irish Dance Music.
Saturday, October 1st.—The autumn programmes, a talk.

NOTES AND NEWS

Launching of the Giant Cunarder "Queen Elizabeth"

As with the Queen Mary, the speeches of Their Majesties the King and Queen were amplified to all the assembled crowds in Memra, John Brown's Shipyard at Dumbarton on September 27th. This event was entrusted to the Marconiophone Company, principally on account of the outstanding success of their apparatus and work on the previous occasion. As before, His Majesty the King's Marconi microphone was available, as was also the special Marconi microphone reserved exclusively for the use of Her Majesty Queen Elizabeth.

EVERYMAN'S WIRELESS BOOK
By F. J. CAMM

Wireless Principles and Fault Tracking simply explained.

8/6/54, by post from Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2

Mr. Neville Chamberlain, the Prime Minister, on his arrival at Heston Airport, after his historic flight to Germany for his talks with Herr Hitler at Berchtesgaden. Mr. Chamberlain is here seen addressing the crowd at the Airport. Note the television camera on the right recording the scene, and the operator, near the centre of the illustration, manipulating the microphone.


**ARMSTRONG 7-STAGE**

All-Wave Boudingin Chassis incorporating Push-button and Manual Tuning, supplied complete with Bin, MATCHED MOVING-COIL Speaker, model A. W. 2BY.

Price £11 1s. 6d. complete.

Call at our Showrooms and see this latest offer.

Specification: New method of Push-button Tuning incorporating genuine Silver Wire Condensers to eliminate static drift, principal Medium Wave Stations and Luxembourg may be obtained by the Push-button method. All latest refinements, including large Tuning Scale calibrated in degrees and corresponding on all wavebands. Short-wave covers all principal bands from 150 to 50 meters. Universal Tone Controls work on Gramophone as well as Radio, Pick-up Leads may be permanently interconnected. Moving-coil speaker made especially for chassis.

Free Advice Bureau COUPON

This coupon is available until October 9th, 1938, and must accompany all Querits and Wrikels.

PRACTICAL AND AMATEUR WIRELESS, 11th S.

**Read all about the CIVIL AIR GUARD IN THIS WEEK’S FLYING**

The New Popular Air Weekly

Of all Newspapers 3d. EVERY FRIDAY

**PRACTICAL WIRELESS SERVICE MANUAL**

By F. J. CAMM.

From all Booksellers 5/- net, or by post 6/- net from George Newnes, Ltd. (Book Dept.), Tower House, Southwark Bridge, London, E.C.4.

**BEFORE DECIDING ON YOUR 1938/9 RECEPTOR OR KIT OF PARTS,**

let us send Full Specifications & Prices of new 1938/9 Armstrong Models. Many refinements are incorporated in these Chassis, usually only found in more expensive sets.

**WE ARE GIVING DAILY DEMONSTRATIONS OF THE NEW ARMSTRONG CHASSIS**

from 10 a.m. to 5 p.m. It’s well worth a visit—no obligation to purchase.

**ARMSTRONG MANUFACTURING Co.**

100, ST. PANCRAS WAY (Formerly King's Road), CHICAGO TOWN, N.1.

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**ARMSTRONG PRESS BUTTON CHASSIS**


Cash Price £12 6s. 1d. or 15/- per month of 12.

**ARMSTRONG 9-Valve All-Wave RADIOGRAPH Chassis**

Model A.W. 2BY, tuning automatic, 7 Trans., 5 Condensers, 15-190 Meters. Complete with order and 12 monthly payments of 1/-.

Price £15 9s. 0d.

**AVO-MINOR TEST METER**

Full Voltage and Resistance with ease and economy. Cash Price £5 10s. 0d. with order and 10 monthly payments of 5/-.

**WE CAN SUPPLY**

The most popular items of the London Radio Company are always in stock and may be seen in our gallery. We are particularly pleased to announce the following:

1. To cut out this advertisement and send it to us, and we will supply the equipment at a reduced price.
2. We can supply any parts or accessories you may require at very reasonable prices.

**CASH OR C.O.D. ORDERS DELIVERED BY RETURN OF POST**

We regret that due to the high demand for equipment, delivery times may be longer than usual.

**PRACTICAL WIRELESS**


October 1st, 1938

PRACTICAL AND AMATEUR WIRELESS 69
LETTERS FROM READERS

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

Received on the "Simplest" Short-wave Two

Sir,—Conditions on 20 metres have improved so much lately that I append some of the best phone transmissions logged here. The receiver is a battery one-valve, using a triode detector, and a half-wave antenna pointing east and west.

K60QE, K6NQZ, K6BNR, V64AY, V65ACN, V65JK, V65OT, V65EF, V65EG, V65M, V65NT, W7BYO, W7EQY, H9TC, TC9AA, NV2AE, TI3AV, K4ERM, V65IS, C0ZLY, V53ABY, HICIS, HICIG, FY4BT, FY2BK, FY1GU, LUCH, L8UFIN, J6-AW, CX9AK, H8IN, OOSAQ (Belgian Congo), V46KHZ, Z1711A, VQ2HC (Northern Rhodesia), ZS1AN, ZS6AI, ZS6RR, ZS6E, PK1MX, PK2VL, PK4DI, PK1ZZ, V2UCQ, VK3AX, VK2YG, VK3IQ, VK2NS, VK3KX, VK3WA, VK3PI, VK3GM, VK3HG.

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

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There is money and pleasure in Journalism and in Story Writing. No apprenticeship, no purgation, no examinations, no outlay necessary. Writing for newspapers, novels or pictures, is not a gift; it is a science that can be acquired by diligent application and proper guidance. It is the most fascinating way of making pastime profitable. "Training ability only is required, we do the training by post. Let us tell you all about it.

DEPARTMENT OF LITERATURE 104.

Correspondent Wanted

Sir,—I wish to get in touch with any reader of PRACTICAL AND AMATEUR WIRELESS, about 17 years old, who is interested in amateur reception. My receiver is a B.T.S. Trophy 3, used with a 200-inch aerial, beam, and listening in both on headphones and on the built-in speaker. All the amateur bands from 1.7 to 29 m.c.s. are covered, and I hope soon to operate a receiver on 56 m.c.s.—S. W. SALT, 4, Chumleigh Walk, Surbiton, Surrey.
Sprite Three

I have been looking through some back numbers for a circuit to build, and am rather puzzled regarding the Sprite receiver. In this you use an aerial and an H.F. transformer, and in both cases primary and secondary are switched for wavechanging. The switching appears to be carried out with a single multi-contact switch, with an earthed spindle or shorting bar, and it would appear on the face of it that this will short-circuit the H.T. through the primary of the H.F. transformer. Perhaps you could explain this point to me."—H. E. (Crewes).

If the switch had a single contact or shorting bar your remarks would be correct. However, the type of switch which was employed has the spindle divided into two sections, so that each is isolated. Therefore, it is possible to switch H.T. and other circuits without introducing short circuits, but if an alternative switch is employed you will have to take care of this point.

Short-wave Receiver

"I wish to start short-wave listening and wonder if it is possible to say what is the most simple and reliable set for use down to 10 metres. I have had no previous experience.

RULES

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

(1) Supply circuit diagrams of complete multi-valve receivers.
(2) Suggest alterations or modifications of receivers described in our contemporaries.
(3) Suggest alterations or modifications to commercial receivers.
(4) Answers to your telephone. We do not answer questions by telephone. We do not answer queries.
(5) Requests for blueprints must not be enclosed with queries as they are dealt with by a separate department.

The simplest circuit for a beginner in short-wave reception

In setting building but now wish to take up science making and experimental work."—G. J. (Croydon).

I agree that the reader, if he wishes to use a circuit of the type described, must have some idea of how to build it himself, as it cannot be done simply by cutting out the parts and putting them together. However, I think that the simplest circuit for a beginner is the one described in our issue dated July 16th, last. You could, of course, follow the design of the Admiral 4-valve receiver, recently published, but if you wish to build to your own ideas I would suggest that you try to design a really efficient set. I have built many sets before, but this is the first time I have thought of trying two really good H.F.’s."—L. W. (Watford).

H.F. Stages

"I am not in favour of the superhet circuit and am thinking of building a straight receiver with two H.F. stages. I believe these are rather tricky to build and get operating properly, and wonder if you have any designs or can give me any information to enable me to design a really efficient set. I have built many sets before, but this is the first time I have thought of trying two really good H.F.’s."—R. C. (Dublin).

Perhaps you could give me some idea of the best lines to adopt."—R. C. (Dublin).

If two pick-ups or mikes are to be used, it is only desired to fade out any one and bring in another, a centre-tapped potentiometer control may be employed. The centre-tapped potentiometer control section (the separate mikes or other instruments are joined across each half of the control). The arm is joined to the mike or pick-up. The mike control may be faded and brought in as desired. For true mixing, two separate controls will have to be used, and the lower end of one should be joined to the arm of the second. If the mike or pick-up is then joined across each control the inputs may both be reproduced together in any desired strength and this gives true mixing. It is also possible to obtain this effect merely by connecting the two instruments and volume controls in parallel, but the former method is to be preferred.

A.V.C. Circuit

"I have added A.V.C. to my receiver with not very successful results. I attach a circuit showing how I have effected the change. Should it be possible to join any of these points to earth, I shall try to do this. If you could indicate why this fails to work properly."—R. B. A. (Queensborough).

The circuit shows that the A.V.C. line is fed to all valves without any decoding. You will find it desirable to connect each circuit on this side, connecting the by-pass condenser direct to the lower end of each variable transformer and to the nearest earth point. The decoding resistance should also be joined direct to the cathode of each valve and then made to the A.V.C. circuit. We think this will cure the trouble you are experiencing.

Pyramid One-valve

"Could you please let me know the price of the components of the complete kit in the Pyramid One-valve, the headphones and batteries, but including the chassis and panel?"—A. H. (Heybridge, Nr. Maldon).

"I am contemplating adding another H.F. stage to my H.F. stage. I am not sure what is the best scheme to adopt. The amplifier is to be used with phonograph pick-up as well as mikes.

Checking Ganging

"I am in doubt concerning the accuracy of the ganging in my four-valver and wonder if you can suggest any simple method of testing without going to the trouble of obtaining an oscillator or output meter. Surely there is some simple little dodge which may have occurred to you and which could be used by others like myself who wish to check their receiver."—A. F. (Bung.)

A GOOD suggestion is to use a differential condenser, the moving plates of which are joined to earth and the fixed plates of which are joined to each section of the condenser. Then, if both sections are accurately trimmed or matched all stations should be received with the moving vane of the condenser in a central position. If on any station a readjustment of the extra condenser is necessary, it will indicate that the sections are not balanced. If more than two circuits are in use a single condenser may be used as the first unit, and it may be joined to each section in the gang condenser in turn to see if any readjustment is needed.

H.F. Gain Control

"I am contemplating adding another H.F. stage to my H.F. stage. I am not sure what is the best scheme to adopt. The amplifier is to be used with phonograph pick-up as well as mikes.

A.M. Gain Control

"I am contemplating adding another H.F. stage to my H.F. stage. I am not sure what is the best scheme to adopt. The amplifier is to be used with phonograph pick-up as well as mikes.

The coupon on page 69 must be attached to every query.
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