

MAKING YOUR OWN COMPONENTS — See Page 460

Practical and Amateur Wireless

3^d
EVERY
WEDNESDAY

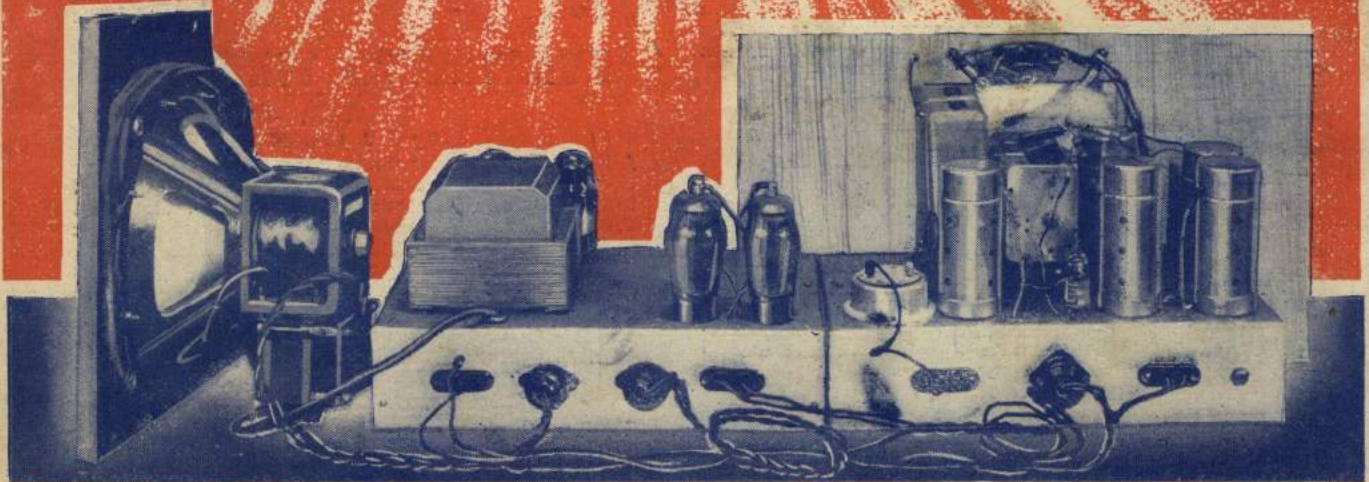
Edited by F.J. CAMM

A GEORGE
NEWNES
Publication

Vol. 13, No. 330,
January 14th, 1939.

AND PRACTICAL TELEVISION

ALL *wave* *stage* SUPER-HET



THE BOOK FOR THE AMATEUR!

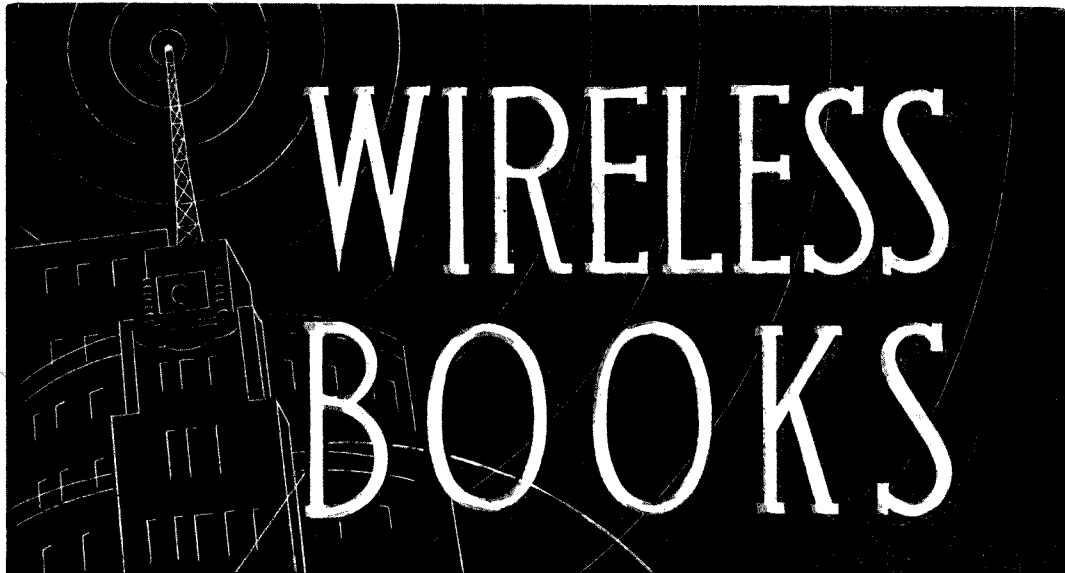
WIRELESS COILS, CHOKES AND TRANSFORMERS : AND HOW TO MAKE THEM.

By F. J. CAMM.

An important Handbook for every home constructor and anyone interested in radio. With Special Chapters on Selectivity, Break-through, Coil Winders, Coil Troubles and their Remedies. 180 pages, cloth bound, with 126 easy-to-follow illustrations

From all booksellers 2/6 or By post 2/10 from the Publishers,

GEORGE NEWNES, LTD. (Book Dept.), Tower House, Southampton Street, Strand, LONDON, W.C.2.



FOR THE PRACTICAL MAN!

THE OUTLINE OF WIRELESS

By RALPH STRANGER

Here is a book which covers the theory and practice of Wireless Reception from A to Z, and makes everything plain even to the most "non-technical" reader. 8/6 net

THE WIRELESS CONSTRUCTOR'S ENCYCLOPAEDIA

By F. J. CAMM

Wireless Terms and Definitions stated and explained in concise, clear language. Profusely illustrated. A veritable treasury of wireless knowledge, and literally invaluable to all who are interested in the science whether as amateurs or experts. 5/- net

THE MATHEMATICS OF WIRELESS

By RALPH STRANGER

This brilliant and experienced writer on Wireless has a happy knack of making even the driest and most abstruse topic interesting—and amusing! 5/- net

SIXTY TESTED WIRELESS CIRCUITS

By F. J. CAMM

Modern circuits of every type. Diagrams and instructions for assembling and wiring, details of components, notes on operation, etc., etc. 2/6 net

COMPLETE THE FORM ON RIGHT AND HAND IT TO YOUR BOOKSELLER

who will get you the book or books you require at the usual price, thus saving postage. Alternatively, send the form to the publishers, with postal order (plus 6d. extra on each book to cover postage), and the book or books will be sent direct to you.

The complete list of practical Wireless Books (from which the above are selections) will be posted to you if you send a card to the address on the coupon on this page.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM

A complete, practical and up-to-date work on the testing and servicing of all types of wireless receivers, packed with valuable information for both the amateur and professional service-man. With over 200 illustrations. 5/- net

WIRELESS TRANSMISSION FOR AMATEURS

By F. J. CAMM

A book which covers fully and clearly the whole field of wireless transmission for the amateur enthusiast, from the obtaining of an amateur transmitting licence to the construction and operation of a transmitter. With 120 illustrations. 2/6 net

EVERYMAN'S WIRELESS BOOK

By F. J. CAMM

A Radio Consultant for the Listener, Expert and Amateur Constructor, with Special Chapters on the Principles of Radio Telephony, Installation and Systematic Fault-finding. With 200 illustrations and Diagrams. 3/6 net

To the Book Publisher, GEORGE NEWNES, Ltd., TOWER HOUSE, SOUTHAMPTON ST., LONDON, W.C.2. Please send me by return the book or books against which I have placed a "X." I enclose Postal Order for the necessary amount.

- THE OUTLINE OF WIRELESS
- THE WIRELESS CONSTRUCTOR'S ENCYCLOPEDIA
- THE MATHEMATICS OF WIRELESS
- SIXTY TESTED WIRELESS CIRCUITS
- PRACTICAL WIRELESS SERVICE MANUAL
- WIRELESS TRANSMISSION FOR AMATEURS
- EVERYMAN'S WIRELESS BOOK

P.O. No. is..... Value.....

Name

Address

P.W.14.1.39

AN EXPERIMENTAL TWO-VALVER—

SEE
PAGE 445.



Practical and Amateur Wireless

Edited by F. J. CAMM

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

Vol. XIII, No. 330. January 14th, 1939.

ROUND *the* WORLD of WIRELESS

All-wave Superhet

MANY constructors ask for multi-valve receiver designs for long-distance work, and we have described several of these from time to time. In this issue we introduce a new set of this type, in which all of the valves used are of identical types. These valves, known as "All-Stage," valves, are produced by the Hivac company, and remove the difficulty of selecting a special type for each stage, and thus when a valve fails it is only necessary to obtain an all-stage replacement without worrying about the special type number. The valves are adaptable for various conditions, and a study of the theoretical diagram in this issue will show how the valves are used. The receiver is built up in two sections and this enables modifications more easily to be carried out when desired, the two chassis being connected by small plug-in cables. The receiver has been designed on up-to-date lines, having a switch so that when local-station quality reception is required the superhet feature may be cut out and the receiver used as a "straight" set.

Home-recording

THE Columbia Broadcasting System has, for the first time in America, granted facilities for the recording on discs for general sale, of a radio drama. This is supplied on three two-sided twelve-inch records. It is not stated whether any rules have yet been drawn up regarding the recording by listeners of plays.

Norwegian Short-wave Station

A 5-kW station has been erected at Lamberseter, near Oslo, and the present schedule is as follows: 20.00-9.00 on 31.48 metres; 9.00-14.00 on 25.56 metres; 14.00-20.00 on 19.78 metres. The Jeloy transmitter, LKJ, will continue to radiate on 48.94 metres.

"Private Enterprise and Public Ownership"

WE are informed that the last of the discussions arranged by the Midland Region under the title "Private Enterprise and Public Ownership" will deal with Broadcasting itself and will be heard on January 12th in the Midland and Regional programmes. In the chair will be Lord Stamp. The speakers for Private Enter-

prise will be Mr. C. B. Cochran and Mr. H. G. Selfridge, Junior. They will take the view that "the show's the thing" and that sponsored programmes by competing commercial systems will provide the best entertainment to listeners. For Public Ownership will be Mr. H. Wickham Steed and Mrs. Mary Agnes Hamilton.

Components Exhibitions

THE 1939 National Radio Parts Trade Show will be held at the Stevens Hotel in Chicago from June 14th to 17th inclusive.

Special precautions are taken to maintain efficiency and the chairman of the National Adequate Wiring Bureau quotes the following excerpts from the bureau's handbook: "At least three outlets with radio antenna and ground connections, preferably adjacent to a standard convenience outlet, in each six-room or smaller house. Proportionately more in larger houses. Unless another method at least equivalent is specified, a twisted pair of wires from the antenna leads shall be carried from each outlet to the attic."

New Sunday News Bulletin

AS from the beginning of the year an extra news bulletin has been included in the Sunday programmes. This is broadcast at 6 p.m. from the Midland, North, West of England, Plymouth, Bournemouth, Wales, Northern Ireland, Stagsaw, Aberdeen, and Scottish transmitters. The existing bulletin at 8.50 p.m. will continue to be broadcast from all transmitters.

European News Bulletins

MODIFICATIONS have been made in times for foreign language transmissions by the B.B.C. The new broadcasts are now as follows:

Weekdays: 7 p.m. G.M.T.—News bulletin in French, London Regional, 342.1 metres, and GSA, Daventry, 49.59 metres.

7.15 p.m. G.M.T.—News bulletin in German, London Regional, 342.1 metres, and GSA, Daventry, 49.59 metres.

7.30 p.m. G.M.T.—News bulletin in Italian, GSA, Daventry, 49.59 metres only.

Sundays: The French, German and Italian bulletins will be broadcast on the same wavelengths as on weekdays at 6 p.m., 6.15 p.m., and 6.30 p.m. respectively.

Installation of Leeds University's New Chancellor

ON Tuesday afternoon, January 17th, the Northern microphone will be at an important Leeds University ceremony, in the Leeds Town Hall, to broadcast speeches at the installation of the Duke of Devonshire (Secretary of State for Dominion Affairs) as Chancellor of the University.

ON OTHER PAGES

	Page
An All-wave All-stage Superhet	443
An Experimental Two-valver	445
Short-wave Section	446
On Your Wavelength	447
Practical Television	449
Readers' Wrinkles	451
Utilising Two-pin Plug-in Coils	452
A Robot Critic	454
Readers' Letters	456
Making Your Own Components—2	460
British Long-Distance Listeners' Club	462
Queries and Enquiries	463

On the first two days of the show, only jobbers, manufacturers, manufacturers' agents and engineers will be admitted. The sixth annual exhibition of components will be held in Paris from January 31st to February 3rd. The venue is Centre Marcelin Berthelot, 28, bis rue Saint Dominique, Paris.

Concealed Radio Wiring

RULES are being drawn up in America for the enclosing of all radio wiring in modern homes. Aerial and earth leads are buried in walls and taken to convenient outlets similar to standard electric fittings.

ROUND the WORLD of WIRELESS (Continued)

Indian Rural Radio

IN order to test the effectiveness and possibilities of rural radio, All-India Radio has equipped twenty of the 381 villages in the Delhi Province with receiving sets.

Cross-Channel Radio-phone

WE understand that the wavelengths to be used by the new cross-Channel radio-telephone stations will be 3.6 and 4.4 metres in one direction, and 3.95 and 4.9 metres in the other.



Barbara Palmer, who was the guest artiste with the "Hawaiian Islanders" in a recent broadcast.

Radio Pirates

DURING the past six months, the number of prosecutions for unlicensed wireless sets, undertaken by the Post Office, is approximately 3,500.

Irish S.W. Station's Wavelength

THE new Irish short-wave transmitter, which is expected to be opened towards the end of February, will share the wavelength of 49.75 metres with the Vatican City transmitter.

It is not expected that the two transmitters are ever likely to be working at the same time.

"Wireless for the Blind" Fund

CHRISTMAS, 1938, was the tenth anniversary of the above fund, and it is gratifying to know that the fund has now provided over 44,000 wireless sets.

"I Remember"

ON January 16th Regional as well as Midland listeners will hear another of Percy Edgar's "I Remember" programmes. This time he is not restricting his choice of items to any particular decade, but ranging over a wide field of ballad, comic song, glee and monologue. The soloists are not yet finally selected and Reginald Burston will conduct the B.B.C. Midland Orchestra and Singers.

The Pleasures of Painting

NORTHERN listeners will hear an interesting discussion of paintings on January 16th in a broadcast called "The

INTERESTING and TOPICAL NEWS and NOTES

Pleasures of Painting"—confessions and criticisms by the Ashington Group, led by Robert Lyon. This Group is organised as a tutorial class from King's College, Newcastle-on-Tyne, and it meets each Monday night under the Master of Painting for discussion of work done during the week. None of the members is a professional artist; many work in the colliery, others are insurance agents and teachers.

World's First Radio Newspaper

THE world's first radio newspaper has made its appearance. In Missouri, U.S.A., a newspaper, the *St. Louis Post-Dispatch*, has broadcast the first edition of their radio newspaper. After months of experiments, they installed receiving sets in the homes of many of their employees. The first edition consisted of nine pages, 8½ inches long, and four columns wide, using the newspaper's regular type. On the first page were the leading articles of the day, then followed sports news, several pages of pictures, the editorial cartoon, a summary of radio programmes, and a page of financial news and stock market quotations. The original copy of the facsimile newspaper, after being printed by normal process, was placed one page at a time on the transmitting apparatus, the cylinder of which revolves at the rate of 75 times a minute. As it revolves a small beam of light no larger than a pin point, and a photo-electric cell, commonly known as an "electric eye," move across the page. The amount of reflected light reaching the "electric eye" varies with the black-and-white pages of type, and with

the depth of shading in the photographs. The light variations control the amount of electric current flowing through the "electric eye." The varying electrical current is amplified by the transmitter, and the outgoing radio waves change in intensity with the reflected light of the copy in the "electric eye." The antenna of the receiving set in the home picks up these waves. The illustration on this page shows Pete Yaeger, radio operator, manipulating the sending machine used by the newspaper in transmitting the "radio-edition."

New American S.W. Station

A NEW 20 kW short-wave transmitter, for service to the Far East, is to be erected by the G.E.C. on Treasure Island, the site of San Francisco's World Fair, and will be completed for the opening of the Fair about the middle of next month. The station will operate on two frequencies, viz., 9.53 mc/s (31.48 m.), and 15.33 mc/s (19.57 m.), which are duplicates of the wavelengths used for many years by the G.E.C. for its Schenectady stations, W2XAF and W2XAD.



Operating the transmitting machine for producing the first radio newspaper.

SOLVE THIS!

PROBLEM No. 330

Jackson had a detector-L.F. receiver which, although it gave fair results, caused motor-boating when used with a mains unit. He decided to decouple the detector stage and found a suitable resistance and 1 mfd. fixed condenser in his junk box. He joined the resistance between the H.T. lead and the L.F. transformer and connected the condenser between the junction of these and earth, but when switched on he could obtain no signals. Reaction was entirely absent, and he therefore suspected that the resistance value was too high, but when he short-circuited this he could still obtain no results. What was wrong? Three books will be awarded for the first three correct solutions opened. Envelopes must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 330 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, January 16th, 1939.

Solution to Problem No. 329

In the receiver which Martin had been using a step-up mains transformer was provided and the input to the smoothing circuit was 450 volts. Accordingly, when he joined his D.C. mains to that point he was providing an input 200 volts less than the receiver required and therefore the receiver failed to function properly. The following three readers successfully solved Problem No. 328, and books have accordingly been forwarded to them: C. Woodridge, 6, Emerald Terrace, Campbell Street, Hull. A. P. Hosking, Long Crespy, Weybridge Park, Weybridge, Surrey. E. Broming, The Shrubbery, Totnes, Devon.

Talks on the Pacific

IT is interesting to note that among the speakers in the new series of twelve talks on the Pacific Ocean will be Sir Frederick Whyte, who will broadcast the first talk on January 12th. Other speakers on subsequent Thursdays, up to March 30th, will include Professor C. K. Webster, Professor J. B. Condliffe, and Mr. G. F. Hudson, the latter in place of Mr. O. M. Green, who, contrary to a previous announcement, will not now be taking part.

Pantomime Broadcast

SCENES from the pantomime "Aladdin," presented by Harry Benet and produced by Frank Adey at the Pavilion, Bournemouth, will be broadcast on January 16th. "Aladdin" will be played by Kittie Prince, "Widow Twankee" by George Hirste, and "Abanazar" by Fred Kitchen, Jr.

An All-wave All-stage Superhet

Preliminary Details are here given of a Quality Receiver, with Special Provision for Local-station Reception

THIS all-wave superhet receiver, which may be converted to a straight set for local-station reception, has been designed and built round the Hivac-Harries All-stage A15 valve. This is a multi-grid critical-distance valve which is so constructed that it may be used in each and every stage of a modern superhet or straight receiver.

The "critical anode distance" employed in Hivac output valves is now well known. By suitable multi-grid design the valve may also be made to give very linear and efficient power output characteristics at a high screen voltage and low-load impedance, while, with a lower screen voltage, the same valve still possesses very linear characteristics, but has a higher A.C. resistance. In both cases the anode to control-grid capacity is kept low, and the valve becomes suitable for efficient operation as a power output, audio or radio-frequency amplifier.

The problem still remains of also incorporating the various requirements of auto-gain control, diode detection, frequency changing, etc., but this has now been done, with the result that a single valve is now available, the characteristics of which may be altered to suit every stage of a modern receiver. The advantages of such a valve from the point of view of servicing are obvious.

The use of one valve for every stage is no deterrent to the performance of a receiver. In fact, the results we have obtained with this receiver are quite up to, and in some cases surpass, the performance that could be expected from a combination of existing specialised valves. The great advantage, of course, is the use of one type of valve for every stage.

Before considering the circuit in detail it is as well to go more closely into the operation of the valve in the various stages in which it is used.

In Fig. 1 is shown the circuit diagram for the complete receiver, from which it will be seen that the

A15 valve is used as a frequency changer, I.F. amplifier, second detector and A.V.C., L.F. amplifier, phase changer, and push-pull output. The second detector valve also has one of its grids used as a leaky-grid detector when receiving local stations.

When used as a frequency changer, a false cathode is produced in the neighbourhood of G3 and modulated by the oscilla-

tions produced by the oscillator grids G1 and G2. Instead of the usual screening grid, an automatic capacity bridge balance is produced in the valve itself. The oscillator is very powerful, and operates satisfactorily on all wavelengths.

The I.F. Stage

In the I.F. stage the operation of the valve is quite straightforward, with the exception of the A.V.C. connection, which is not made as usual to the control grid but to another special auto-gain grid positioned between two positive grids. The A.V.C. control efficiency is very good indeed, and pre-detector distortion and cross-modulation are avoided. The control grid is always operating under optimum bias conditions, and this was shown up in practice by the fact that the distortion is far less noticeable with this circuit when a station fades, than with other more common arrangements.

Another advantage of this type of control is that it possesses sufficient input voltage-handling capacity even when the receiver is operated on a large aerial near a broadcasting station. This has been of great benefit to the designer as the set has been built and tested under these conditions. In a good many instances it has been found necessary to use a wavetrap in the aerial to cut down the strength of the local station to avoid overloading the frequency-changer and I.F. stages, but this new receiver is quite happy when receiving a 50-kW station situated less than ten miles away.

The second detector stage may look rather complicated, but it is really quite simple if you imagine G1 and the anode as two diodes of a double-diode valve. Tracing the circuit between these two will show that normal practice is followed. The L.F. output developed across the 250,000 ohm load resistance is fed to the volume control, and A.V.C. voltages to the preceding valves in the usual way. It will be noted that a 1,000-ohm resistance is

(Continued on next page)

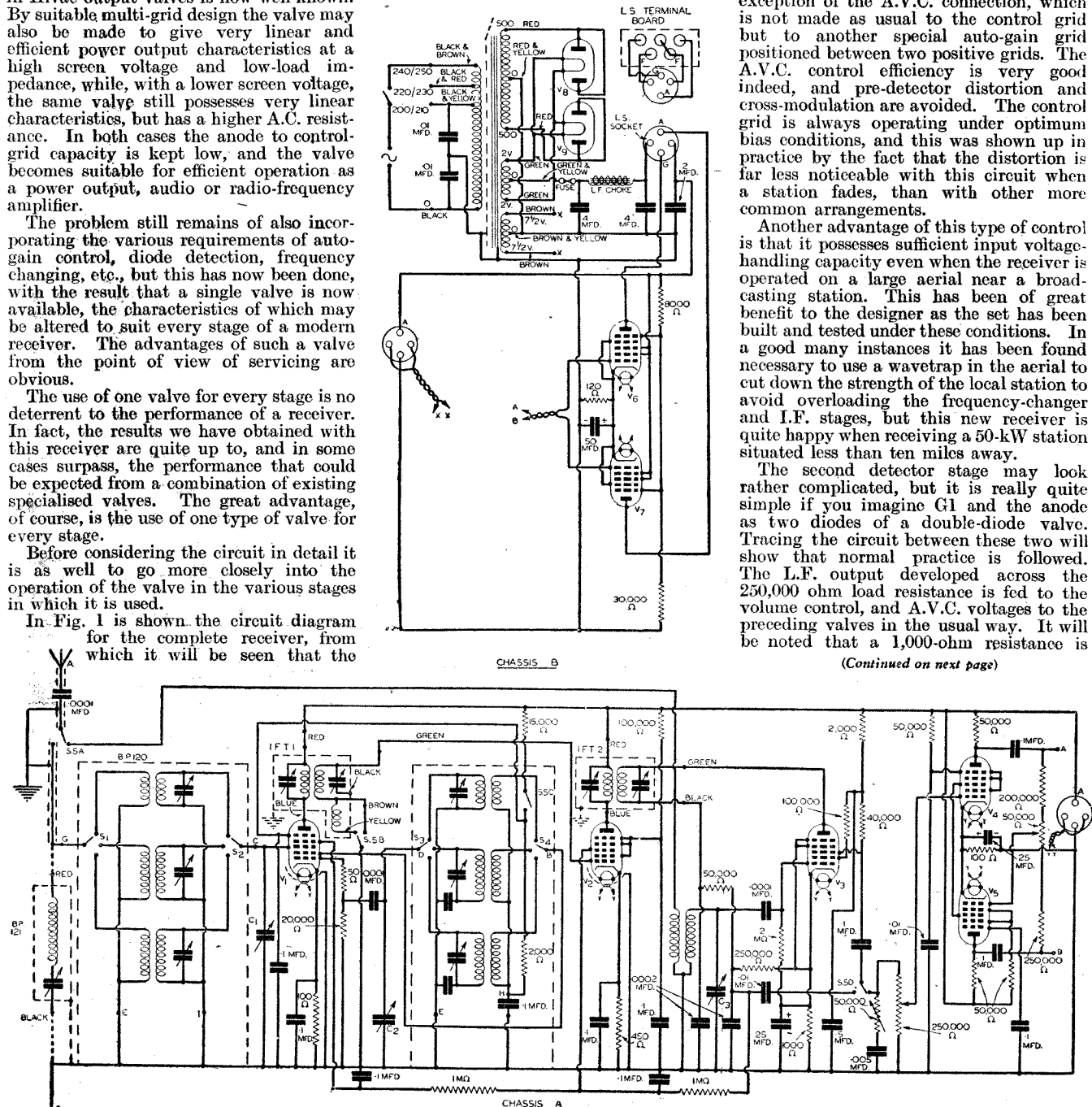


Fig. 1.—Theoretical circuit of the All-wave All-stage Superhet, showing the division of the receiver and mains sections into two separate chassis—A and B.

AN ALL-WAVE ALL-STAGE SUPERHET*(Continued from previous page)*

included in the cathode lead, and the current taken by grids G2 and G3 flows through this resistance, producing the necessary delay voltage.

Grids G1, G2 and G3 are used as a simple leaky-grid detector for local-station work. G1 is the control grid, G2 the screen, and G3 is used as the anode, the output from this section of the valve also being fed to the volume control.

The L.F. stage is also quite normal and resistance-capacity coupling is used. Part

of the audio-voltage developed across the grid-leak of valve V6 is fed back to the grid of valve V5, which acts as a phase-changer, and feeds a voltage to valve V7 which is in opposite phase to that fed to valve V6.

In the output stage the advantage of low anode to control-grid capacity is obtained by the use of more than one grid between the control grid and the anode, and the full advantages of the critical distance are obtained by putting a lower voltage on grid G5 than on the other positive grids. A result of this critical distance and low anode

to grid capacity is that it is unnecessary to use a pentode resistance-capacity series shunt across the loudspeaker to equalise the load. In fact, this is undesirable since, used unshunted, the loudspeaker gives a rising characteristic with frequency, thus minimising the effect of side-band cutting in the I.F. stage.

Examining the receiver circuit itself in more detail, it will be seen that a single tuned circuit precedes the frequency changer so that trimming arrangements are more simpler and cost is reduced. This arrangement has the disadvantage that the liability to second-channel interference is increased, but, by using an intermediate frequency of 465 kc/s, this trouble is almost entirely overcome on the medium and long-wave bands. The aerial primary windings have been specially designed to help reduce this interference, and even when situated near a local station, second channels are very few. Constructors living near the coast, however, may find interference caused by morse stations, as their frequency is not far removed from that of the intermediate frequency. To meet such cases, a series acceptor or filter circuit, consisting of a coil in series with a condenser, may be connected across the aerial and earth terminals of the receiver, the capacity of the condenser being adjusted until the interference is removed. The use of this filter, which is shown theoretically in Fig. 1, may cause some loss of signal strength at the top part of the medium waveband.

The connection between the frequency changer and the I.F. stage is by means of a variable selectivity I.F. transformer. This has an auxiliary coupling winding, allowing single-peak curve for selectivity, or double-peaked curve for quality.

NOTE.—Messrs. Hivac have generously offered to supply the complete kit of valves required for this receiver for £4-1-0, representing a saving of £1-11-6 on the list price.

LIST OF COMPONENTS FOR THE ALL-STAGE ALL-WAVE SUPERHET.

One Varley B.P.120 465 k/c all-wave coil unit.
One Varley 465 k/c I.F. transformer, type B.P.122.
One Varley 465 k/c I.F. transformer, type B.P.124.
One Wearite P.H.F.2 coil, complete with trimmer.
One J.B. 3-gang bar-type condenser with all-wave dial.
Five 5-pin valveholders—Clix V111.
Six octal valveholders—Clix V218.
One octal ceramic valveholder—Clix V248.
Five valve screens—Bulgin type 5000.
One aerial-earth socket strip—Bulgin P.51.
One plain socket strip—Bulgin.
One mains input socket strip—Bulgin P.62.
Two 10-way group boards—Bulgin C.32.
One 5-way group board—Bulgin C.31.
One 4-pole 3-way midget rotary selector switch—Bulgin S.204.
One L.F. choke, 30 henries at 120 mA.—Wearite H.T.14.
One mains transformer, 200-250 volts primary, secondaries 500-0-500 v., 4 v. 3A C.T., 15v. 5A C.T., manufacturers' type, colour-coded leads—London Transformer Products.
Three 5-pin cable plugs—Bulgin P.36.
One baseboard fuseholder with 250 mA fuse—Bulgin F.12.
One 50 ohm $\frac{1}{2}$ W resistance—Dubilier F.1.
One 20,000 ohm $\frac{1}{2}$ W resistance, Dubilier F.1.
One 100 ohm $\frac{1}{2}$ W resistance, Dubilier F.1.
Two 1 meg. $\frac{1}{2}$ W resistances, Dubilier F.1.
One 15,000 ohm 1W resistance, Dubilier F.1.
Two 2,000 ohm 1W resistances, Dubilier F.1.
One 450 ohm $\frac{1}{2}$ W resistance, Dubilier F.1.
One 50,000 $\frac{1}{2}$ W resistance, Dubilier F.1.
Two 250,000 ohm $\frac{1}{2}$ W resistances, Dubilier F.1.
One 2 meg. $\frac{1}{2}$ W resistance, Dubilier F.1.
One 1,000 ohm 1W resistance, Dubilier F.1.

One 40,000 ohm 1W resistance, Dubilier F.1.
Two 100,000 ohm 1W resistances, Dubilier F.1.
Four 50,000 ohm 1W resistances, Dubilier F.1.
One 200,000 ohm $\frac{1}{2}$ W resistance, Dubilier F.1.
One 100 ohm 1W resistance, Dubilier F.1.
One 120 ohm 1W resistance, Dubilier F.1.
One 8,000 ohm 1W resistance, Dubilier F.1.
One 30,000 ohm 1W resistance, Dubilier F.1.
One 50,000 ohm volume control, Dubilier type B.
One 250,000 ohm volume control, Dubilier type J.
Twelve 0.1 mfd. tubular condensers, Dubilier type 4003/S.
Three 0.0001 mfd. condensers, Dubilier type 690W.
Two 0.0002 mfd. condensers, Dubilier type 690W.
One 0.01 mfd. condenser, Dubilier type 4601/S.
One 0.5 mfd. condenser, Dubilier type 4608/S.
One 0.005 mfd. condenser, Dubilier type 691W.
Two 25 mfd. electrolytic condensers, Dubilier type 3016.
One 50 mfd. electrolytic condenser, Dubilier type 3016.
One 2 mfd. condenser, Dubilier type LEG.
Two 4 mfd. condensers, Dubilier type LEG.
One 0.01+0.01 mfd. condenser, Dubilier type BE328.

Approximate cost £11 10s. 6d.

VALVES:

7 Hivac-Harries All-Stage Valves, type A.15. } *
2 Hivac UU.120/500 rectifier valves. }

LOUDSPEAKER:

One 1,250 ohm field mains-energised speaker with transformer to match push-pull output stage, 12,000 ohm centre-tapped—W.B. type EM/S.

*Complete kit of Hivac Valves is offered by the makers at a special price of £4-1-0.

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, January 11th.—Symphony Concert : Ninth Concert from the Queen's Hall, London.
Thursday, January 12th.—All Hands Ashore : light entertainment.
Friday, January 13th.—Lakmé, an opera by Leo Delibes.
Saturday, January 14th.—Music Hall.

REGIONAL (342.1 m.)
Wednesday, January 11th.—Star-Gazing—10 : Jessie Matthews.
Thursday, January 12th.—Variety from the stage of the Hippodrome, Bristol.
Friday, January 13th.—Red Riding Hood : Pantomime from Covent Garden.
Saturday, January 14th.—Three Men in the Snow, adapted as a radio play by Robert Kemp.

MIDLAND (297.2 m.)
Wednesday, January 11th.—Landmarks in English Music : orchestral programme.
Thursday, January 12th.—Discussion : Private Enterprise and Public Ownership in Broadcasting.
Friday, January 13th.—Midland Marionettes, women's concert party.
Saturday, January 14th.—Variety programme.

WEST OF ENGLAND (285.7 m.)
Wednesday, January 11th.—London Theatre Successes of 1938 : a programme of gramophone records.
Thursday, January 12th.—A Variety Programme, broadcast from the stage of the Hippodrome, Bristol.
Friday, January 13th.—Made in the West : a feature programme to introduce the forthcoming series of talks on industries in the country towns of the West.
Saturday, January 14th.—Sports Special : a feature for fans.

WELSH (373.1 m.)
Wednesday, January 11th.—Talks and Discussions on The Small Nations (in Welsh).
Thursday, January 12th.—Drama : Campbell o Kilmhor (Campbell from Kilmhor), by J. A. Ferguson.
Friday, January 13th.—Heddiw yw Dydd Calan yng Nghwm Gwaun (To-day is New Year's Day in the Gwaun Valley) : feature programme.
Saturday, January 14th.—An Hour of Melody : Orchestral concert.

NORTHERN (449.1 m.)
Wednesday, January 11th.—Music of the People, a concert from Birkenhead.
Thursday, January 12th.—The First Five Years : a dramatised Discussion on

Nursery Schools, with recordings made at the Rachel McMillan L.C.C. Nursery School.
Friday, January 13th.—Club Concert, from East End Park Working Men's Club.
Saturday, January 14th.—Northern Choral Singing—1.

SCOTTISH (391.1 m.)
Wednesday, January 11th.—Scottish Dance Music.
Thursday, January 12th.—Choral programme.
Friday, January 13th.—Inside Information—Happy Feet, recorded programme.
Saturday, January 14th.—Three Men in the Snow, adapted as a radio play by Robert Kemp, from Cyrus Brooks' translation of the story by Erich Kästner.

NORTHERN IRELAND (307.1 m.)
Wednesday, January 11th.—Chamber Music.
Thursday, January 12th.—A Song Recital.
Friday, January 13th.—Country Concert from Armagh.
Saturday, January 14th.—Association Football—Newry v. Larne : a commentary during the second half of the match, from the Show Grounds, Warrenpoint Road, Newry.

AN EXPERIMENTAL TWO-VALVE

How to Build a Simple Two-valve Set from Old Components for Broadcast Reception, and for Tests and Experimental Work. By W. J. DELANEY

LAST week we explained how it is possible to utilise old components in certain types of receiver, and promised to describe a receiver which could be used on these lines for various purposes. Probably the best type of set to be built for general use is a two-valver in which the valves carry out the functions of detector and L.F. or output stage. Such a receiver calls for only one tuning coil and condenser, and

almost instantaneous change from one form of coupling to the other, and the amateur can make up various units for use with this scheme. It is, in fact, as simple as ordinary coil changing as used in short-wave receivers.

The coil may be wired according to the particular component available, although the circuit shows a coil having an aerial winding. The coil described last week in the first of the articles on Making Your

but if the condenser is a good one it should be found possible to bring the receiver into oscillation with a high value without the difficulty of overlap. Fixed condensers, and the grid-leak, may be of any make or type, choosing values from the range indicated on the circuit diagram. The H.F. choke is a most important component, and in many receivers of this type it is generally found that poor reaction control is due to an unsuitable choke. A screened component is not necessary, but if an unscreened coil and choke are employed it is worth while trying to modify the positions of both so that interaction does not take place between them.

The Output Stage

A triode or power type of valve is shown in the circuit, but if desired a pentode may easily be substituted. In that case a 5-pin valveholder should be used and the additional terminal should be joined to the positive speaker terminal. The layout is not critical, and a suitable scheme is indicated in Fig. 2. For the panel you may use wood, ebonite or metal, as the moving vanes of the tuning and reaction condensers are shown joined to earth. In the event of a coil being used in which the reaction winding is already connected to the earth end of the grid coil (which would necessitate the inclusion of the reaction condenser between anode and reaction winding) an insulating washer would have to be mounted on the reaction condenser so that the reaction coil would not be short-circuited. A panel is not, of course, essential, and by using component-mounting brackets the condensers and switches may be supported in such a manner that they are easily replaced when alternative components are being tried.

Experimental Modifications

The details given will enable a very useful set to be built up, and for the experimenter who is just starting radio

(Continued on page 458)

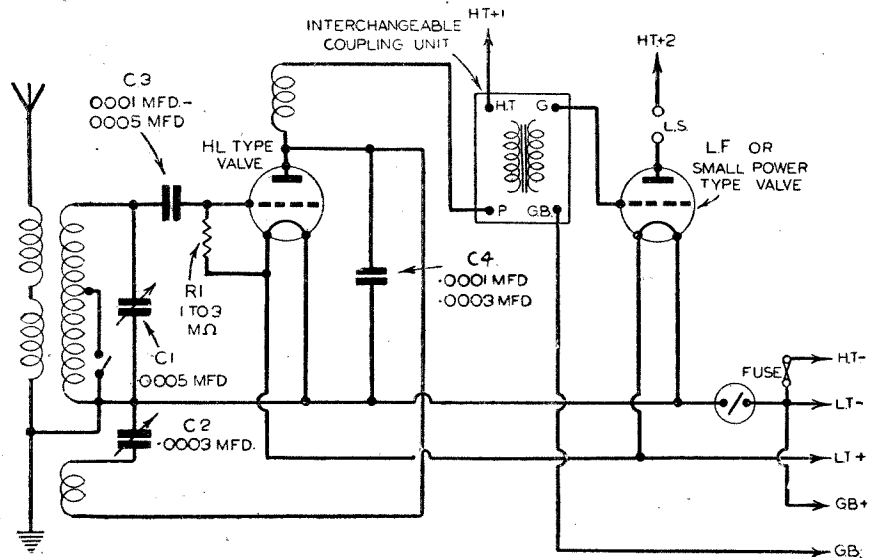


Fig. 1.—Theoretical circuit of the two-valve experimental receiver.

thus there is no difficulty in setting up the receiver, nor in its operation. A set of this type may be built with practically any make of component, and will give satisfactory results, the performance depending, obviously, upon the quality of the parts which are used. Some difficulty is often experienced by the amateur in deciding upon the best type of low-frequency coupling, and although there is only the choice of either transformer or resistance-capacity coupling, these may be modified so far as the connections or values of component are concerned. In this receiver, therefore, a plug-in device has been incorporated so that the set may be used as a stand-by test unit wherein various types of transformer may be instantly compared, the effects of different ratios noted, or suitable values of resistance-capacity components ascertained.

Adaptability

The method of making up the plug-in device is shown in Fig. 3, whilst Fig. 1 shows the theoretical circuit with special lines indicating the wiring of the L.F. transformer when this component is employed. If a resistance-capacity coupling unit is desired it would be wired as shown in Fig. 4, and thus it will be seen that it is an extremely simple matter to make an

Own Components could, of course, be utilised in this receiver. The tuning condenser should have a value of .0005 mfd., and although a slow-motion drive is desirable it is not essential. The reaction condenser should be selected to give good reaction control with the coil in use, and in most cases a maximum capacity of .0003 mfd. will be found suitable. In some cases a lower value may be found more useful,

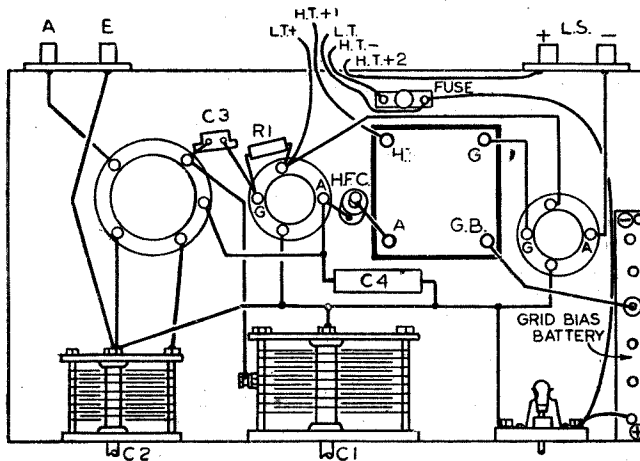
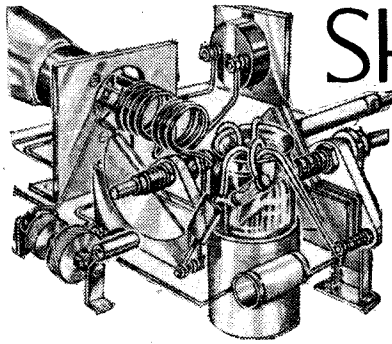


Fig. 2.—Suggested layout for the receiver, showing the replaceable coupling panel.



SHORT-WAVE SECTION

HUM AND THE SHORT-WAVE RECEIVER

Common Causes of Hum and Instability are Here Revealed, together with the Most Effective Methods of Curing Them.

BACKGROUND noise is particularly objectionable with any form of radio reception. Whether it is present in the form of valve noise, microphony, modulation or mains hum, or interference due to defective components, it tends to detract from the entertainment value of the reception and, in certain instances, it is possible for it to affect the efficiency of the receiver to the extent of blotting out a station which, under normal conditions, would be logged at a satisfactory strength. This applies in particular to the short waves. Any listener to the transmissions on the lower wavelengths will agree that the first essential is a dead silent background. Admitted that this desirable qualification is not always obtainable so far as atmospheric conditions are concerned, but that is no reason why every care should not be taken to make the set as perfect as possible, thus reducing the total interference to the minimum.

Valve noise, microphony and defective components can, more or less, be eliminated comparatively easily by due attention to circuit design, construction, and normal tests, but when hum is the most disturbing factor the matter is not quite so simple, as it is impossible to define an exact cure for each and every case. Many constructors avoid trouble from this source, and, incidentally, others by using a battery-operated receiver for their short-wave listening. Such procedure is all very well so far as obtaining freedom from set interference, but it does not strengthen their position when they switch over to a mains or an eliminator-operated outfit.

A Compromise

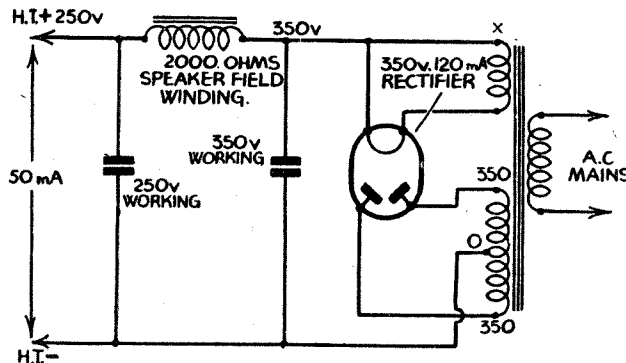
Quite a number of listeners attempt to compromise by using a receiver employing standard two-volt valves with their filaments supplied from an accumulator, and an eliminator for the source of high tension. A certain percentage of them are fortunate and experience no trouble, but against these we have to put a surprising number who do strike the very snag they were trying to avoid, namely, modulation and mains hum.

It would appear, therefore, that the root of the trouble in such instances is, undoubtedly, in the mains section of the equipment, so before going to the trouble of modifying or rebuilding the receiver it is always advisable to concentrate on the rectifier and smoothing equipment first.

The fact that an eliminator or mains section works perfectly when used in conjunction with an ordinary broadcast receiver does not mean anything so far as its suitability for short-wave work is concerned, other than, of course, the proof that the apparatus is in order as regards delivering a reasonably smoothed output of the correct voltage and current.

Short-wave receivers using circuits tuned

to high frequencies are much more susceptible to any interference, either from direct injection or radiation from adjacent apparatus, than their broadcast counterparts; therefore, remembering that the H.T. supply is common to all anodes, it is obvious that particular care must be taken to ensure that the supply is filtered in an adequate manner and that components carrying raw A.C. are kept at a distance greater than their effective fields. The



A standard valve rectifier circuit using the field of an energised speaker for smoothing.

circuit shown above will be recognised as a perfectly standard rectifier arrangement. The valve in question is of the 350-volt 120-mA type, but that is quite immaterial as we are only concerned with the smoothing of the output.

It will be noted that the usual inductance and capacity is connected in series and across the positive and negative lines. The inductance being provided by the field of an energised loudspeaker in place of an ordinary L.F. choke more widely used with lower outputs.

A.C. Ripple

The output from the smoothing choke is generally referred to as "D.C.," but it should be borne in mind that although a rectifier has been used the output will bear a ripple, the degree of this depending upon many factors. This ripple is not of great importance in broadcast apparatus, but on the short waves it is possible for this to be modulated, thus giving rise to audible hum in the output circuit. Feedback between various stages is also possible as the choke is common to all stages, and it is these factors which concern the short-wave listener. A simple mains unit or battery eliminator will not, of course, employ such a high inductance smoothing choke as a speaker field and thus the trouble is even more pronounced.

The first step in removing these troubles is to isolate the detector stage, as it will be found that this is most prone to troubles from outside sources. Simple decoupling may prove effective, but where experimental work is to be avoided it may be preferable to adopt the following procedure right

away. As we have stated that the detector stage is most likely to be the root of the trouble, this should be fed with a separate H.T. supply, and the easiest way of doing this is to take a separate lead from the point marked "X" in the diagram and to connect a standard L.F. choke at this point. Assuming that the choke shown in the diagram is a standard component (and not a speaker field) we can then use one H.T. output for the H.F. and L.F. stages, and the remaining one for the detector stage. In addition to providing a separate smoothed supply for the detector we may thus have at our disposal a much higher voltage than is available at the other choke, due to the fact that a much smaller anode current is flowing and there will consequently be a smaller voltage drop. This will enable a large value of decoupling resistance to be included in the detector anode circuit, and the additional smoothing should then enable hum-free working to be obtained.

As an alternative, the output from a speaker field (as shown in the diagram) may be used for the detector stage, and the output from the standard choke may be

used for the remaining stages, providing in this case extra H.T. for output valves which may be of a more efficient type than may be used when a low H.T. voltage is available.



Ultra-short wireless waves as a method of treating inflamed and ulcerated eyes have proved so successful that the Royal Westminster Ophthalmic Hospital, Holborn, W.C.2, has installed a specially designed short-wave generator. The patient is given ten to fifteen minutes "local application" of six-metre short waves through the eyes. Only a sensation of slight warmth is felt, and the apparatus is the first of its kind in Britain. The illustration shows a patient receiving the new radio treatment at the Royal Westminster Ophthalmic Hospital.

ON YOUR WAVELENGTH



The New Year on the Air

I LISTENED to the B.B.C. broadcast of the various New Year's Ceremonies. I was not in the least surprised that Scotland was given pride of place, bearing in mind that some members of the B.B.C. are drawn from that likeable, if fiery, race, and that both Directors-General Sir John Reith and Mr. Ogilvie are Scots. One would imagine from the nature of this broadcast that the New Year Celebrations were some speciality indigenous to the soil of Scotland to which Englishmen are privileged to listen. May I offer a friendly word of advice to the B.B.C., that it is an organisation run from London, the capital of England, and chiefly out of English money. The B.B.C. must therefore sink its natural pride in the race from which it draws some members of its personnel, and give pride of place to England now and again. After all, there are only three million Scots in Scotland, and I have always understood it to be the policy of the B.B.C. to please the majority of its listeners! I can assure them that the majority of their listeners do not like an overweening proportion of Scottish material in B.B.C. programmes. More hoots, hohs, hichs, and achs, from Scotland or Scitland!

Liberties with King's English

WHILST I am dealing with this problem there is one other matter to which I advise the B.B.C. to give most careful attention. It is this: Owing to the influences to which I have referred there is a grave risk that eventually all Englishmen will be speaking with a Scotch accent. Now, as an Englishman I particularly resent pronunciation by B.B.C. announcers based on the multifarious dialects of the Highland and Lowland Scots. I am not alone in my objection to this, for I see in the dignified pages of *John o' London's Weekly* the following letter. The writer is referring to "The dialect or patois which is called *Oxfawd*." This is what he says: "The variety which emanates from the B.B.C. differs entirely from any dictionary pronunciation which I have met. For example, the announcer, whom I am informed, from the very fact of his position, must be of uncommon erudition (probably Public School and University), recently called an Arterial Road an 'Ahterrial Road,' Materially is 'Materially,' Herr Hitler was re-christened 'Huh Hitlah,' and Europe 'Yurrup.' Then we hear about 'High presshaw,' from the 'Nauth,' and 'Fah perriods,' etc., etc. "All of this is of 'cawse' 'qaite naice and refaned"—but if it is to become the language of the country the existing dictionaries should be scrapped, and the folks who persist in the old-fashioned pronunciation, viz., the King, the Archbishop of Canterbury, Lord Ponsonby, and many others, should be advised that they are 'out of date.'"

I have commented on this matter before, and given as my opinion that only the English should decide on the pronunciation of their language. We have no need to go to a Welshman, an Irishman, or a Scot. The B.B.C. is embarking upon a dangerous policy in toying with a language which is

By Thermion

older than science, many centuries older than the B.B.C., and certainly much older than the Scottish dialect. I cannot admit that Gaelic is a language.

"Torch" Again

OUR old friend Torch wishes to illuminate my columns with another piece of poetic prose. May his filament never grow less, and may his nose never blue-glow.

Now listen to anode!
May Torch the Rhymester send a New Year's wish, "Good Luck to PRACTICAL AND AMATEUR WIRELESS." May Mr. Camm, our great preceptor, still chase and hunt the Mad Inventor, and you to Scots cry "Pish."

May manufacturers be led to know the Home Constructor isn't dead, but still is active, and very much alive; and when from them we order parts, not break enthusiastic, patient hearts, with too long waiting till their interest's fled.



Curse the long-wave winding!

May spiritualists so gaunt and pale, in darkened rooms on tambourines performing; let loose on them the Rhymester Torch, their "never-mention-ems" he'll scorch, their "Magic Arts" make fail.

A little nonsense now and then, is relished by the wisest men, as "On Your Wavelength" tinged with wit and humour, may laughter make our eyebrows rise, at quip and crack and maxim wise, from Thermion's able pen.

In good old "P. and A" no sign, of increased price, a foul design, we'll get our full three-pennorth every Wednesday morning, enthusiastic readers all, there'll

be no circulation fall, in nineteen thirty-nine.

"TORCH."

The Indistinct "Tim"

I HAVE drawn your attention, as well as that of the Post Office, to the indistinct enunciation of the girl with the golden voice when she is announcing 30 seconds and 40 seconds, both of which are pronounced the same when you dial "Tim," and you have to wait for the second announcement to know whether she is saying 30 seconds or 40 seconds. After the great amount of trouble which was spent in finding a girl whose diction would be plain for all to hear, it is somewhat surprising that the Post Office view this matter with equanimity, for they replied to my letter by stating that everyone who dials "Tim" would certainly wait for the previous and following time announcement. My old friend Donald Knock (VK2NO), of the *Bulletin*, Sydney, Australia, writes in connection with this matter:

"On page 79 of your issue for October 8th last, reference is made to the 'Speaking Clock' you Londoners enjoy by the medium of the land-line, and the indistinct articulation of the words 'thirty' and 'forty.'"

"In Australia there would be no doubt about the Y part of it at least, the custom on the part of radio-telephony operators being to lay stress on the Y by pronouncing it Eye. Thus 'forty' becomes 'forteye.' There couldn't be much mix-up thus between 'fourteen' and 'forty.' That,

An old contributor of P. & A. W. now resident in South Africa, sent me an amusing greetings card, part of which is reproduced here. He added a few lines to the original drawing to give it a radio atmosphere.

however, doesn't clear up the similarity in 'thirty' and 'forty.'

"A nice problem it will be for New York, U.S.A., if a time-speaking clock is installed. One would be likely to get something like this: 'The toime is foirthoity in the moining.' At least, that's what the screen would indicate."

Back Issues

J. T., of Acocks Green, has copies of this journal for 1937 and 1938. He is willing to dispose of them to anyone sending carriage. The first letter I receive will be forwarded, and the remainder returned.

(Continued overleaf)

ON YOUR WAVELENGTH

(Continued from previous page)

The Cuttings File

HEREWITH letter from A. D., of Jesmond:

"The reference you make to a cuttings file in PRACTICAL AND AMATEUR WIRELESS of December 31st, 1938, probably refers to your remarks in the issue of November 26th, 1938 (page 263) relating to my letter to you. My cuttings file is on the lines of an encyclopædia of radio, and consists of about 120 brown paper folders with white labels pasted outside with the subject it contains. There are separate folders for each class of valve, also for meters, tests, faults, etc. The particulars have been collected during the last 10 years, and are filed in a drawer 10in. by 10in. by 14in. long. Under 'Meters' there are particulars of meters not generally found in text-books on radio, information such as the meaning of 200 ohms per volt. All small cuttings are pasted on each side of a white quarto sheet to form a page, whilst full-page cuttings are trimmed by the removal of the margins to make them small, dates being retained when possible. I have not found any difficulty with matter printed on both sides of a page, but coming under other headings the best is chosen. When Mr. Camm's book on Coils, Chokes, etc., was issued, all folders relating to short-wave coils were thinned out, as my encyclopædia refers to practical points not found in radio text-books."

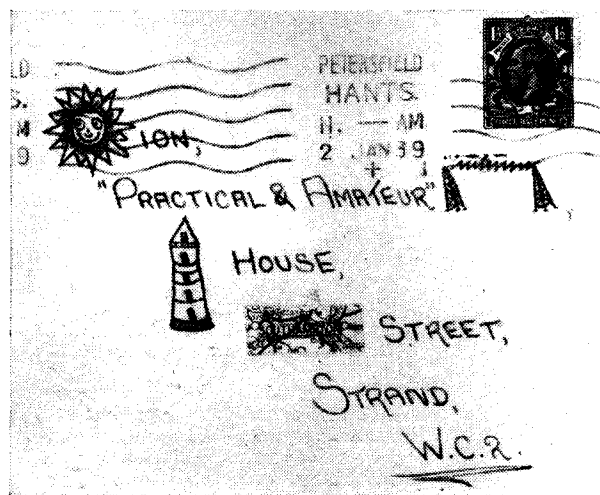
Television Transmission Tube Developments

AT the Institution of Electrical Engineers recently two very interesting papers were read dealing with television transmission tubes and feeder cables. In the case of the first-named, information was imparted which gave a much clearer explanation of the operation of the storage type camera, and helped to remove many of the points of doubt which had hitherto existed. It was pointed out that in the generation of the television signal the flow of secondary electrons from the mosaic to the second anode must be controlled by the potentials of the mosaic elements in the immediate neighbourhood of the scanning spot, rather than by the potential of the second anode. Furthermore, the E.M.I. engineers reading the paper stated that the camera tube operates with the low efficiency of about 5 per cent. of the theoretical maximum. This arises from the lack of saturation of the photo emission from the mosaic during most of the frame period. Another reason put forward for this, although of secondary importance, is bound up with the spread of secondary electrons released by the scanning beam from the mosaic. These secondaries neutralise the charges stored on the mosaic elements, and also generate spurious signals of which one is a low-frequency component known as "tilt," which is superimposed on the picture signals. Readers will remember a recent note in these columns which dealt with one method whereby this defect can be corrected by suitable electrical circuits in association with an additional grid electrode.

Separating the Functions

IT was primarily as a result of the difficulties associated with the standard form of storage tube, coupled with its low efficiency, that steps were taken to separate the two functions of photo emission and charge storage. This is the principle now governing the operation of the super-

emitron which has been used occasionally by the B.B.C. The optical picture of the scene to be transmitted is focused on to a continuous photo surface which is of the transparent type. The resulting electron image so generated at this surface varies in density across its section according to the varying degrees of illumination of the picture. This image is then electrically accelerated and focused on to the storing mosaic which is not photo sensitive, but secondary emissive. At this plane a charge distribution is generated which corresponds to the optical picture on the photoelectric cathode. The scanning of the mosaic signal plate is carried out in the normal manner by the electron beam, and in this way the elements are restored to their equilibrium potential. The advantages accruing from this separation of the camera functions are threefold. First there is an improvement in the efficiency of the photoelectric cathode; second, the multiplication of the charges on the mosaic by secondary emission, and third, the greatly improved



Such is fame! A letter I received recently from a reader in Petersfield was enclosed in the envelope shown here, which reached me safely.

optical conditions which give a greater depth of focus.

"Gold in Australia"

RADIO features have been written about many subjects, but as yet none have touched gold. Yet nothing is more dramatic than the cataclysmic effect that the discovery of gold has on a country.

John Richmond is producing a story of Australia where gold was discovered in 1839—two years after Queen Victoria's accession. Although this radio story will describe the various gold rushes and scrambles which took place in East and West Australia, yet it is also built round the human story of migration, dealing with two or three generations of one family.

The magic lure of gold drew the adventurous immigrant from the home country. Listeners will follow his fortunes and, through the power and impetus of gold, see what becomes of the lone immigrant's descendants up to the present day. Such a story is suited to the radio medium. The British Empire overseas was to a great degree financed and developed from the mineral wealth that British colonists discovered in the new lands.

"Gold in Australia," which will be given in the National programme on January 31st, will also be broadcast from the Empire transmitters, and Australians themselves will no doubt like to feel that the home country is also listening to a human story of an Australian family. The programme has been written by R. L. Mégroz and will be produced by John Richmond.

Listeners' Reactions

NO one could have foreseen a few years ago that by 1938 it would have become necessary for a special section of the staff of the B.B.C. to do nothing but answer the questions, acknowledge the suggestions, appreciations and criticisms that three van-loads of mailbags bring them by the gross every day. And that's not counting the two young women whose job is to answer inquiries that are phoned by the public every few minutes. . . .

This tremendous mail, however, normally totalling two thousand letters a week, is welcome, and far from being an unnecessary evil, it is one of the few ways in which the B.B.C. is helped to know what listeners are thinking, a "box office" barometer of public opinions.

Only a short time ago, stacks of letters for and against the broadcasting of what was called "dance music" on Sundays reached Broadcasting House. Similarly, more than a thousand postcards, most of them addressed to the Director-General,

recently arrived from people in all parts of the country, asking the B.B.C. to continue the foreign language broadcasts.

If you should ever hear a comedian exclaiming "Blimey!" or "Hell!" in a B.B.C. programme, you may be sure that several hundred listeners are about to put pen to paper to tell the B.B.C. that this kind of thing must stop and should never have happened, anyway.

Similarly, there are those who urge the B.B.C. to become a teetotalitarian state, where alcohol in its various quenching guises is outlawed, and where drinking songs should refer to lemonade, milk, or water.

Nowadays, however, the B.B.C. is so aware of the sort of things that may quite unwittingly offend listeners that it is a point of policy to see that programmes both avoid those which may honestly give pain to a considerable section of the unseen audience and lay a minimum stress on others, which, though generally innocuous, would, without much doubt, disturb hypersensitive listeners.

It is on record that a listener some time ago wrote to Broadcasting House asking where he could get a translation into Chinese of "O, Golden Sun of Oblivion."

The B.B.C. was able to tell him.

Other strange queries, taken at random from the files, have ranged from "What would Shakespeare be writing if he were alive to-day?" and "Is the sun a fixture?" to requests for a list of unusual Irish feminine names—by someone with a daughter to be christened.



Practical Television

January 14th, 1939. Vol. 3. No. 134.

TELEVISION RECEIVER CHOICE

SINCE the closing of Radiolympia up to the present time there has been a marked lag between television receiver orders and their ultimate delivery into the homes of the eager purchasers. With the advent of the New Year this condition is showing considerable improvement, however, and many who have withheld their interest are once more examining the merits of the different types of receivers available with a view to deciding which type of model meets the domestic needs of the household. When it is remembered that there are over sixty different television receivers to choose from, it is natural to find the potential customer a little bewildered, and although the complete range of models can be reduced to types with common features there are many important points to be taken into consideration, quite apart from the all-important one of first cost.

Settling the Types

There are no doubt several ways in which a list of types can be drawn up, but from observation it would seem that the most reasonable is to segregate the sets into the following headings:

- (a) Adaptor or Add-on Unit.
- (b) Vision and Sound Only.
- (c) Vision and Sound, together with All-wave Radio.
- (d) Projection Receivers.
- (e) Television and Radiogram.

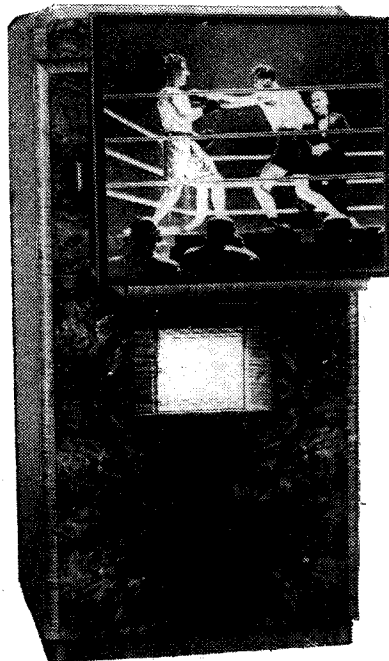
In any case, this form of separation will suffice for the purpose of dealing with the features to look for prior to purchase. There is no doubt that the first-named section is one around which quite a good deal of controversy exists, so it is advisable to examine the case impartially. These units, as a rule, take one of two forms—namely, those which adapt the home radio set to the sound side of the vision broadcast by producing an intermediate frequency with the vision frequency-changer, so that the domestic set has to be tuned accurately to obtain the required I.F., and secondly, those which “add on” to the radio set by feeding the low-frequency output of the unit into the gramophone pick-up terminals of the home receiver. In each of these cases, of course, the picture is provided by the tube and chassis integral with the adaptor or unit; the home set merely being a link in the ultra-short wave sound chain.

Small Saving

The sum of money saved by this means is not of considerable proportions, however, although naturally it enables a favourite home receiver, with which an individual may be loath to part, to help in giving sound and vision entertainment. Then, again, there are some who like sectionalising their radio equipment into parts, and in those cases the adaptor scheme is an admirable one. From the point of view of immediate capital outlay there is certainly a saving, and it may be regarded as an

intermediate stage, as against a future date when both adaptor and domestic radio set will together give way to a combined television, and radio instrument, with all the modern developments to meet the family needs.

To others, of course, the idea will not appeal, for it means two cabinets and connecting leads which may be inconvenient, or awkward, to accommodate in that part of the room which gives the best viewing position for television programme enjoyment. Again, there is always the possibility of frequency-changer drift, and this can only be countered by retuning the radio set each time it occurs. More important still is the fact that since most radio sets have a fairly sharp frequency cut-off at about 5 kilocycles, the high fidelity of the television sound transmission cannot be taken advantage of in any way



The Ekco-Scophony big-screen televisor.

The good quality sound which accompanies every television broadcast is a feature commented upon by everyone, provided, of course, the set employed is capable of handling the higher frequencies involved, that is, up to at least 10 kilocycles.

From these rather brief remarks, therefore, it will be obvious that the decision to acquire an adaptor or add-on unit is one which has to be considered from every angle in the light of domestic convenience, suitability and age of an existing home broadcast receiver, coupled with the necessity for having two cabinets which must be juxtaposed in order to give the illusion of the sound emanating from the picture. That they fulfil a useful purpose is proved by the manufacturers who have



A typical television add-on unit, providing only the television sound and picture.

made this equipment available, and assuming the vision side performance is up to standard, the final choice is more of a personal problem than in any of the other categories.

A Separate Set

While the number of adaptors at present available is rather limited, there is quite a wide choice for those who feel that it would be advantageous at the present juncture to purchase a set which is designed solely for the vision and sound programmes now being radiated from the Alexandra Palace station. There are at least two dozen models which fall within this category, and the choice should therefore be dependent upon such features as reliability, ease of control, picture size and clarity, together with any aesthetic appeal in the complete design. Most of these vision and sound sets have a picture which does not exceed 10in. by 8in., being built up round a 12in. diameter cathode-ray tube. It would appear that the aim of many of the manufacturers of these sets has been to provide a potential viewing public with a neat, efficient set, relatively small in overall dimensions, which can be regarded solely for the purpose of providing pictures and sound from the B.B.C. television service without in any way interfering with the established domestic radio installation.

Complete in itself, the price is but little in excess of the adaptor or add-on unit, and has the merit of being capable of being placed anywhere in the room where convenient viewing can be undertaken. Most of these sets have their controls reduced to the barest minimum, in some cases a simple contrast control for vision and a volume control for sound, so that after installation by the dealer or engineer it is simply a case of switching on and enjoying the programme fare now provided by the B.B.C.

Points to look for in making a final choice are an adequate range of contrast in the picture itself, with a degree of brightness sufficient for the proposed amount of lighting it is intended to have in the room when watching televised items. Be sure the colour of the picture is as near black and white as possible, unless you have a marked preference for sepia or shades towards green or purple. Examine the focus of the cathode-ray tube to ensure that when close to the set each line is clear

(Continued overleaf)

PRACTICAL TELEVISION

(Continued from previous page)

over the available scanned area. Any patchy misfocusing becomes very annoying when the initial enthusiasm for the "new toy" wears off, and the members of the household settle down to critical viewing.

See that there is full detail in the picture with an absence of line pairing due to an imperfect interlacing. This produces a slightly blurred picture which should be capable of rectification by reducing slightly the lock control of the synchronising. Yet another item that merits the closest attention is any ghost or double images. It sometimes happens that a vision chassis has certain frequencies over-emphasised, and this results in ringing effects which are very noticeable at edges where there is a sharp change from black to white. Linearity of scan is also worth watching, otherwise the picture will be opened out at the top and/or left of the scan, and rather squeezed up on the right and/or bottom of the framing mask. Now linearity can arise from a variety of causes, and a defect of this nature is sufficient reason for refusing to choose that particular model, as the picture will continually be out of balance, and if very pronounced, make the figures rather grotesque in shape.

The Third Class

Coming now to the third category, from which there are about the same number of models to choose from—that is, two dozen—these sets are primarily for those listeners who feel that their present set is so old that a change is necessary, and at the same time desire to take advantage of the new form of home entertainment—television! The additional sum of money involved when compared to vision and sound only is less than that for separate television and broadcast receivers because of the reduced manufacturing costs brought about by the saving of a cabinet and certain of the radio components. There is a choice of really first-class table or console types, depending on the purchaser's private tastes and having in mind the price of receivers of this nature, the broadcast radio set incorporated is of the latest type and of good quality. All the points associated

with the picture itself which were enumerated for the preceding class hold for those in this category, so that the prospective purchaser should be able to make a really intelligent selection.

There is one small drawback, of course, and this arises from the fact that it is not possible to have broadcast radio and television reception both available at the same time. It is seldom that such a condi-

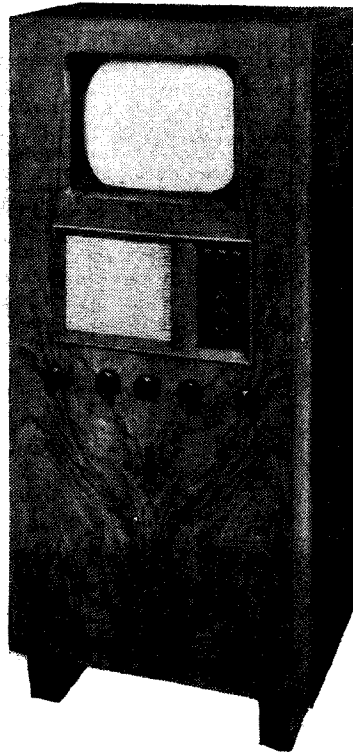
provided that the mirror is a surface-silvered one, then there is little to choose between the final reproduced picture, assuming other things are equal. As a rule, a slightly wider viewing angle is possible when the picture is seen on the tube face direct, but this is only a matter of importance when a very large party desire to look in at the same time. As the prices for these receivers range from about £30 to £90, it will be appreciated that it should be possible to satisfy all tastes.

Large Pictures

The question of very large pictures for domestic purposes does not really arise unless the user has rooms of ample dimensions, or proposes to use the set in a hall. With the present standard of definition of 405 lines, a picture 2ft. wide needs to be viewed a substantial distance away to give justice to the results. The reason for this will be obvious when it is remembered that picture size and viewing distance are inter-related by simple proportion. Of course, added to this is the question of first cost which, due to the nature of the equipment used, is very much in excess of the simpler domestic models employing the usual form of cathode-ray tube. There are at the moment only four or five large-picture receivers on the market, and apart from the final colour of the picture the results are all comparable.

The Final Category

Those receivers which give what is so often termed complete home entertainment, embody television, all-wave radio, and a gramophone with or without an automatic record changer. There is no doubt that these instruments represent the last word in quality and appearance, and in every case steps have been taken to ensure that first-class reproduction is obtainable in both sound and vision. A sum of £150 or more can be paid for these sets, although they are available for as low as £70. In any case, from the point of view of the picture, the points detailed earlier hold with even greater emphasis. Since these sets are not of the mass-production class, however, it will be found generally that craftsmanship and performance are of a really high standard.



A new Baird combined television and all-wave radio receiver.

tion is likely to arise in the average household, however, and is one that should easily be capable of mutual settlement between the differing sections. Direct and indirect viewing is available in both classes, and

Picture Correction

ON two or three occasions in these columns attention has been drawn to an annoying effect in pictures which occurs at times whereby there is a progressive increase or tilt in the brightness of the received picture towards one side. At the same time it is often found that the darker sections of the picture have a tendency to exhibit a whitish, misty, appearance. This arises from an inherent camera fault, and various schemes have been suggested or tried to overcome the defect. Many of these prove quite effective if the average brightness of the scene which is being transmitted is not changed at a relatively rapid rate. When this is necessary, however, such as would arise with certain classes of talking films which are being televised, then the defect may once more make its presence felt. One scheme has been proposed recently for the express purpose of meeting these extreme cases. It consists simply of incorporating in the cathode-ray tube a local source of light which can, if desired, take the form of an incandescent filament. The idea of this simple addition is to liberate a small quantity of slow-moving electrons which will stabilise whatever tilt is

TELEVIEWS

present, and in this way enable it to be more easily corrected by the standard methods.

Becoming Television Conscious

THE advent of the New Year will signalise a determined effort on the part of everyone associated with the television industry in an endeavour to make the British public, or at least that section within the accepted service area, really television conscious. Since the closing of the Radio Exhibition doors at Olympia in September last, the manufacturers of television sets have in nearly every case been much behind schedule in the execution of firm orders. This position has now been rectified, however, and coincident with it a concentrated drive has been arranged between the B.B.C., dealers and manufacturers. Special forms of television advertising will be

arranged, and the new B.B.C. television public relations officer, Mr. Wolfe Murray, will give a series of talks in halls situated in the London and Home Counties area. Demonstrations will accompany the talks, and naturally, dealers in the chosen areas will associate themselves with the work. The full extent of the B.B.C. co-operation is as yet unknown, but there is no doubt that this will be of a very full character for the extent of future development in hours of transmission, improved quality of programmes and, most important, the decision to extend the service to the provinces must obviously be in part dependent on the total number of viewers who are taking advantage of the existing B.B.C. service by having sets installed in their own homes. Every owner of a television set is known to become an unconscious ambassador for television. Friends are invited in to see the new acquisition to the family fireside, and the good programme fare now provided by the B.B.C. convinces others that they are missing something really tangible unless they have a set of their own. Home demonstrations have proved to be the best selling media.

A PAGE OF PRACTICAL HINTS

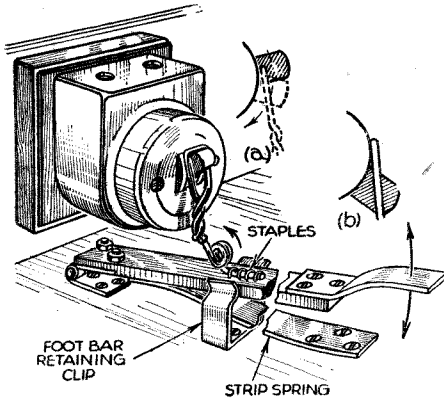
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Foot-operated Switch Fitment

AS the position of my work-table renders the main switch normally inaccessible, I devised a foot-operating arrangement, as shown in the accompanying



A handy foot-operated switch fitment

illustration. With a length of heavy gauge galvanised wire moulded into a springy catch, I experimented with one or two different types of movement until it became apparent that by leaving sufficient "slot" in the end of the catch the dolly of the switch would fall into position under its own spring, both for operating downwards and restoring upwards.

The inset diagrams (a) and (b) show this point, and from these it will be noticed that the end of the catch "wipes" on the moulding flanges or shoulders of the switch cap, owing to the springy formation of the catch. The foot-bar was made from a length of oak strip, the retaining clip being shaped out of thick brass, and the underneath strip spring being of reasonably thick-tempered steel. The foot-bar is hinged to the floor boards, and is long enough to depress and restore whilst at work on the table, but to permit the toe of my shoe to engage under the bar it was necessary to form a slightly raised extension strip, and for this I used a piece of cadmium steel I had handy.—G. J. LEHART (Bury St. Edmunds).

A Valve-cap Repair

THE following "hint" may be of use to those readers who have been unfortunate enough to displace the cap from an S.G. or similar valve when unscrewing the terminal.

It usually happens that the cap brings with it the major portion of the wire which protrudes from the top of the valve, making soldering impossible. I have satisfactorily mended two valves to which this accident occurred, and in the following manner:

First clean from the top of the valve, and from the cap, the remains of the material which the manufacturer thought would cause the cap to adhere to the glass bulb. Hold the cap to the light and examine to see if there is a hole through the brass portion. If so, fill this hole with solder.

THAT DODGE OF YOURS!

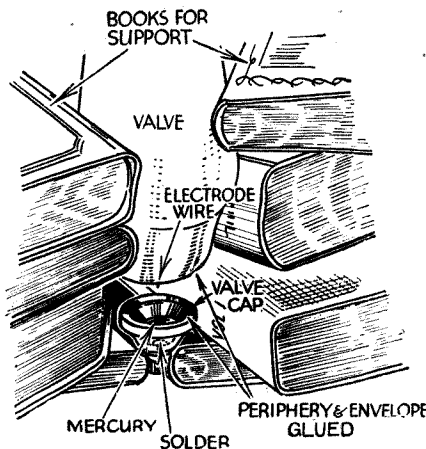
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account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

SPECIAL NOTICE

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

Invert the cap and fix it in the open jaws of pliers, or between two hooks. Into the miniature egg-cup so formed pour sufficient mercury to just fill it. Then smear that portion of the glass bulb and of the cap which are in contact when in normal position with a little strong adhesive.

Stand the valve, legs up, and bring the two adhesive surfaces together, prop in



An efficient method of repairing a valve cap.

position with books, and leave for about twelve hours to harden.

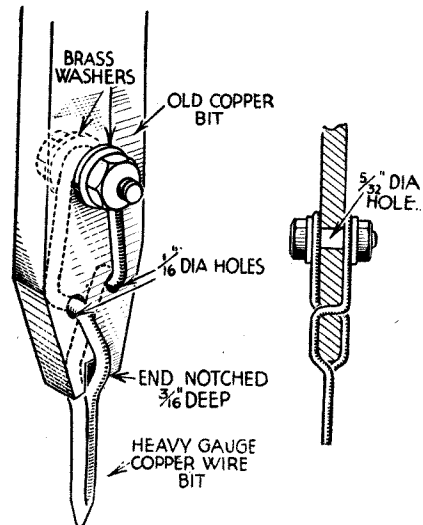
The mercury makes perfect contact between the lead-out wire, even when broken off flush with the glass, and the metal terminal.

The small quantity of mercury required will cost much less than a new valve.

In the case of mains valves some difficulty may be caused by expansion of the mercury owing to the heat, but the "cure" seems perfect with battery-heated valves.—S. W. POWER (Terenure, Co. Dublin).

A Novel Extension Soldering Bit

THE bit of my soldering iron having become very worn I constructed a new one, as shown in the sketch. This bit has the advantage of being easily replaceable,



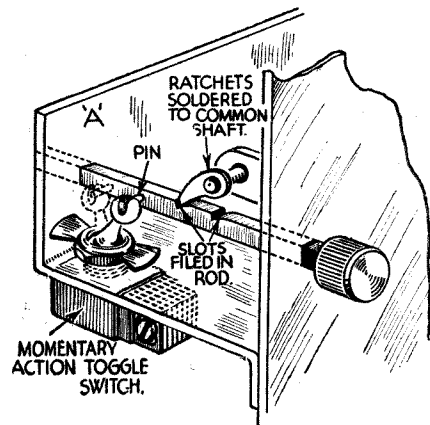
A novel method of extending a soldering bit.

and is so flexible that the most inaccessible corner of the set can easily be reached. The sketch clearly shows the construction—K. E. WATKINS (West Dulwich).

A Push-button Tuning Unit

HERE is a simple method of making up a push-button tuning unit. It consists of a framework, A (in my case it was of brass), with momentary action toggle switches mounted so that the projecting pins on the rods will engage with the slots in the "dollies" of the switches.

The momentary action type of switch should be used as no external restoring spring is then needed, the ratchet holding the switch in the "on" position. Thus, when a button is pressed it raises all the ratchets and thus allows any rod in the "on" position to spring back. Automatic wave-changing can be provided for by mounting two switches on one rod, and any number of buttons can be used.—D. TWIVEY (Market Rasen).



A simple push-button tuning device.

WHEN mention is made nowadays of plug-in coils, one naturally thinks of the popular four- and six-pin types used for short-wave work, and not of the two-pin variety so widely used in the early days of radio.

Although the majority of constructors who have any of the older types amongst their "spares" have no doubt confined them to the junk box, there are many who would like to put them into service, either for experimental or general utility purposes. A visit to the traders who deal in second-hand components or surplus material will reveal the fact that perfectly good plug-in coils of the basket and honeycomb varieties can be picked up for a few pence and, for a very slight additional outlay, holders of both fixed and variable pattern to suit. It must be remembered by those who would not be above scoffing at the thought of using such antiquated components that the coils were not discarded because of their low efficiency. Far from it. It was rather a matter of them being swept away by the introduction of "canned" coils and units when receiver design was passing through one of those rapid progressive changes. The development of multi-valve receivers, using one or more stages of H.F. amplification, necessitated effective screening between inductances and, likewise, coils of smaller bulk. The demand for self-contained switching, fewer controls, and dual-range coils all helped to oust the sturdy and reliable plug-in coils, with the result that they have been shelved and forgotten by all except those who remember the good work which could be done with them.

With modern valves there is no reason why efficient receivers of the detector and L.F. type, and even those employing one stage of H.F. amplification, should not be built round this type of coil to-day; therefore, for the benefit of those who have some on hand, and those who do not wish

UTILISING TWO-PIN

The Original Type of Two-pin Plug-in Coils is not so how They can be Utilised in Simple Circuits which

primary winding, or by tapping the input down the tuned section. If, therefore, local conditions demand a sharply-tuned circuit, it would be advisable to use the modifications indicated by Figs. 1 and 6. In the first it will be seen that two coils

it will be found that if a 60-turn coil is used for L2, a 35- or 40-turn coil will be sufficient for L1.

With coils of the basket type and many of the honeycomb kinds, it will be possible to scrape away a tiny portion of the insulation of one of the turns and solder a wire to it or make contact with the aid of a small crocodile clip. By doing this the same effect as tapping down an ordinary modern solenoid coil can be obtained. The tap should be tried at, say, a third or two-fifths of the coil from the top end (Fig. 6).

Reaction

The method of securing the necessary reaction can be either pure induction or capacity and induction. The latter is more widely used in modern designs as it

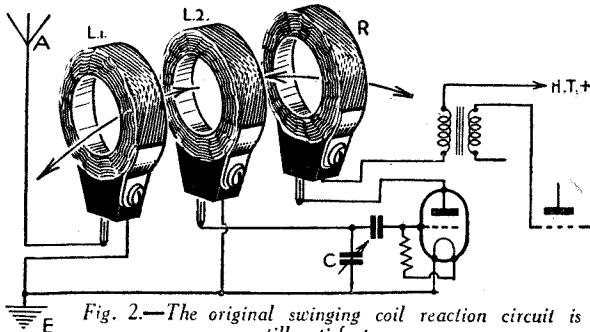


Fig. 2.—The original swinging coil reaction circuit is still satisfactory.

are used for the aerial circuit; the one marked L.1 being connected between aerial and earth, without any tuning condenser across it, while L.2, which is actually tuned by the variable condenser C, is not connected directly to the aerial. By arranging L.1 and L.2 close together it is possible to transfer the energy from the aerial into the tuned circuit and, what is more important, by regulating their positions with relation to each other, control the amount of energy transferred and the load of damping across L.2, thus providing a means of improving the selectivity.

The size of L.1 to that of L.2 must be determined by experiment. In most cases

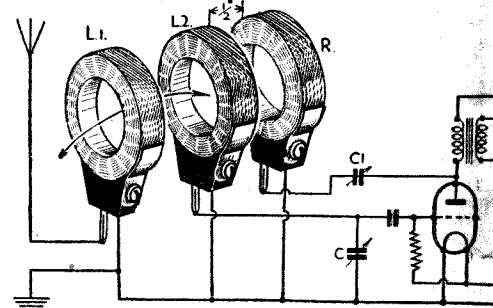


Fig. 3.—Variable aerial coupling and "capacity control reaction." The reaction coil R is fixed.

does offer certain advantages but, if the necessary condenser is not to hand, the former method can be used quite success-

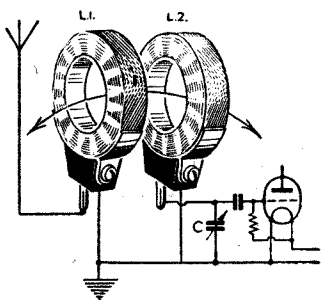


Fig. 1.—Simple but effective variable aerial coupling.

to lay out the cost of a modern coil, here are details of suitable circuits.

Selectivity

The possible lack of selectivity when using the old type of plug-in coil may as well be considered and dealt with right away, as many will raise this objection at once.

With a modern component an increase in selectivity is obtained by the use of a

Smooth Picture Fading

WHEN watching a television transmission where three or four cameras have to be brought into use in turn in order to allow the producer full scope for his ideas on programme presentation, it seldom occurs to viewers that the scheme of camera fading from one to another is a very important matter technically. In the control room the producer has two monitor receivers, and on one of them he is able to watch a replica of the picture which at that moment is on the air. He is able to issue instructions by telephone to the camera-man to ensure that the picture fulfils every requirement of a correct focus, and relative positioning with reference to the artist or scene which is being enacted. On the second check receiver is reproduced a picture from the camera which he proposes next to bring into circuit, and during the fade-over period this picture is naturally transferred to No. 1 receiver which symbolises the "air" transmission. An item of extreme importance which occurs at the fade-over period is that the vision signals are interchanged between cameras or reduced to zero picture modulation if desired, but during this time the synchronising signals must in no way be

TELEVISIC

affected, otherwise the picture seen on every home receiver would go out of synchronism. Not only would this be annoying, but the continuity of the programme would be lost, and the continual recurrence of frame and line slip would make many viewers switch off in disgust. The producer's control knob therefore carries out a complicated sequence of functions at a speed which depends entirely on the rate of the manual rotation, and the circuits involved are made to discriminate between the actual picture signals and the synchronising pulses. The amplitude of the former has to be adjusted without in any way affecting the latter, so that the new picture which is being faded in is correctly locked in step with the synchronising pulses. Occasionally, this does not happen, and sets with weak synchronising locks of their own, and more particularly mechanically-operated sets, exhibit a tendency to lose synchronism, although under favourable circumstances normal conditions will be restored automatically.

A Robot Critic

HITHERTO it has often proved difficult for a singer or instrumentalist to ascertain when an exact note was produced. Tuning pipes and other aids are often used, but there is often a slight difference in pitch which, when two or more voices or instruments are operating together may produce a discord or otherwise prove disconcerting. From America comes an invention in the form of a stroboscope, and which is claimed to be a hundred times more sensitive than the human ear. A microphone is employed and when sounds are picked up—either from an instrument or

from a human voice, a "picture" is reproduced on a scale and thirteen little windows, lit by neon tubes, and black circles spin round. When dead in pitch the circle on the window corresponding becomes stationary. If the note is sharp the disc spins anti-clockwise and if flat it spins clockwise. The apparatus is portable, and will, no doubt, find great favour in musical circles, where it may yet prove of value in re-designing certain instruments in order to ensure perfect accuracy of the note produced. The accompanying illustration shows the first model in England in operation.



Alfredo Campoli, radio violinist, Ruby Moule, B.B.C. singer, and Warde Morgan, first singing professor to use the "Robot Critic," seen with the apparatus in London.

A NEW METHOD OF TESTING WIRE ROPES

A NEW development of the Philips Industrial X-Ray Service is the Philips-Suszycki method of testing wire ropes. The instrument operates on the magneto-inductive principle, alterations in the magnetic field caused by faults in the specimens being detected by means of search coils which pick up and measure the electro-magnetic disturbances. The use of intensive fields and correctly proportioned oscillating coils make the apparatus extremely sensitive to fault disturbances even where they may exist inside the rope.

In practice, the rope is passed through the electro-magnet and the current oscillates in an axial direction in the measuring coil, which encloses the rope between the magnetic poles. The coil picks up induced currents as soon as the magnetic field is disturbed by the presence of a broken strand.

The coil is sub-divided into three parts and the induced currents are recorded by means of three extremely sensitive galvanometers. In this way, the instrument gives not only an indication of the breakage but also shows its approximate position. The apparatus also embodies a camera attachment, by which the existence and position of a fault can be recorded photographically on a sensitized paper strip.

The instrument is simple to operate and the provision of various pole pieces enables it to be used for ropes of widely varying diameters up to a maximum of 3½ ins.

FIRST GENERAL LISTENING BAROMETER

THE B.B.C. announces that a new Listener Research scheme has started, designed to show how many people listen to each programme. Five or six hundred different programmes are broadcast each week and the B.B.C. would like to know the size of the audience for each item. So its Listener Research Unit is tackling this question which, in the normal way, the B.B.C. has no means of answering.

For the success of this General Listening Barometer the B.B.C. is relying on the help of 4,000 listeners in every walk of life. They have already been picked at random from 30,000 listeners who have offered, from time to time, to help in Listener Research work, and it is a striking fact that over 90 per cent. of those invited to co-operate have agreed to take part in the inquiry.

These 4,000 listeners are receiving every week for four months a Listening Log Sheet, consisting of a printed list of the principal evening programmes of the week in the National, Regional, Midland, North and West of England programmes. A specimen is attached. Listeners are marking the log sheets so as to show which programmes they have heard and are then returning them to the B.B.C.

The new scheme is one further step in a campaign to get at the facts about listening. It is a development of the Variety Listening Barometer in which 2,000 listeners co-operated a year ago. That scheme was so successful that the new Barometer has been given much wider scope. It covers all types of programme from Band Wagon to Chamber Music, and from Boxing to the News.

ALL-GLASS RADIO VALVES

Loktal-type Valves, Having no Base, set up New Performance Standards

REVOLUTIONARY new valves, called Loktal Tubes, which eliminate the ordinary valve-bases, are being introduced by Philco for the first time in the new Transitone models, according to an announcement made by Sayre M. Ramsdell, Philco vice-president, says our contemporary *Radio To-day*.

Nothing like these Loktal Tubes has been used in radio sets before. Much smaller in size than the ordinary valve, some of them measuring only 2½" in height, they are without a base and are the first valves to be all valve.

The lower portion of the bulb is simply fitted with a metallic shell holding a small metal guide-pin which accomplishes the locking-in action in the socket.

The Loktal Tubes made it possible for the new Transitone models to be the first compact-type radios ever approved by the Underwriters Laboratories, Inc., as being safe from fire and shock. They consume only half the filament current of valves customarily used in small-size compacts, with a resulting tremendous reduction in the amount of heat generated by the set.

Due to the use of the Loktal Tube, it was possible to design circuits for the new Transitone radios whereby all resistance was built into the set itself, thus enabling them to avoid the practice of using the socket cord wire for resistance.

Before the development of these valves fire underwriters have refused to approve as safe any compact-type radio because the valves used for their operation represented a fire menace due to the serious overheating of the radio.

Additional novel features of the Loktal Tubes include prongs different from those used in the conventional type of valve, thus calling for a new type of socket. Troublesome cap connections are eliminated through the use of much shorter grid leads, made possible by the fact that they connect to one of the pins at the bottom of the valve.

The small dimensions of these new valves which are being made available to the entire industry in America make possible the building of compact radios which offer the facilities and performance, as well as the safety, of radios many times their size.

TALKS FOR DISCUSSION GROUPS

WE are informed by the B.B.C. that three series of talks for Discussion Groups will be broadcast between January and March, 1939.

On Mondays, throughout the season, the subject will be "Children at School." This should be of interest not merely to the teaching profession and to every parent with children of school age, but to every citizen who year by year contributes through rates and taxes towards the educational system of the country. The problems to be discussed, although familiar to educationists, are not always understood by the general public. How have certain subjects won their places in the school curriculum? Why have Latin and Greek been associated for a thousand years with a liberal education? Is homework really necessary for success at school? Are there enough scholarships and free places available to provide equality of opportunity? What are the real issues in this battle over examinations? What is the true significance of "Reorganisation"? These are but a few of the questions about which the man in the street wants information.

With the growth in the number of schools equipped with wireless sets and the increasing interest in education shown by the general public in recent years, it is to be hoped that where Parents' Associations exist, teachers and parents will take the opportunity to listen together to these talks and discuss them afterwards. Most of the subjects dealt with will have a local application, the discussion of which might lead to increased understanding between parents and teachers. The series will be in the hands of W. E. Williams, Secretary of the British Institute of Adult Education, who will interview at the microphone parents who have themselves met with the problems under survey.

The Pacific

Starting on January 12th, twelve talks on "The Pacific" will be broadcast. Among the speakers who will examine the problems connected with the Pacific Ocean from varying angles will be Sir Frederick Whyte, Professor C. K. Webster and Mr. O. M. Green.

On January 17th, the series of broadcasts entitled "The Under-Twenty Club" will be resumed. These are intended especially for listeners between the ages of fifteen and twenty years. The series will continue on the same lines as during the last three months, when a variety of topics was dealt with, including adventure, crime, China, Youth Movements, life on a South Sea Island, and ghosts. Evening institutes have discovered the series, and are making increasing use of it as a training both in listening and self-expression, while Youth Clubs of all descriptions are introducing it as an additional feature among their activities.

Further information about any of the series may be obtained from the Secretary, The Central Committee for Group Listening, 9, Langham Street, London W.1, and the booklet, "Talks for Discussion Groups January to March, 1939," may be obtained on application by post to the B.B.C. Publications Department, 35, Marylebone High Street, London, W.1, or on personal application to Broadcasting House, Portland Place, London, W.1, or to any B.B.C. Regional office, free and post free.

PETO-SCOTT

MANUFACTURERS of TRANSMITTING AND RECEIVING GEAR to H.M. GOVERNMENT.

BRITISH and BETTER 12-MONTHS' GUARANTEE EST. 1919

Coupled with an assurance of complete satisfaction is a 12 months' guarantee which covers all Peto-Scott assembled Chassis Units, Receivers and Radiograms, etc.; valves are included in this guarantee. Replace your old equipment now and enjoy a degree of satisfaction unobtainable elsewhere.

7-Stage 5-Valve A.C. Mains Superhet RADIO or GRAMO. CHASSIS

- All Waves 18-2,100 Metres.
- Automatic Volume and Tone Controls.
- Illuminated Station Calibrated Dial.
- Pick-up Sockets, 3 Watts Output.

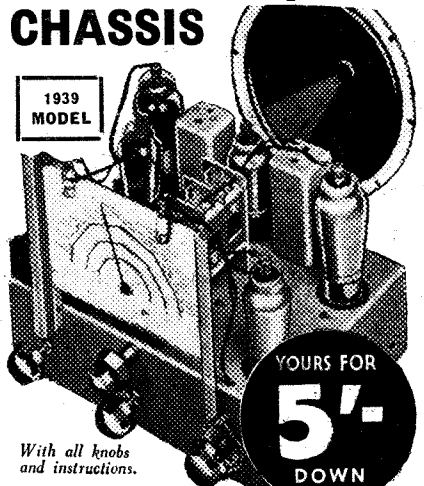
Here is unbeatable value in modern chassis. This 5-valve 7-stage superhet, as illustrated, covers the short, medium, and long waves. Sensitivity and selectivity rivalling an expensive multivalver. Supplied to you complete with all knobs and valves and matched energised moving-coil speaker. Chassis size 11 1/2 in. wide, 9 1/2 in. high, 8 1/2 in. deep. Normal Value, £9/9/0.

WE SAVE YOU £3 : 3 : 0
Our price cash or C.O.D. 6 gns. or yours for 5/- down and 18 monthly payments of 8/- (for A.C. mains only, 200/250 Volts). **6 gns.**

5-VALVE AC/DC CHASSIS

Similar to above but with circular station-named scale for A.C. or D.C. mains, 200/250 volts. Normal Value, £9/9/0

WE SAVE YOU £3 : 3 : 0
Our price 6 Gns. cash or C.O.D. Yours for 5/- down and 18 monthly payments of 8/- **6 Gns.**



1939 MODEL
With all knobs and instructions.

YOURS FOR **5/-** DOWN

CAMM'S P.B.4 KIT BATTERY MODEL

KIT "A" CASH or C.O.D. YOURS £5:5:0
CARRIAGE PAID FOR

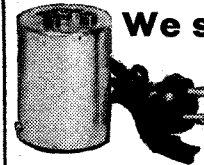
9/- down and 12 monthly payments of 9/-.
Comprising all first specified parts for Mr. Camm's receiver, including Peto-Scott ready-drilled chassis, push-button unit, condenser and dial, etc. Varley I.F. transformers, wire, flex, and screws, but less valves, speaker and cabinet.

SET OF 4 SPECIFIED VALVES, 36/-, or add 3/- to Kit "A" deposit and to each monthly payment.

SPECIFIED PETO-SCOTT P.B.4. CABINET, Cash, C.O.D., carriage paid, 27/6 or yours for 4/- down and 7 monthly payments of 4/-.

Peto-Scott TRICKLE-CHARGER

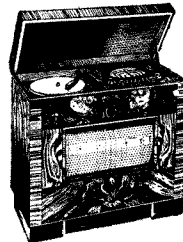
Merely connect to A.C. 200/250 volt supply and your 2 volt accumulator, and your L.T. is silently charged at 1-amp. rate at negligible cost. Normal list value at least 21/-.



We save you 11/-

Our price cash or C.O.D. 10/-. Employs metal rectifier and air-cooled transformer, complete with mains plug and battery clips. Ready for immediate use and absolutely nothing to wear out or go wrong. **10/-**

De-Luxe Radiograms at Economy Prices



1939 5-Valve AC/DC All-wave S/Het R/Gram

MODEL 9068 (not illustrated). Manual Radio tuning only. This modern super Radiogram represents amazing value for money. A 5-valve 6-stage circuit is employed for radio providing all-round reception on 16-2,000 metres. Automatic and manual Volume Control. 3 watts output. Garrard Universal motor. Superb Walnut veneered Cabinet. For A.C. or D.C. Mains, 200-250 volts. Normal Value £17.17.0.

We Save You £5:5:0 OUR PRICE 12 Gns. or 15/- Down
balance in 18 monthly payments of 15/6

6-VALVE A.C. RADIOGRAM WITH PRESS-BUTTON AND MANUAL TUNING

(as illustrated). A magnificent performer on Radio and Gramo. 8 balanced stages. A.V.C. Wave-range 10-2,000 metres. Garrard Motor. Imposingly and really beautiful cabinet, veneered with selected walnut. For A.C. Mains only. Normal value 19 gns. **We save you 5/- gns.** Yours for 15/- down and 18 monthly payments **OUR PRICE 13 1/2 gns.** of 17/6.

1939 All-Wave S.G.3 Chassis

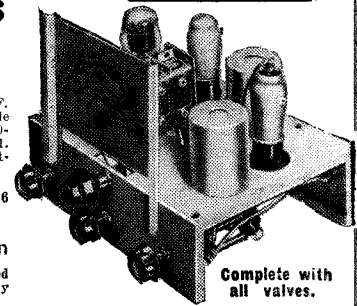
GUARANTEED FOR 12 MONTHS

- All Waves, 18-2,100 metres
- Amazing Sensitivity
- Balanced and Screened Coils
- Powerful Pentode Output
- Low H.T. Consumption
- Station-Named Scale

SPECIFICATION: Powerful 3-valve 3-stage circuit with variable-mu H.F. pentode, high efficiency Detector and Harries distortionless output pentode Clear, colour-coded, station-named dial. Wave-ranges, 18-52, 200-550 and 900-2,100 metres. Duplex Epcyclic tuning with slow-motion ratios of 9-1 and 80-1. Balanced and screened, air-cored wave-wound broadcast coils; screened short-wave coil. Alternative aerial tapplings. Rotary wave-change switch, with silver-plated contacts. Volume control. Chassis size 11 1/2" wide, 9 1/2" deep, 9 1/2" high. Supplied complete with 3 British valves and all knobs. Normal Value £4/18/6

We save you £1 : 7 : 0 OUR PRICE **£3:12:6** or 5/- down

balance in 12 monthly payments of 6/8. If required with specially matched moving-coil speaker, add 21/- to cash price, or same deposit and 12 monthly payments of 8/-.



Complete with all valves.

Free! SEND NOW for complete colour catalogue and illustrated lists covering Receivers, Chassis and Radiograms from £3-12-6 to 15 gns. at terms from 5/- down.

THIS COUPON SAVES YOU fff's

PETO-SCOTT CO., LTD., 77 (Pr.W.22), CITY ROAD, LONDON, E.C.1. Tel.: CLIssold 9875.
41, HIGH HOLBORN, W.C.1. Tel.: HOL. 3248.

NAME.....
ADDRESS.....

Post in unsealed envelope (i.d. stamp).



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).

An 11-metre Log from Essex

SIR,—I have pleasure in enclosing my log of stations in the 11-m. broadcast band during December 25th and 26th, which I hope will be of interest to other readers.

W9XA (Kansas City), 11.33 metres, relays KWKC.

W9XAZ (Milwaukee), 11.36 metres, relays WTMJ.

W2XJI (New York), 11.4 metres, relays WOR.

W9XJL (Superior), 11.49 metres, relays WEBC.

W9XTC (Minneapolis), 11.51 metres, relays WCTN.

W9XUP (St. Paul), 11.56 metres, relays KSTP.

W8XMU (Cincinnati), 11.6 metres, relays WSAL.

All above stations were received between R7 to 9 between 2 p.m. and 6 p.m.

A special attraction of station W9XA, Kansas City, is that it will read out over the air free of charge for any S.W. listener, any equipment they wish to exchange or swap with other listeners. The question of finance cannot be taken by this station. The star station of the band is W9XUP (St. Paul), which is rated at 1,000 watts, and can be tuned in any afternoon at R8.

My receiver is a three-valve battery-operated set with S.G. H.F. stage, Det. and tetrode output using Hivac valves with ceramic bases, and covering from 4.5 to 15 metres, with plug-in coils coupled to an inverted "L" type antennae. Lastly, I would be pleased to correspond with any other readers interested in ultra-short waves.

My best wishes to PRACTICAL AND AMATEUR WIRELESS.—L. C. STYLES (2CTL), Waterworks, Ingatestone, Essex.

Correspondents Wanted

SIR,—I would be glad if some of your readers would correspond with me. Amateur short-wave logging is the chief subject I am interested in. I shall do my best to reply to all who write me.—E. FLETCHER (Persabus, Port Askaig, Isle of Islay).

SIR,—I wish to thank PRACTICAL AND AMATEUR WIRELESS for the very interesting articles on transmission and reception which have been published during the last three years. Before that time I knew nothing about wireless, but by a stroke of luck I happened to read one of my friend's copies, and since then my knowledge of wireless has increased by leaps and bounds. I should like to correspond with someone in the Midlands who is interested in short-wave work.—FRANK E. LANE (9, St. James Rd., Handsworth, Birmingham, 21).

SIR,—I have been a reader of your fine paper for nearly three years. It has added much to my knowledge of radio.

with its invaluable assistance. Also, I should be pleased to hear from any reader in Great Britain who is interested in amateur transmission. Wishing PRACTICAL AND AMATEUR WIRELESS every success.—PETER F. ILIFFE (22 Firfield Avenue, Birstall, Leicester).

S.W. Results in Ross-shire

SIR,—It is about a year since I last wrote you. I still take PRACTICAL AND AMATEUR WIRELESS every week, and will continue to do so, as it is well worth the threepence and a lot more. I am especially interested in the transmitting section and "Leaves from a Short-wave Log."

Last October I joined the B.S.W.L. I have now 13 SWL cards, and about 22 QSL cards. My best QSL cards are from W9XUP and JVH, while the nicest is from SPW. I have heard every Continent now, except Australia. This locality seems to be a blank or dead spot for the reception of Australian transmissions, as even people around here with seven or eight-valve all-wavers can only get them faintly, and others never receive them. Any day now I should have QSL's from HP5G, W2XGB, and VUD3.—WILLIAM FORSYTH (Avoch, Ross-shire).

CUT THIS OUT EACH WEEK.

Do you know

—THAT in an emergency a triode valve may be used as a half-wave rectifier, ignoring the grid.

—THAT when an iron-core choke or coil is suspected of being open-circuited an ordinary pocket compass may be placed over it to indicate the flow of current.

—THAT when breaking circuits carrying high currents a Q.M.B. (quick make-and-break) type of switch, or a specially-designed switch should be used.

—THAT a single broken strand in a stranded cable can cause many peculiar forms of trouble.

—THAT insulators in an aerial should be kept clean and free from sooty deposits.

—THAT copper is the best material for U.H.F. screens, with aluminium as the next best. The surface should be polished.

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

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

Copyright in all drawings, photographs and articles published in PRACTICAL AND AMATEUR WIRELESS is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden.

A Reader's Appreciation: Correspondent Wanted

SIR,—A few days ago I bought a copy of your publication, "Wireless Transmission for Amateurs," and think it is the best half-a-crown's worth I have had for a long time. I find your series, "The Amateur Transmitter," most helpful.

I should also like to get in touch with an amateur enthusiast in my district.—DENNIS ROBINSON (70, Penny Lane, Mossley Hill, Liverpool, 15.)

Car Radio

SIR,—Regarding the controversy over car radio, a few figures might be of interest. The armatures of most car dynamos, excepting those on the smallest cars, are wound with wire ranging from 19½ S.W.G. to 18½ S.W.G.; that is, from 38 to 44 mils. diameter. Four thousand amperes per square inch is generally considered enough for wires around this size on revolving armatures; this would come out at about 6 amperes for 44 mil. wire, and as there are two circuits in parallel it works out at 12 amperes. But the armature has to provide field current as well as the external current, and the field current on these machines is commonly from 2½ amperes to 4½ amperes (compared with one ampere or so on an ordinary dynamo). It will be seen, therefore, that when 10 amperes charge is shown on the ammeter, such a machine is doing as much as is reasonably safe for it, and, in fact, most of them are not simply warm but fairly hot at this loading.

To increase this current by five amperes, or anything approaching it, seems to me to be asking for trouble; it must be remembered that the total heat generated varies as the square of the current, so that the heating in a machine whose total armature current is raised from, say, 13 to 18 amperes, will go up by well over 70 per cent.

With the ordinary car dynamo having third brush regulation, it is easy for anyone to advance the third brush until the machine is doing far more than its safe output, and having rewound a good many of these armatures, I would say that three out of every four which require to be rewound have failed not through any defect, but through sheer overload, the cotton covering of the wires being burnt black, and falling off as it is unwound.

The special construction of these machines makes them self-regulating only when coupled to a battery, not even on a lamp load, and if the battery circuit be broken, the voltage will rise, certainly to 25 on a 6-volt dynamo at ordinary speeds. It must be remembered that the field current will rise in proportion to the machine voltage, and a rise to three times normal voltage means three times the amperes in the fields; that is, the heat developed in them will be nine times normal, which would be disastrous, hence the practice of fitting field fuses.

A resistance of 1.5 ohms in the main circuit when running at 10 amperes causes a drop of 15 volts, requiring the machine volts to be 15 above normal. The field winding would not stand this for any length of time, and the better way, if varying output currents are required, is that used by the makers themselves—a resistance in the field circuit. But let it be pointed out that the makers use this resistance for variation between full output and part output, not between full output and overload.

A 1.5 ohm resistor in a main circuit carrying 10 amperes means a waste of energy, I²R, of 150 watts. A 10-watt resistor would be useless.—A. O. GRIFFITHS (Wrexham).

Items of Interest

Variety in The New Year

VARIETY series scheduled by John Watt for production during the quarter from January to March include two for which increasing popularity has brought "promotion"—Anthony Hall's "Alpine Hut" shows and Doris Arnold's "The Melody is There" programmes. Up to now they have been broadcast only during the afternoon; during the next quarter they will each be diagonalised, so that they will be broadcast twice in home programmes the same week, once in the afternoon and once in the evening.

Here is other news about some of the B.B.C.'s best-liked series.

"Monday Night at Seven," "Band Waggon," "Music Hall," "In Town To-night," "For You, Madam," will continue. "Monday Night at Seven" will be extended in length from 50 minutes to one hour, and "Music Hall" will again become the regular Saturday night variety production. "Sing Song," "The Legionnaires" and "Good News" will be "rested."

Louis Levy will launch a new edition in series form of "Music from the Movies," and arrangements have been made for the "gipsy-party" broadcasts from the Hungaria Restaurant to return to the programmes each fortnight.

Two "Kentucky Minstrels" shows will be on the air, one in January and the other in February; and plans are being made to revive the radio adaptation of the big sound-film success, "Congress Dances" (provided that Conrad Veidt, the star, is again available) and to adapt two other sound films for broadcasting during February and March.

Operetta and Musical Comedy

A SPECIAL seventy-five-minute radio version of the complete operetta, "Die Fledermaus," is being written by V. C. Clinton Baddeley for production in March, and the German light musical play, "Gluckliche Reise" (Bon Voyage), is to be produced in February. It had a great success in Berlin a year or two ago, but has not yet been performed in this country. Eric Maschwitz, formerly Director of the B.B.C. Variety Department, is making both the translation and the adaptation.

Merchant Shipping Wireless Telegraphy

THE Board of Trade announce that revised Statutory Wireless Telegraphy Rules were made on December 15th, 1938, and came into force as from January 1st, 1939. The Rules are issued in pursuance of the Merchant Shipping (Wireless Telegraphy) Act, 1919, and the Merchant Shipping (Safety and Load Line Conventions) Act, 1932, and replace the previous Rules dated November 1st, 1932.

The changes in the requirements under the new Rules are of a technical character, arising from the decisions of the International Radiocommunication Conference which was held at Cairo early this year. The categories of ships which must be equipped with wireless telegraphy remain unaltered, that is, all sea-going passenger ships, irrespective of their tonnage, and all sea-going cargo ships of 1,600 tons gross tonnage and upwards. The classification of

ships for the purpose of wireless watch-keeping at sea for safety purposes is also unchanged.

B.B.C. Exhibition at Leicester

THE Director-General of the B.B.C., Mr. F. W. Ogilvie, paid his first official visit to the Midland Region on January 2nd, when he spoke on the occasion of the opening of the B.B.C. Exhibition in Leicester by the Lord Mayor of that City (Alderman T. J. Gooding, M.B.E., J.P.). While in Leicester Mr. Ogilvie visited one of the largest hosiery factories in the

country, and also the works of a firm which makes lenses for television cameras.

The B.B.C. Exhibition will be at the Museum and Art Gallery, in the New Walk, Leicester, until January 14th. This is the first visit of the B.B.C. Exhibition to the provinces, apart from its appearance at the Empire Exhibition at Glasgow. By thirty-three photomontage panels (including one specially devoted to Midland broadcasting) the Exhibition illustrates the development of radio, and the manifold activities of the B.B.C.—in fact, takes people behind the scenes. There are a number of models, and the latest type of ribbon microphone is shown. The Exhibition is open free to the public. Other Midland towns to be visited are Northampton (January 20th to 28th), Nottingham (February 2nd to 18th), Wolverhampton (February 24th to March 8th), and Birmingham (March 15th to 26th).

SENSATIONAL BARGAINS

N.T.S. Right-Price Radio Offers — Order Now!

Replace Your Old Set with this ALL-WAVE BATTERY S.G.3 CHASSIS

List Value £6:6:0

4 WAVEBANDS: 14-31, 28-62, 200-550, 900-1,200 metres; Slow-motion drive, 8-1 and 100-1; Low capacity switch, full-vision scale engraved stations and wavelengths.

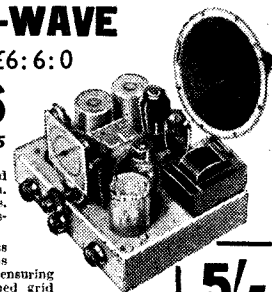
BARGAIN 69/6

Yours for 5/- down and 15 monthly payments of 5/-.

Provides reception from all parts of the world. Variable Selectivity. Stove enamelled steel chassis, size 11 1/2 in. w. 9 in. h., 9 in. deep. Screened coils. Low H.T. Consumption. Each chassis supplied complete with Screen Grid, Detector and Pentode output valves. Chassis size 11 1/2 in. w., 9 in. h., 9 in. deep. Fully tested on all wave-bands before despatch. An excellent bargain you must not miss.

A.C. MAINS 4-VALVE MODEL 3 wave-ranges 18-2,000 metres. Bandpass tuning. Air-plane illuminated dial stations and wavelengths with slow-motion drive. Low-capacity switch with silver-plated contacts ensuring trouble-free switching. 4 British valves comprise: Variable mu H.F. pentode, screened grid detector, high efficiency output pentode and rectifier. Sensitivity and volume controls. 3-Watts undistorted output. Gramophone pick-up sockets. Size 11 1/2 in. wide, 8 1/2 in. high, 9 in. deep. Complete with valves and knobs. Guaranteed fully tested. **ORDER EARLY AND AVOID DISAPPOINTMENT.** List value £6/10/0. **BARGAIN 79/6**, or 5/- secure, balance in 15 monthly payments of 6/-.

SPECIALY MATCHED SPEAKERS. A few only energised and P.M. speakers for above chassis, shop-botted only, otherwise in perfect operating condition. Worth 30/- each, **BARGAIN 12/6.**



5/- DOWN

BARGAIN POST FREE 5/6 LIST VALUE 35/-

Secure your set. 3 matched 2-valve battery valves. 2 S.G.'s and Pentode output complete with 3 valve holders, all data and circuit diagrams — all for 5/6 post free. These Phibco types are offered to you—brand new in maker's carton and represent amazing value for set builders, experimenters, servicemen and for replacement purposes. Only available from N.T.S. and it will be impossible for us to repeat when present stock is cleared.

DATA and DIAGRAMS

TESTED KITS—VALVES FREE

N.T.S. Kits can be relied upon to give complete satisfaction. All parts are carefully matched and tested and by buying complete you save 22/6. "World" Kits are supplied less coils to accommodate those who already possess famous B.T.S. self-loading inductors. Matched and tested valves given FREE. **ALL-WAVE WORLD S.G.3.** Wave-range 9-2,000 metres, slow-motion tuning. Station-name scale. Kit includes all parts with transformer, etc., and FREE S.G. Det. and Pentode valves. List value £4/15/0. **BARGAIN 29/6** or 2/6 down and 12 monthly payments of 2/10. **ALL-WAVE WORLD S.G.4.** Employs one more S.G. audio stage than the 3-valve model and all extra components. Station-name scale. 4 valves given FREE. Astounding **BARGAIN** at 42/- cash or C.O.D., or 2/6 down and 12 monthly payments of 3/9. **COILS.** Complete set of 10 coils, 9-2,000 metres. List 27/6. N.T.S. **BARGAIN 17/6**, or add 1/6 to World Kit deposit and to each monthly payment.

AMAZING 1-VALVE S/Waver OFFER. Complete kit for all-world reception on 12-94 metres. Supplied with pair of lightweight headphones, all coils and FREE matched valve. List value 55/-. **BARGAIN 27/6**, or 2/6 down and 11 monthly payments of 2/6.

MORE Amazing CHASSIS BARGAINS

Order from descriptions with complete confidence. Complete specifications available on request.

S.G. BATTERY 3 CHASSIS. Famous set maker's surplus. Wave-range 200-2,100 metres. Engraved dial. Steel chassis. Screened coils. Wonderful choice of British and Continental stations. Fully tested. List value 59/6. **BARGAIN 19/6.** Matched British S.G. Det. and Pentode Valves 13/9 extra. Cash or C.O.D. only. Order type 7021.

STRAIGHT BATTERY 3 CHASSIS. Amazing offer. Employs screened coil, steel chassis and engraved scale 200-2,100 metres. Brand new, fully tested. Well worth 55/-. **BARGAIN 12/6**, cash or C.O.D. Order type 7019. 3 matched valves 10/6 extra.

A.C. S.G.4 BANDPASS CHASSIS. Only a few left now. Wave-range 200-2,100 metres. Engraved scale. Wonderful selectivity and sensitivity. Output 3 watts, P.U. sockets. Steel chassis and screened coils. Complete with 4 British Matched valves. Ideal replacement chassis for A.C. mains. Fully tested. List value £3/15/0. **BARGAIN 55/6**. Yours for 5/- down and 12 monthly payments of 5/-. Order type 7053.

SPECIAL OFFER CLASS "B" 4-VALVE CHASSIS. Powerful new model, giving volume equal to a mains set. Amazing range and sensitivity. Full-vision scale calibrated 200-2,000 metres. Steel chassis and screened coils. Complete with all valves. Fully tested. List value 5 gns. **BARGAIN 59/6**, or 5/- down and 12 monthly payments of 5/3. Order type 60410.

8 ONLY 4-VALVE SUPERHET CHASSIS. Excellent replacement model. Powerful and selective. A.V.C. and manual control. Wave-range 200-2,100 metres. Station-calibrated scale. Steel chassis. Screened coils and I.F.'s. Complete with all valves. Brand new, fully tested. List value 6 gns. **BARGAIN**, to clear, £3/7/6, or 5/- down and 14 monthly payments of 5/3. Order type 7093. For A.C. Mains only.

POST ORDERS. All goods offered sent carriage or post charges paid. C.O.D. charge extra on orders under 10/-. Overseas orders carriage extra.

CALLERS. All lines available to callers at our only address as below. Call in for complete bargain lists without obligation to purchase.

FREE Send now for your copy of the N.T.S. short-wave Bargain booklet; also Bargain Chassis List and valve replacement chart.

*** "Performs admirably on the s/waves and no instability" — says Mr. F. J. CAMM. See P. Wireless 7/1/39.**

Secure your **PENTA-KIT NOW.** Build a Converter, Adapter, 1, 2 or 3-valve Receivers. Wave-range 9-2,000 metres. Kit comes to you absolutely complete, all coils and 3 FREE British valves including Pentode. List £4/10/0. **AMAZING BARGAIN 42/-** cash or C.O.D. or 2/6 down and 12 monthly payments of 3/9.

YOURS FOR 2/6 DOWN

NEW TIMES SALES CO.

56 (Pr.W.22), LUDGATE HILL, LONDON, E.C.4
Phone: City 5516 Est. 1924

*What will you
be doing - ONE
YEAR FROM TODAY* ?

● Three hundred and sixty-five days from now—where will you be?

Still struggling along in the same old job at the same old salary—worried about the future—often unable to make both ends meet? Still putting off your start to success—frittering away precious hours that will never come again?

Don't do it, man—don't do it! There's no greater tragedy than that of the man who stays sunk in a rut all his life, when with just a little effort he could get out of it and advance.

There are thousands of successful, prosperous men in every business and industry who owe much of their success to the International Correspondence Schools. They refused to be beaten by lack of training.

They found that the I.C.S. offered them comprehensive yet simplified Instruction Manuals prepared by outstanding authorities, together with personal guidance and expert understanding tuition.

That wonderful I.C.S. Service, which has led the field in training by post for nearly 50 years, can do for you what it has done for others.

Write to us to-day for full information or use the attached coupon.

COUPON FOR FREE BOOKLET

**INTERNATIONAL
CORRESPONDENCE SCHOOLS LTD.**
Dept. 94, International Buildings,
Kingsway, London, W.C.2.

Please send me free booklet describing I.C.S. Courses in the subject I have marked X. I assume no obligation.

**RADIO ENGINEERING RADIO
RADIO SERVICING TELEVISION**

Also

- | | |
|--------------------|---------------------|
| ACCOUNTANCY | GENERAL EDUCATION |
| ADVERTISING | HORTICULTURE |
| AERONAUTICAL ENG. | INSURANCE |
| AGRICULTURE | JOURNALISM |
| AIR CONDITIONING | MECHANICAL ENG. |
| ARCHITECTURE | MOTOR ENGINEERING |
| BOOK-KEEPING | SALESMANSHIP |
| BUILDING | SANITARY ENG. |
| BUSINESS TRAINING | SECRETARIAL WORK |
| CHEMICAL ENG. | SHORT-STORY WRITING |
| COMMERCIAL ART | SURVEYING |
| CIVIL ENGINEERING | TEXTILE MANUF'G |
| DIESEL ENGINEERING | WINDOW DRESSING |
| DRAUGHTSMANSHIP | WOODWORKING |
| ELECTRICAL ENG. | WORKS MANAGEMENT |

EXAMINATIONS :

Technical, Professional, Civil Service, Matriculation (including Inst. Wireless Tech., P.M.G. Certif. for Wireless Operators, City and Guilds Radio Comm., and Prov. Certif. in Radio Telephony and Telegraphy for Aircraft).

State your Exam. here.....

Name..... Age.....

Address.....

Greatest, largest and most famous of all institutions devoted to spare-time training by the postal method. Branches in 30 countries, students in 50.



Television Programmes

Sunday Afternoon Television Features

OUTDOOR feature programmes will be among the principal items in the regular Sunday afternoon television transmissions which begin in the New Year.

On January 15th, a mobile unit will visit Watford Junction, L.M.S., to show some of the more spectacular operations in locomotive maintenance. An express engine will be partly dismantled and viewers will see how the boiler is cleaned, how bearings are tightened and how connecting rods are fitted. The process requires expert crane work. A high-speed job will be the replacement of a sixty-foot rail by a gang of twenty-four men who must complete the job in twenty minutes.

A visit to the International Telephone Exchange at Faraday House, is scheduled for January 29th. Television cameras will pass slowly along the bays in which girl operators are in touch with all parts of the world. Long distance telephone conversations will be heard.

The "courtesy cops" will be seen at work on one of London's arterial highways on February 5th. A spot has been chosen where accidents occur frequently and it is expected that the majority of the road users who drive unknowingly into the picture will

provide the officials with all the necessary examples of good and bad driving.

In February, visits will be paid to the Exhibition of Inventors, at the Horticultural Hall, Westminster, and to Hanworth Air Park, where the civil air guard are in training. Life on canal barges and the thrills of dinghy sailing will be televised in March.

Western Cabaret

TELEVISION will go all "hill-billy" again on January 12th, when Harry Pringle repeats his Western Cabaret programme, compered by Big Bill Campbell. The Alexandra Palace studio will be decked out as a camp clearing with log huts and a camp fire, around which the cowboys and girls will gather.

The Sensational Carsons will be seen in a knife-throwing act, and Evelyn Dall, the blonde singer, will appear as a cowgirl. The visitors will also include Bob Dyer in "hill-billy" songs; Cal McCord, raconteur; "Buck" Douglas giving his well-known recitation, "The Shooting of Dan McGrew"; Chief White Eagle, the tenor singer, in full Indian regalia; Joe, Steve, and Hank in "hill-billy" songs; and Freddie "Trump" Wood and the Hill-Billy Band.

Western Cabaret was first televised on January 10th.

AN EXPERIMENTAL TWO-VALVER

(Continued from page 445)

construction there are two or three interesting modifications which can be incorporated. Firstly, the anode-by-pass condenser may be replaced by a pre-set type of condenser, by the aid of which the effects of this condenser on signal strength may easily be ascertained. Varying the capacity from zero to maximum will result in variations in reaction control, and on some weak stations it may even be found

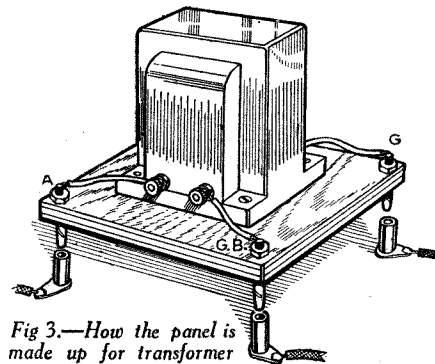


Fig. 3.—How the panel is made up for transformer coupling.

that at some value the stations will be practically inaudible. The same remarks apply to a series-aerial condenser, which may be included between the aerial terminal and the tuning coil. Again, a pre-set condenser may be included, and its effect on the wave-range of the coil and the selectivity will be easily noted. If a pentode output valve is used, a tone-control circuit may be made up and wired either across the loudspeaker terminals or between the anode of the output valve and earth. If the tuning coil is replaced by one of

the modern all-wave types the receiver may be used as a satisfactory all-wave receiver, but it is not recommended that short-wave coils alone be used, as the components for an efficient short-wave receiver have to be carefully selected, and in that case a short-wave tuning condenser should be used rather than a .0005-mfd. component. All-wave coils, however, are designed for use with the higher-value condenser, and thus the receiver is suitable for that purpose. Separate H.T. leads have been fitted so that a suitable voltage for the detector valve may more easily be found, and if a screen-grid valve is to be used in that stage the screen must be connected to a suitable tapping on the

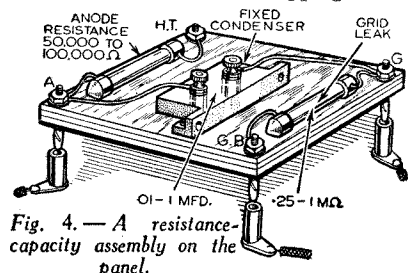


Fig. 4.—A resistance-capacity assembly on the panel.

H.T. battery. This type of valve is available with four-pin base, and the original anode pin in Fig. 2 should then be joined to the new H.T. tapping, whilst the lead shown in that illustration joined to the anode terminal will be connected to the top cap on the valve. A 4-pin H.F. pentode may, of course, be employed in place of the S.G. valve. A variable-mu type of valve cannot be used in a straight detector stage unless the variable characteristics are neglected, and a straight type of valve is therefore called for.

Notes from the Test Bench

Screened Slewing

IN several of the receivers which we have designed the blueprint has indicated that certain leads are provided with stranded screened slewing. It is important to remember that this material is placed over a connecting wire and must not, on any account, come into contact with the internal wire. The screening is connected to earth, and there is usually a length of insulated slewing inside it through which the connecting lead is passed. The ends of the stranded covering should be turned back and bound so that a short length of uncovered insulated slewing projects to prevent the covering slipping up to the point to which the internal wire is joined. A receiver was recently received for test in which the constructor had joined the screening covering to the internal wire and connected all points to the screening braid and thus effectively short-circuited many circuits at once.

I.F. Transformers

THE majority of I.F. transformers now available are enclosed in a metal can, the bottom of which is open.

These transformers are mounted on a chassis by passing a bolt attached to each side of the can through holes in the chassis and cutting a large clearance hole for the connecting wires. In some cases instability may arise due to interaction taking place through these clearance holes. To avoid this it is in some cases desirable to cut a square of metal and make holes through which the connecting leads may be passed and then the transformer should be "closed" by locking this plate up before the bolts are passed through the chassis. A lock-nut on the bolts will keep the lower plate in position and effectively screen the component.

Crackling Components

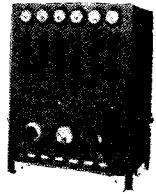
ONE of the commonest troubles met with in modern receivers is that of crackles, and in many cases these will be found to be due to break-down of insulation or loose connecting leads inside components. The most satisfactory way of locating such components is to make up a small test panel in which a variable voltage may be applied to the component, and to feed this to a simple amplifier through a normal R.C. coupling unit. The current may be varied, and by placing each suspected component in turn on the test panel the production of crackles can be heard through a speaker or 'phones and the faulty component more easily found.

ELECTRADIX BARGAINS IN WINTER CHARGERS

Fine **DAVENSET A.S.C.4**, 4 circuit charger for up to 80 cells. List price, £32. Four sets of Auto-charge regulators and indicators on panel with selector switch volt control. Four independent circuits of 1, 2 and 2 amps., or 3 of 1, 2 and 2½ amps., etc., or one of 50 v. 6 amps., 10 amp. Valve fitted and charger, very smart. It is a very fine set that will quickly earn its cost and show a good profit, is fully guaranteed and for quick sale a great bargain at **£14/10/-**. Other chargers at bargain prices are below.

Lesdix 6 Circuit for 200 cells **£32**.
PHILIPS Model 1081 Steelcadd, 230 v. A.C. to 24 v. 19 amps., **£7/10/-**. **PHILIPS** "3-in-One" ten-guinea charger, 1a., 2a., and 4a., **£6/10/-**.

Two A.C./D.C. **DAVENSET CHARGERS**, Type S.P.C., for 230 volts A.C. to 250 volts 250 m.a. D.C., fitted Ferranti meter and volt regulator. As new, **£6/17/6**.
TUNGAR CHARGERS. Two of these famous sets. One for 70 volts, 6 amps., with meters and controls, etc., will handle 100 cells a day, **£7/17/6**. Another fine Tungar for two 5 amp. circuits with meters and variable volt controls, 75 volts 10 amps. for 200 cells. Bargain **£12/15/-**.



Other Chargers. Crypton "SERVICE 3," similar to above but 3 circuits of 12 cells each at ½ amp., 2 amps. and 6 amps. 30 volts. 6 amps. max. For 70 radio cells, crackle black steel case, **£6/15/-**.
MAINS CONVERSION UNITS. For operating D.C. from A.C. mains, screened and filtered, 120 watts output, **£2/10/-**.
THERMATRIX. Charges by heating. A.C./D.C., 230 volts to 2 volts ½ amp., **30/-**.

METAL CHARGERS. All British. No German selenium rectifiers used.

MODEL R. WESTINGHOUSE single circuit, 230v. A.C. Wall type "R," steel case, 12in. by 19in A.C. mains to D.C. 40 volts 3 amps. for 40 Radio Cells. Guaranteed. **£7/7/6**. Similar one for Car Battery Charging. 15 volts 6 amps., D.C. output, **£6/17/6**. Fine model also for A.C. mains with D.C. output of 280 volts, 250 m.a., **£7/2/6**. Two 50-volt circuits, each of 750 m.a., D.C. from A.C. mains, is another bargain at **£6/10/-**.
UNITS ONLY. Westinghouse Metal Rectifier Units, 110 volts 1.5 amps., **35/-**; 55 volts 1.5 amp., **37/6**; 20 volts 3 amps., **46/-**; 9 volts 2 amps., **26/-**.

HOME RADIO AND CAR CHARGERS.

The **A.C. NITNDAY** will keep your battery fit without attention. **Model N/A6**, 100/250 volts A.C. and D.C. 6/8 volts ½ amp., **15/-**. **Model N/B6**, 100/250 volts to D.C. 6/8 volts 1 amp., **25/-**. **Model N/C6**, 100/250 volts to D.C. 6/8 volts 2 amps., **35/-**. **Model N/D12**, 100/250 volts to 12 volts 1 amp., **32/-**. Ditto, 12 volts 2 amps., with 6-volt tap, **55/-**. 5 amps., **£4/10/-**.

A.C. ROTARY CHARGERS. 3-phase motor, 200 volts to D.C. Dynamo 8 volts 13 amps., **£4/17/6**. R.C.A. 3-ph. motor, 220 volts coupled to D.C. dynamo, 500 volts 200 m/a., **£5/10/-**. Higgs 230-volt A.C. motor coupled to D.C. dynamo, 8 volts 16 amps., **£5/10/-**. B.T.H. ditto 1½-ph. motor and starter on bed, with 10-volt 30 amp. dynamo, **£7/10/-**.
300-CELL A.C. CRYPTO MOTOR-GEN. SET. For 220 v. A.C. mains. For Radio Cell Circuits and ten 12-volt 10 amp. Car Batt. D.C. output, **£32**.

D.C. CHARGING OFF D.C. MAINS. £14 Davenport D.C.2 Steel-cased 200/250 v. Charger, large meters, wheel controls, 2 circuits, 1 amp. and 3 amps., as new. Sale price, **£5/10/-**. Others, all sizes in stock. State load required.

D.C. ROTARY CHARGERS. 3 h.p. 220 volt D.C. motor, 6 volts 250 amps. dynamo, **£16**. 200-volt motor, 25 volts 8 amps. dynamo, **£4**. Motor 220 volts, 8 volts, 50 amps. dynamo, **£6/10/-**. And others up to 6 kw.

New January Bargain List "N" Free.

ELECTRADIX RADIOS

218, Upper Thames Street, London, E.C.4.

Telephone: Central 4611

RADIO CLUBS & SOCIETIES

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

THE CROYDON RADIO SOCIETY.

Headquarters: St. Peter's Hall, Ledbury Road, S. Croydon.

Meetings: Tuesdays at 8 p.m.

Hon. Pub. Sec.: Mr. E. L. Cumbers, 14, Campden Road, S. Croydon.

THE society's second half of session is now in full swing, and of special interest is next week's programme, as follows:—

Tuesday, January 17th: Talk by Mr. F. G. G. Davey, of Messrs. E. M. G. Hand-made Gramophones, Ltd., on: "The Design of a Communication Receiver," with demonstration. The Chair will be taken at 8 p.m. by the society's president, Mr. H. R. Rivers-Moore. The event takes place in St. Peter's Hall, Ledbury Road, South Croydon, and PRACTICAL AND AMATEUR WIRELESS readers are invited to come along and hear Mr. Davey. They are also invited to apply for the new fixture card, giving full programmes until the end of the session.

RADIO, PHYSICAL AND TELEVISION SOCIETY

Headquarters: 72A, North End Road, West Kensington, W.14.

Meetings: Friday evenings.

Hon. Sec.: C. W. Edmans, 15, Cambridge Road, North Harrow, Middx.

THE first meeting of the second half of the 1938-39 session will be held at the society's headquarters on Friday, January 13th, when Dr. C. G. Lemon will deliver a lecture entitled "Surface Tension and Experiments in Bubble-Blowing." The lecture will be fully demonstrated.

In view of the fact that this is to be the first lecture of the New Year, new members will be especially welcome. Further particulars may be obtained by writing to the hon. secretary, or to the Headquarters at the above address.

COMPENSATING TILT

ASSOCIATED with the equipment used at Alexandra Palace with the television camera is a piece of apparatus called the "tilt and bend" generator. One of the defects linked up with the operation of the camera is a form of illumination distortion which gives an incorrect lighting distribution over the picture itself. The generator is charged with the task of producing specially shaped electrical pulses for feeding to the "A" amplifier illumination correcting controls so that when mixed in the right proportions the distortion mentioned is reduced in value, or even prevented. Now the elimination of "tilt," as it is somewhat peculiarly called, has been the subject of considerable research, and many schemes have been propounded for the purpose. The name is derived from the fact that each scanning line towards the end of its traverse is given a false increase in brightness or tilted upwards so that the picture as a whole has an unpleasant "flare" on one side which is foreign to the actual scene that is really being reproduced. One scheme which has been suggested to prevent this occurring is to interpose a grid of vertical strips between the signal mosaic, and the beam of scanning electrons. This gives a series of dark lines on the signal plate which bring about a series of controlled currents which are in turn used to eliminate the unwanted brilliance tilt. Special precautions are taken to ensure that no pattern from the grid is included in the actual vision modulation, otherwise this would only have the effect of removing one trouble at the expense of another.

A Week-end Companion For Every Mood!

"SATURDAY TO MONDAY"

Compiled by **FRANK WHITAKER**
 (Editor, John o' London's Weekly)
 and **W. T. WILLIAMS**

Contents include:
 Songs with Music. Limericks. Unpunctuated Passages. Lists of Words for Charades. Lists of Words for Spelling Bees. Games. Acrostics. Numerical Verses. Weather Lore. Fortunes from Cards. The Beauty of English. Origin of Place-Names. Various games of Patience. Legal Problems by Hans. W. Priwin (creator of Inspector Hornleigh). Children's Puzzle Section, etc., etc. "A pocketful of fun and fancy."—THE STAR.

From all booksellers 5/- net, or by post 5/6 direct from the publishers:

GEORGE NEWNES, LTD.
 (BOOK DEPT.)

Tower House, Southampton Street, London, W.C.2.

Making Your Own Components—2

Screening and Using the Coil Described Last Week · Matching Coils: Using Gang Condenser: Making H.F. Chokes.
By FRANK PRESTON

THE coil of which I gave full constructional details last week can be used in the majority of "straight" circuits, but is most suitable in sets having not more than one H.F. stage. The reason for this is not that the type or size of the coil is not of general application; but that it is an extremely difficult matter for the average constructor to match a set of coils with sufficient accuracy to permit of their efficient use with a multi-gang condenser. If an inductance bridge or other

for the other coil. Obviously, this test must first be made with the wave-change switch in the medium-wave position, and turns must be removed only from the medium-wave winding. Afterwards, the tests must be repeated for long waves. To ensure accurate matching on medium waves it will be found that close adjustments are required, and it is worth noting that a slight reduction in inductance (the self-capacity is also affected to a minor degree) can be obtained by moving four

broken line. It should also be noted that the reaction winding on the first-aerial-coil is not used. This will not affect matching to a marked extent when using the grid tapping; any discrepancy can be balanced out by means of the trimmers on the gang condenser. Of course, if two separate tuning condensers are

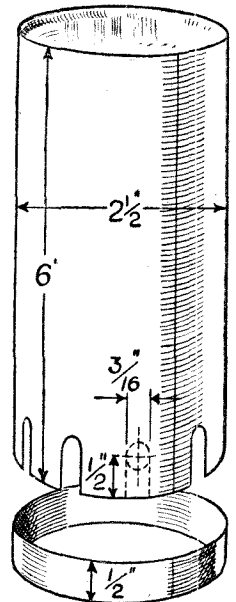


Fig. 2.—Details of a screening can which can be made from sheet copper.

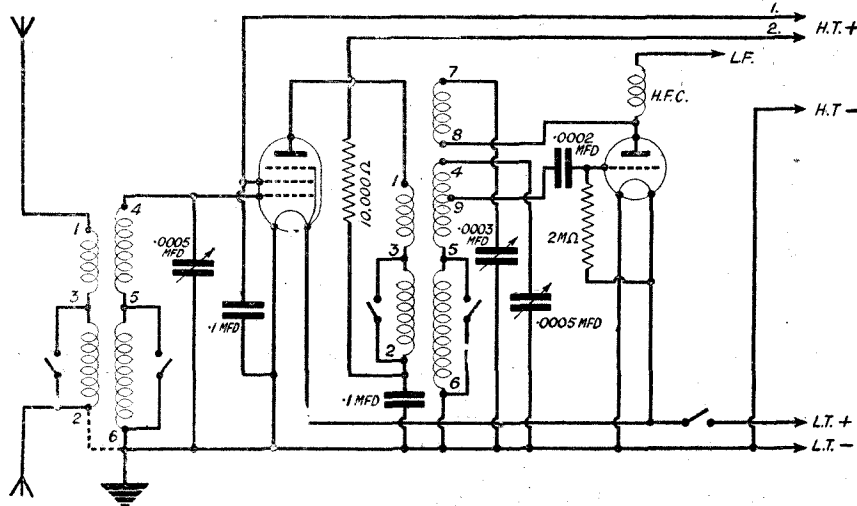


Fig. 1.—An H.F. detector circuit using a pair of the coils described. The reaction winding is not used in the case of the aerial coil.

highly-developed test gear were available, matching could be carried out without great difficulty, but even then a fair amount of patience and not a little skill would be necessary.

Simple Matching of Coils

When only two coils are to be used, in a circuit similar to that in Fig. 1, for example, it is possible to match them sufficiently well to permit of the use of a standard two-gang condenser. The simplest method is to make up a single-valve set having a circuit similar to that shown last week. Then, with one coil in circuit, tune to a steady transmission. If the signal is so strong that tuning is comparatively flat, try another station or reduce volume by substituting a short length of wire for the aerial. Note the exact condenser setting for the station and then remove the coil and connect a second coil in its place. Alter the condenser setting so that the same station as before is accurately tuned.

It will almost certainly be found that the condenser reading is lower for one coil than for the other, indicating that that coil is of higher inductance. A few turns, or even a fraction of a turn, should then be removed from the grid winding until the "test signal" is received with the condenser at the same setting as that required

or five of the end turns a fraction of an inch away from the main winding. On long waves it is not necessary to work as closely, and even a complete turn more or less will not have a marked effect.

Coil Screens

Provided that the coils are spaced fairly well, and if they are mounted with their axes at right angles and a vertical aluminium screen erected between them, complete screening will seldom be necessary. With regard to the method of mounting, one coil should be fitted upright on top of the baseboard or chassis and the other mounted end-on to the panel or on a disc of wood attached to an angle bracket screwed to the baseboard.

It will be seen from Fig. 1 that the type of circuit suggested is one with an H.F. pentode followed by a triode detector. Tuned-transformer coupling is used between the two valves, and the grid lead to the detector is taken from the grid tapping—terminal 9. With this arrangement really sharp tuning can be obtained, particularly if the reaction circuit is used skilfully. As with the single-valve circuit shown last week, either a doublet or ordinary single aerial can be used; when using a single aerial terminals 2 and 6 of the first coil should be joined together as indicated by a

used any trouble in this direction will be obviated.

If it is considered desirable to screen the coils completely there are two effective methods. One is to obtain screening cans about 2 1/2 ins. in diameter by approximately 6 ins. long. The coils would then be fixed to the base or lid with small angle brackets, or by fitting them over 1 1/2 in. diameter wooden discs placed over the lids and held in place with central screws passing through the discs and the lids. Screening cans of this type are not readily obtainable nowadays, for it is customary to make coils a good deal smaller than described (this point was explained last week). But it might be possible to pick up screens from some old coils, or to make new screens from 20 gauge (approximately 1/16 in. thick) copper sheet. Details are given in Fig. 2.

First a cylinder 6 in. long and 2 1/2 in. diameter is made by curving a sheet of copper measuring 6 in. by 8 in. round a wooden cylinder. This can be shaped with the fingers and a wooden mallet so that the edges of the joint butt closely. The cylinder can be kept close by binding a length of wire round it; after that, smear a small amount of flux down the joint and run solder along the joint with a large soldering iron. A disc is made to fit tightly into the top of the cylinder and is soldered in position. A lid is made in a similar manner, using a strip of metal about 1/2 in. wide and 8 1/2 in. long. Before soldering the joint make sure that this ring is a tight fit round the main can. Then fit an end disc.

The slots for the connecting wires can be made before bending, or after if a wooden rod is available which is a close fit in the can. Drill 1/4 in. holes and cut down to

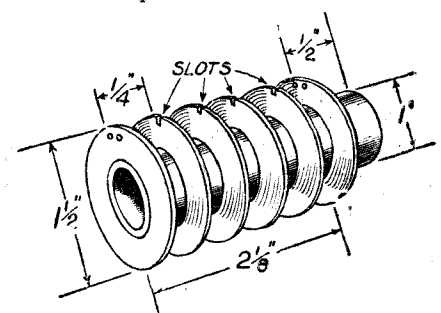


Fig. 3.—A suitable paxolin or shellacked-cardboard former for H.F. chokes.

them with a pair of shears. To protect the connecting wires it will be wise to pass them through lengths of systoflex sleeving or, better still, to solder lengths of rubber-covered flex to the leads close to the windings. These leads can be used to connect directly to the components or they can be soldered to tags on terminals mounted on a couple of ebonite strips. Alternatively, the whole coil and screen can be mounted on a metal baseplate, remembering to fit an earthing terminal to the screen.

Screening Boxes

The other method of screening is to place each coil with its corresponding valve-holder and allied components inside a square copper screening box of the type that can be obtained from various accessory makers and from certain dealers in obsolete components. In that case, the gang condenser would be placed alongside the screening boxes and connected to the coils with screened leads. If separate tuning condensers were employed, the screening boxes could be placed side by side and parallel to the front edge of the chassis, whilst the condensers could also be mounted in the boxes with the spindles passing through them.

Making an H.F. Choke

Efficient H.F. chokes can be made by following a similar form of construction for that employed for the coils. Fig. 3 shows how suitable formers can be made from lengths of 1in. diameter paxolin or shellacked cardboard tube and six spacing

washers. A total of about 1,500 turns of 36-gauge enamelled wire should then be wound, 300 turns in each slot. The wire is passed through small notches in the separators from one section to another and is anchored at the ends by passing it through a pair of small holes.

This type of choke is very efficient for use in a detector circuit of a broadcast receiver. When making an anode choke for an H.F. pentode it is better to wind about 2,500 turns in all to provide a higher inductance. Lengths of rubber-covered flex should be soldered to the ends of the winding for connection, or soldering tags might be riveted to the end cheeks and the 36-gauge wire soldered to these; connecting leads would also be soldered to the tags.

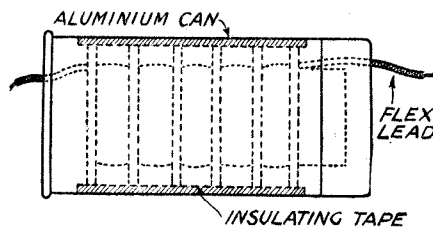


Fig. 4.—How a small canister—similar to those used for shaving soap—can be used as an H.F. choke screen.

Again screening might be required—if square screening boxes are not used for the coils—and it can be provided by a small aluminium tube of the type sometimes used for shaving soap. As shown in Fig. 4, the choke is wrapped with insulating tape

so that it will fit tightly into the metal tube, and flexible connecting leads are passed through the ends of the screen. The choke would then be mounted by means of a strap screwed to the chassis. Another method is to pass the second connecting lead through the side of the tube and to screw the end cap to the chassis, so that the choke can be fitted into it.

An All-wave Choke

If an all-wave choke were required it could be made by following the same general form of construction, but by placing a single-layer winding in the first slot, about 50 turns in the second, 100 in the third, and filling the other two with the 36-gauge wire. The beginning end would be connected to the anode terminal of the valve, the other end being the H.T.+ connection. The object of this method of construction is to reduce as far as possible the self-capacity of the "anode" end of the choke. For that reason it is better to break up the 50-turn winding by means of a layer of insulating tape between two layers of turns.

Other components, such as fixed condensers and resistors, will be dealt with in a later article, while readers are invited to forward requests for constructional details of any components that would be of general interest. Remember, however, that there are limitations to the home construction of components for other than simple sets, for it is often impossible to ensure the necessary degree of accuracy in making parts for sensitive superhets. and advanced multi-range receivers.

(To be continued.)

STARTLING!! ENTHRALLING!!!

AIRMEN AT WAR

By **LT. COL. L. A. STRANGE, D.S.O., M.C., A.F.C.**

Here, at last, is a first-hand account of those heroic days at the beginning of the Great War when British airmen flew antiquated machines with rifles, duck-guns and even stones as armaments. Colonel Strange writes with authority, for he was a distinguished member of the small and gallant company of airmen who shared the R.F.C.'s baptism of fire in 1914.

IN THE FEBRUARY

AIR STORIES

Of all Newsagents and Bookstalls, or by post 11d. from the Publisher, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

9 D.

George Newnes, Ltd.

Get back that P-U-N-C-H in your Set!

With the *D.C.*

AVOMINOR
Regd. Trade Mark
ELECTRICAL MEASURING INSTRUMENT

BRITISH MADE

RADIO SERVICING SIMPLIFIED 6th Edition
This valuable text-book, written in the light of the latest radio knowledge, covers the whole routine of testing modern radio receivers. Clearly explains causes of faults in receiving and amplifying apparatus; describes all tests in detail. Shows how to use radio testing instruments. 150 pages. Numerous diagrams and graphs.
Price **2/6** Post free **2/10**.

This precision built moving-coil D.C. instrument, with 13 ranges covering 0-120 m/A, 0-600 volts, and 0-3 megohms, provides adequate testing facilities for checking valve performance, batteries and power units, etc. It reduces trouble-tracking to its simplest terms. In case, with leads, interchangeable testing prods and crocodile clips, and instructions **45/-** (Including Case) DEFERRED TERMS IF DESIRED booklet.

CURRENT		VOLTAGE	
0—6 m/A.	0—6 v.	0—240 v.	
0—30 "	0—12 v.	0—300 v.	
0—120 "	0—120 v.	0—600 v.	

RESISTANCE	
0—10,000 ohms	0—1,200,000 ohms
0—60,000 "	0—3 megohms

● Write for fully descriptive leaflet.

Sole Proprietors & Manufacturers.
THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.
Winder House, Douglas Street, London, S.W.1. Phone: Victoria 3404-7

Said the owl that wa
perched 'other night,
On the aerial belonging
to White,
"From the sound of
the crackle,
It's time he should
tackle
That wiring of his with
FLUXITE!"



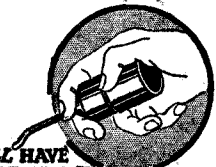
See that FLUXITE is always by you—in the house—garage—workshop—wherever speedy soldering is needed. Used for 30 years in government works and by leading engineers and manufacturers. Of Ironmongers—in tins, 4d., 3d., 1/4 and 2/8.

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

TO CYCLISTS! Your wheels will NOT keep round and true, unless the spokes are tied with fine wire at the crossings AND SOLDERED. This makes a much stronger wheel. It's simple—with FLUXITE—but IMPORTANT.

THE FLUXITE GUN

is always ready to put Fluxite on the soldering job instantly. A little pressure places the right quantity on the right spot and one charging lasts for ages. Price 1/6.



ALL MECHANICS WILL HAVE

FLUXITE

IT SIMPLIFIES ALL SOLDERING

FLUXITE LTD. (Dept. W.P.) DRAGON WORKS, BERMONDSEY STREET, S.E.1.

McCARTHY CHASSIS—WELL IN THE LEAD FOR QUALITY

Always a lap ahead, McCarthy gives you advanced design, the best components made, the unhurried workmanship of craftsmen who are above mass-production methods. The result is superb reproduction—and real "all-wave," with continuous coverage from 13 to 550 metres. McCarthy Chassis are steadily building up a wonderful reputation, at home and overseas.

- Examples from the 1939 Range :
- RS639. 8 stages, 6 valves, 4 wavebands, for A.C. Mains \$9 0 0
 - RS639U. As above, for A.C./D.C. Mains.
 - RS739. 9 stages, 7 valves, 4 wavebands, for A.C. Mains \$10 17 6
 - RS739U. As above, for A.C./D.C. Mains.
 - PP739. 9 stages, 7 valves, 4 wavebands, push-pull output, providing 10 watts undistorted, A.C. \$11 11 0
 - PP939. 11 stages, 9 valves, 4 wavebands, push-pull output, providing 12 watts undistorted. Noise suppression, variable selectivity, non-drift I.F. transformers, permeability tuned. Wave range 10-2,200 metres, A.C. \$14 14 0
 - PP939U. As above, for A.C./D.C. Mains.

FOR FULL DETAILS, POST THIS

H. McCarthy Ltd.,
92, Queensway, Bayswater, London, W.2.
Please send Abridged List of Chassis, free.

Name

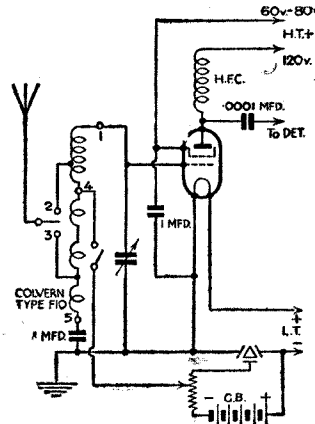
Address

P.W. 14/1/39

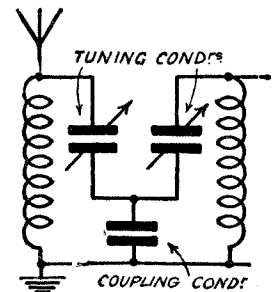
B.L.D.L.C. The British Long-Distance Listeners' Club

Tuning Coils

WHEN building a simple receiver the problem often arises as to the best type of aerial circuit to adopt. Selectivity is obviously the long-distance listener's main aim, and although there may be a loss of sensitivity when using a highly selective circuit, the fact that a station may be received without a background is generally of the first importance. The simple receiver will employ a single coil, and therefore the most satisfactory plan to obtain the necessary degree of selectivity is to use a coil which is tapped well down for the aerial connection. If the same degree of selectivity is required on the long waves the long-wave section must also be tapped, and this means that a



A tapped grid winding provides high selectivity, but band-pass tuning (shown on the right) calls for two coils and two condensers.



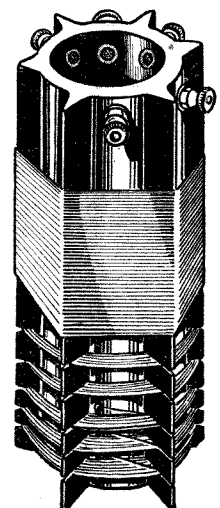
Push-pull Bias

WHEN using indirectly-heated output valves in a push-pull stage, bias may be obtained automatically through a cathode resistance, but as the two valves are more or less identical a single resistance may be employed. For this purpose, both cathodes should be joined together and the bias resistance with by-pass condenser then joined between the cathodes and earth (or the junction of the two grid leaks when R.C. coupling is employed). Remember that when calculating the value of resistor required, there is double the anode current flowing and the rating of the resistor will accordingly need to be modified.

Coil Windings

A MEMBER recently wrote and asked how he could wind a modern dual-range coil to obtain good results on the

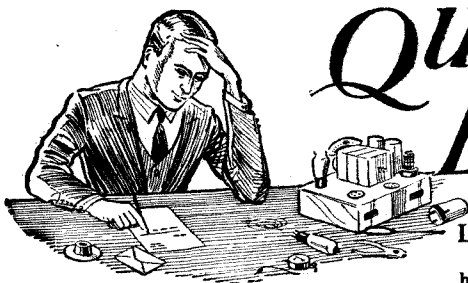
long-wave section. His main point was that he had tried to make a neat pile winding such as is found on a modern coil and had failed. One scheme was illustrated in our issue last week in the article on making your own components, and there is a further idea illustrated below which may be used. For this a ribbed ebonite former is used, and the medium-wave winding is wound on the ribs in the usual way. For the long-wave section it is desirable to split up the winding into sections, and by slotting the ribs the various windings may be placed in position as shown in this illustration, the reaction winding being placed between the medium and long-wave sections. This type of winding is very efficient and the air-spaced medium-wave winding will give much better sensitivity and selectivity than the winding which is placed flat on a former. A coil of this type may, of course, be tapped as above mentioned, or a separate primary winding may be placed inside the coil former on a smaller diameter tube.



How a sectioned winding may be wound, using a ribbed ebonite former.

transfer aerial tapping will have to be employed. A typical circuit of such a coil is shown, and this is a Colvern F.10 coil which was at one time very popular. In most cases an existing coil may be modified to adopt this scheme merely by soldering a lead to a point on the two windings and taking them to a change-over switch mounted on the panel. To find the appropriate point on the coil the aerial lead should be connected to an ordinary sewing needle and the end wrapped with insulation tape. The point of the needle may then be pushed into the wire, where it will pierce the cotton or other covering and make good contact with the wire, without giving rise to a short-circuit. When the appropriate point has been found the wire may be scraped and the lead soldered in position. A point about 25 per cent. of the total winding from the earth end will generally be found most suitable to give adequate selectivity without loss of signal strength.

Band-pass tuning will provide selectivity, but generally the losses incurred result in weakened signals and in many cases this will be found unsuitable for a simple type of receiver. Two identical coils are required and this means two tuning condensers or a ganged component. A condenser is used for coupling in one form as shown in the next column, but it is also possible to use a condenser across the "tops" of the two coils to give better sensitivity, whilst a combination of both top and bottom coupling will often give the desired results.



QUERIES and ENQUIRIES

Motor Interference

"I have an A.C. mains set and the switch is on the same circuit as an electric motor. This is the cause of crackling noises when kept running. Can you suggest a remedy for this, keeping the motor running?"—L. N. (Hull).

If the motor is of the standard type, it is quite possible that the noises arise from the brushes. In that case a fixed condenser joined between each brush and the frame (earth) would probably cure the trouble. On the other hand there may be a need for some more elaborate suppressing device, and if you find that the condensers do not prevent the noise, we suggest that you get into touch with the Belling Lee people who specialise in interference suppressors, and give them details of the motor when they will, no doubt, suggest a suitable suppressor. The condensers should be of 2 or 4 mfd. capacity and designed for working at the voltage which exists across the brush circuit. You might also try a mains input filter consisting of condensers between each side of the mains and earth, the values of these condensers being found by trial and error methods.

Home Recording

"I have been told that it is possible to take records of broadcasts, and I should try to like this. What apparatus do I need and how must it be fed?"—H. E. R. (Perth).

A RECORDING pick-up joined to an output filter circuit in a standard receiver may be used to cut either aluminium or other type of record disc which may be played back through an ordinary pick-up and amplifier circuit. Some standard pick-ups may be used for recording purposes, and although ordinary needles may be used for the cutting, special needles should be used for the best results. A tracking device will have to be used to obtain the necessary spiral trace on the record blank. We refer you to the article on the subject in our issue dated March 20th, 1937.

Untuned Aerial Circuit

"I am thinking of adding an H.F. stage to my short-wave four, but am uncertain regarding the circuit to adopt. I propose to use a variable- μ valve, but would like to avoid a further tuned circuit, and I believe that a choke or resistance may be employed. If this is so can you recommend suitable components and values?"—N. E. (Belfast).

AN untuned circuit is quite standard, and although either a choke or resistance may be used we think you will find it preferable to use a carbon type variable resistance. This will enable you to adjust the value to the best position according to the waveband in use and a maximum value of 100,000 ohms for the component may be recommended. If you do adopt an H.F. choke, a good short-wave component should be employed, and although a screened choke would avoid troubles from interaction, you may be able to place it in such a position that it cannot interact with other inductive components in the receiver.

L.F. Instability

"Reproduction on my set is spoiled by a high-pitched whistle, and I find that this is not audible when I tune to a point between stations. Is it possible to say what causes this, and how I can prevent it? It is loudest on London Regional."—J. L. (Uxbridge).

It is possible that the trouble in your case is L.F. instability, and there are several methods of avoiding it. If you are using two L.F. transformers a reversal of the connections to the secondary of one of them should stop the whistle. Other cures are to include a high resistance in the grid lead to the output valve or to place a low-value resistance in the anode lead to that valve. 100 ohms should prove suitable in the latter

RULES

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

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

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

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

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

case and a value from 50,000 to 100,000 ohms in the former.

Coil Connections

"I am constructing an all-wave receiver using a separate short-wave coil consisting of 24 turns of 18 gauge wire on a 1½ in. former. If this coil is connected in series with the broadcast coil and left in circuit when receiving on the broadcast bands will it make any appreciable difference to the wavelengths covered by the broadcast coil?"—B. W. (S.W.20).

THE amount of wire included in the S.W. coil would make very little difference to the broadcast coil, especially on the long waves. On the medium waves the tuning points on the dial will be lowered slightly and the range covered by that coil will be shifted slightly upwards. In practice very little difference should be noted, but it would be preferable to use a change-over switch so that each coil could be used alone.

Screening a Coil

"It is said that if a coil is screened too closely its efficiency is affected. Does this mean that the wavelength covered is altered, or that the electrical efficiency is reduced? Does this apply to short-wave coils more than to broadcast coils?"—W. B. (Wimbledon).

THERE is a magnetic field surrounding a coil, and if a screen (earthed) is placed close to the coil it will cut this field and

consequently modify the inductance of the coil. In this way the efficiency will be reduced owing to the inductance modification and the waverange covered will be altered. A short-wave coil is generally wound to be more efficient than a broadcast coil and accordingly has a larger field. Therefore, the effect of screening as mentioned by you would be more noticeable on a short-wave coil.

Using Headphones

"I have an aged member of the family who is very deaf. We have a commercial all-wave A.C. 6. For him to hear the set it has to be on so loud that no one else can stand it for long. There are extension speaker sockets. Could headphones be used with these? I have tried it with an old pair of 2,000 ohm 'phones, but it's just a whisper when volume is on full. Can you help me?"—H. J. L. (Northfleet).

It should be quite possible to fit headphones to extension speaker sockets, but these are probably designed for a low-impedance speaker and thus low-impedance headphones will have to be used. You can make use of your present 'phones by connecting a step-down transformer between them and the sockets. It would be preferable first to communicate with the makers of the receiver and ascertain whether or not this is so, and it should be remembered that in some cases with A.C. apparatus a shock may be experienced if precautions are not taken when connecting the 'phones.



Replies in Brief

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

A. H. (Holbeach). The Push-button 4 may be used for record reproduction, but we have not published a design of a complete radiogram.

J. C. (Birkenhead). The receiver was published in a contemporary not now published. We regret that we have no details of the circuit.

J. W. W. (Cleckheaton). Without a type number we cannot give connections, as several different patterns have been produced by the firm in question. There is no standardisation of terminal arrangements or numbers.

S. A. W. (Long Eaton). Without a circuit diagram we hesitate to give connections as in some cases special precautions have to be taken. You give no details as to number of valves, etc.

F. M. (Darlington). The circuit is quite in order and the only improvement we can suggest is the use of a pre-set condenser for the anode by-pass component.

G. O. B. (Mandsey). Although you can use the 4-pin coils, the absence of a primary winding will reduce efficiency and perhaps introduce difficulty in reaction control, etc. In the circumstances, we suggest that you adhere to the 6-pin coils.

H. C. M. (Edgware). We regret that we have no details of the coils, which were specially designed by a contemporary no longer on the market, and thus cannot supply a blueprint or circuit in which they may be used.

S. O. (Blackheath). Although you could use the valves mentioned we recommend the use of the SP2D for the I.F. stage. We note your remarks concerning the switch, and the correct type number is S.139.

J. W. (Airdrie). The speaker could be used, but the markings referred to are merely the field resistance windings, which will not concern you in the set mentioned. The speaker is simply joined to the L.F. terminals.

D. A. I. (Leicester). We regret that we have no blueprint or circuit details which would enable you to use up the parts mentioned in your letter. We only guarantee our receivers when parts which we specify are employed.

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

Practical and Amateur Wireless BLUEPRINT SERVICE

These Blueprints are drawn full size. Copies of appropriate issues containing descriptions of these sets can in some cases be supplied at the following prices, which are additional to the cost of the Blueprint. A dash before the Blueprint Number indicates that the issue is out of print.

Issues of Practical Wireless .. 4d. Post Paid.
 Amateur Wireless .. 4d. ..
 Practical Mechanics .. 7d. ..
 Wireless Magazine .. 1/3 ..

The index letters which precede the Blueprint Number indicate the periodical in which the description appears: Thus P.W. refers to PRACTICAL WIRELESS, A.W. to Amateur Wireless, P.M. to Practical Mechanics, W.M. to Wireless Magazine.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS No. of Date of Issue. Blueprint.

CRYSTAL SETS.
Blueprints, 6d. each.
 1937 Crystal Receiver .. 9.1.37 PW71
 The "Junior" Crystal Set .. 27.8.33 PW94

STRAIGHT SETS. Battery Operated.
One-Valve : Blueprints, 1s. each.
 All-wave Unipen (Pentode) .. PW31A
 Beginner's One-valver .. 19.2.33 PW85
 The "Pyramid" One-valver (HF Pen) .. 27.8.33 PW93

Two-valve : Blueprints, 1s. each.
 Four-range Super Mag Two (D, Pen) .. PW36B
 The Signet Two (D & LF) .. 24.9.33 PW76

Three-valve : Blueprints, 1s. each.
 The Long-range Express Three (SG, D, Pen) .. 24.4.37 PW2
 Selectone Battery Three (D, 2 LF (Trans)) .. PW10

Sixty Shilling Three (D, 2 LF (RC & Trans)) .. PW34A
 Leader Three (SG, D, Pow) .. 22.5.37 PW35
 Summit Three (HF Pen, D, Pen) .. PW37

All Pentode Three (HF Pen, D (Pen) Pen) .. 29.5.37 PW39
 Hall-mark Cadet (D, LF, Pen (RC)) .. 12.6.37 PW41
 F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three) .. 13.4.35 PW49

Genet Midget (D, 2LF (Trans)) .. June '35 PM1
 Cameo Midget Three (D, 2 LF (Trans)) .. 8.6.35 PW51

1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) .. PW53
 Battery All-Wave Three (D, 2 LF (RC)) .. PW55

The Monitor (HF Pen, D, Pen) .. PW61
 The Tutor Three (HF Pen, D, Pen) .. 21.3.36 PW62
 The Centaur Three (SG, D, P) .. 14.8.37 PW61

F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) .. 31.10.36 PW69
 The "Colt" All-Wave Three (D 2 LF (RC & Trans)) .. 5.12.36 PW72

The "Rapid" Straight 3 (D, 2 LF (RC & Trans)) .. 4.12.37 PW82
 F. J. Camm's Oracle All-Wave Three (HF, Det, Pen) .. 28.8.37 PW78

1938 "Triband" All-Wave Three (HF Pen, D, Pen) .. 22.1.38 PWS4
 F. J. Camm's "Sprite" Three (HF Pen, D, Tet) .. 26.3.33 PWS7

The "Hurricane" All-Wave Three (SG, D (Pen), Pen) .. 30.4.33 PWS9
 F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tot) .. 3.9.33 PW92

Four-valve : Blueprints, 1s. each.
 Sonotone Four (SG, D, LF, P) .. 15.5.37 PW4
 Fury Four (2 SG, D, Pen) .. 8.5.37 PW11

Beta Universal Four (SG, D, LF, Cl, B) .. PW17
 Nucleon Class B Four (SG, D, (SG), LF, Cl, B) .. 6.1.34 PW34B

Fury Four Super (SG, SG, D, Pen) .. PW34C
 Battery Hall-Mark 4 (HF Pen, D, Push-Pull) .. PW46

F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) .. 26.9.36 PW67
 All-Wave "Corona" 4 (HF Pen, D, LF, Pow) .. 9.10.37 PW79

"Acme" All-Wave 4 (HF Pen, D, (Pen), LF, Cl, B) .. 12.2.33 PW83
 The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) .. 3.9.33 PW90

Mains Operated.
Two-valve : Blueprints, 1s. each.
 A.C. Twin (D (Pen), Pen) .. PW18
 A.C.-D.C. Two (SG, Pow) .. PW31

Selectone A.C. Radiogram Two (D, Pow) .. PW19
Three-valve : Blueprints, 1s. each.
 Double-Diode-Triode Three (HF Pen, DDT, Pen) .. PW23

D.C. Ace (SG, D, Pen) .. PW25
 A.C. Three (SG, D, Pen) .. PW29
 A.C. Leader (HF Pen, D, Pow) .. PW35C

D.C. Premier (HF Pen, D, Pen) .. 31.3.34 PW35B
 Ubique (HF Pen, D (Pen), Pen) .. 28.7.34 PW36A
 Armada Mains Three (HF Pen, D, Pen) .. PW33

F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) .. 11.5.35 PW50
 "All-Wave" A.C. Three (D, 2 LF (RC)) .. PW54

A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) .. PW53
Mains Recd. All-Wave 3 (HF Pen, D, Pen) .. 5.12.36 PW70
 All-World Ace (HF Pen, D, Pen) .. 28.3.37 PW80

Four-valve : Blueprints, 1s. each.
 A.C. Fury Four (SG, SG, D, Pen) .. PW20
 A.C. Fury Four Super (SG, SG, D, Pen) .. PW34D

A.C. Hall-Mark (HF Pen, D, Push-Pull) .. 24.7.37 PW45
 Universal Hall-Mark (HF Pen, D, Push-Pull) .. 9.2.35 PW47

A.C. All-Wave Corona Four .. 6.11.37 PW81

SUPERHETS. Battery Sets : Blueprints, 1s. each.

£5 Superhet (Three-valve) .. 5.6.37 PW40
 F. J. Camm's 2-valve Superhet .. 13.7.35 PW52
 F. J. Camm's £4 Superhet .. PW53
 F. J. Camm's "Vitesse" All-Waver (5 valver) .. 27.2.37 PW75

Mains Sets : Blueprints, 1s. each.
 A.C. £5-Superhet (Three-valve) .. PW43
 D.C. £5 Superhet (Three-valve) .. 1.12.34 PW42
 Universal £5 Superhet (Three valve) .. PW44

F. J. Camm's A.C. £4 Superhet 4 .. 31.7.37 PW50
 F. J. Camm's Universal £4 Superhet 4 .. PW60
 "Qualitone" Universal Four .. 16.1.37 PW73

Four-valve : Double-sided Blueprint, 1s. 6d.
 Push-Button 4, Battery Model } 22.10.33 PW95
 Push-Button 4, A.C. Mains Model }

SHORT-WAVE SETS. One-valve : Blueprint, 1s.

Simple S.W. One-valver .. 9.4.33 PW38
Two-valve : Blueprints, 1s. each.
 Midget Short-wave Two (D, Pen) .. PW38A
 The "Fleet" Short-wave Two (D (HF Pen), Pen) .. 27.8.33 PW91

Three-valve : Blueprints, 1s. each.
 Experimenter's Short-wave Three (SG, D, Pow) .. 30.7.38 PW30A
 The Prefect 3 (D, 2 LF (RC and Trans)) .. 7.8.37 PW63

The Band-Spread S.W. Three (HF Pen, D (Pen) Pen) .. 1.10.38 PW68

PORTABLES. Three-valve : Blueprints, 1s. each.

F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) .. PW65
 Parvo Flyweight Midget Portable (SG, D, Pen) .. 19.6.37 PW77

Four-valve : Blueprint, 1s.
 "Imp" Portable 4 (D, LF, LF, Pen) .. 19.3.39 PWS6

MISCELLANEOUS. S.W. Converter-Adapter (1 valve) .. PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS. Blueprints, 6d. each.

Four-station Crystal Set .. 23.7.38 AW427
 1934 Crystal Set .. AW444
 150-mile Crystal Set .. AW450

STRAIGHT SETS. Battery Operated. One valve : Blueprints, 1s. each.

B.B.C. Special One-Valver .. AW387
 Twenty-station Loudspeaker One-valver (Class B) .. AW449

Two-valve : Blueprints, 1s. each.
 Melody Ranger Two (D, Trans) .. AW388
 Full-volume Two (SG det, Pen) .. AW392
 Lucerne Minor (D, Pen) .. AW426
 A Modern Two-valver .. WM409

Three-valve : Blueprints, 1s. each.
 Class B Three (D, Trans, Class B) .. AW386
 New Britain's Favourite Three (D, Trans, Class B) .. 15.7.33 AW394

Fan and Family Three (D, Trans, Class B) .. 25.11.33 AW410
 £5 5s. S.G.3 (SG, D, Trans) .. 2.12.33 AW412
 Lucerne Ranger (SG, D, Trans) .. AW422

£5 5s. Three : De Luxe Version (SG, D, Trans) .. 19.5.34 AW435
 Lucerne Straight Three (D, RC, Trans) .. AW437

Transportable Three (SG, D, Pen) .. WM271
 Simple-Tune Three (SG, D, Pen) .. June '33 WM327
 Economy-Pentode Three (SG, D, Pen) .. Oct. '33 WM337

"W.M." 1934 Standard Three (SG, D, Pen) .. WM351
 £3 3s. Three (SG, D, Trans) .. Mar. '34 WM354
 1935 £6 6s. Battery Three (SG, D, Pen) .. WM371

PTP Three (Pen, D, Pen) .. WM389
 Certainty Three (SG, D, Pen) .. WM393
 Minutiae Three (SG, D, Trans) .. Oct. '35 WM396

All-Wave Winning Three (SG, D, Pen) .. WM400
Four-valve : Blueprints, 1s. 6d. each.
 65s. Four (SG, D, RC, Trans) .. AW370

"A.W." Ideal Four (2 SG, D, Pen) .. 16.9.33 AW402
 2HF Four (2 SG, D, Pen) .. AW421
 Self-contained Four (SG, D, LF, Class B) .. Aug. '33 WM331

Lucerne Straight Four (SG, D, LF, Trans) .. WM350
 £5 5s. Battery Four (HF, D, 2 LF) .. Feb. '35 WM381
 The H.K. Four (SG, SG, D, Pen) .. Mar. '35 WM384

The Auto Straight Four (HF Pen, HF Pen, DDT, Pen) .. Apr. '36 WM404
Five-valve : Blueprints, 1s. 6d. each.
 Super-quality Five (2 HF, D, RC, Trans) .. WM320

Class B Quadradyne (2 SG, D, LF, Class B) .. WM344
 New Class B Five (2 SG, D, LF, Class B) .. WM340

Mains Operated. Two-valve : Blueprints, 1s. each.

Consoelectric Two (D, Pen) A.C. .. AW403
 Economy A.C. Two (D, Trans) A.C. .. WM286
 Unicorn A.C.-D.C. Two (D, Pen) .. WM394

Three-valve : Blueprints, 1s. each.
 Home Lover's New All-electric Three (SG, D, Trans) A.C. .. AW383
 Mantovani A.C. Three (HF Pen, D, Pen) .. WM374

£15 15s. 1936 A.C. Radiogram (HF, D, Pen) .. Jan. '36 WM401
Four-valve : Blueprints, 1s. 6d. each.
 All Metal Four (2 SG, D, Pen) .. July '33 WM326

Harris' Jubilee Radiogram (HF Pen, D, LF, P) .. May '35 WM386

SUPERHETS. Battery Sets : Blueprints, 1s. 6d. each.

Modern Super Senior .. WM375
 Varsity Four .. Oct. '35 WM395
 The Request All-Waver .. June '36 WM407
 1935 Super Five Battery (Superhet) .. WM379

Mains Sets : Blueprints, 1s. 6d. each.
 Heptode Super Three A.C. .. May '34 WM359
 "W.M." Radiogram Super A.C. .. WM365

PORTABLES. Four-valve : Blueprints, 1s. 6d. each.

Midget Class B Portable (SG, D, LF, Class B) .. 20.5.33 AW389
 Holiday Portable (SG, D, LF, Class B) .. AW393
 Family Portable (HF, D, RC, Trans) .. 22.9.34 AW447

Two H.F. Portable (2 SG, D, QP21) .. WM363
 Tyers Portable (SG, D, 2 Trans) .. WM367

SHORT-WAVE SETS—Battery Operated. One-valve : Blueprints, 1s. each.

S.W. One-valver for America .. 15.10.38 AW429
 Rome Short-waver .. AW452
Two-valve : Blueprints, 1s. each.
 Ultra-short Battery Two (SG det., Pen) .. Feb. '36 WM402

Home-made Coil Two (D, Pen) .. AW440
Three-valve : Blueprints, 1s. each.
 World-ranger Short-wave 3 (D, RC, Trans) .. AW255
 Experimenter's 5-metre Set (D, Trans, Super-regen) .. 30.6.34 AW433

Experimenter's Short-waver (SG, D, Pen) .. Jan. 10, '35 AW463
 The Carrier Short-waver (SG, D, P) .. July '35 WM390

Four-valve : Blueprints, 1s. 6d. each.
 A.W. Short-wave World-Beater (HF Pen, D, RC, Trans) .. AW436
 Empire Short-waver (SG, D, RC, Trans) .. WM313

Standard Four-valver Short-waver (SG, D, LF, P) .. Mar. '35 WM383
Superhet : Blueprint, 1s. 6d.
 Simplified Short-waver Super .. Nov. '35 WM397

Mains Operated. Two-valve : Blueprints, 1s. each.

Two-valve Mains Short waver (D, Pen) A.C. .. AW453
 "W.M." Band-spread Short waver (D, Pen) A.C.-D.C. .. WM368
 "W.M." Long-wave Converter .. WM380

Three-valve : Blueprint, 1s.
 Emigrator (SG, D, Pen) A.C. .. WM352
Four-valve : Blueprint, 1s. 6d.
 Standard Four-valve, A.C. Short-waver (SG, D, RC, Trans) .. Aug. '35 WM394

MISCELLANEOUS. S.W. One-valve converter (Price 6d.) .. AW329

Enthusiast's Power Amplifier (1/6) .. WM387
 Listener's 5-watt A.C. Amplifier (1/6) .. WM392
 Radio Unit (2v.) for WM392 .. Nov. '35 WM398

Harris Electrogram (battery amplifier) (1/-) .. WM399
 De-Luxe Concert A.C. Electrogram .. Mar. '36 WM403

New Style Short-wave Adapter (1/-) .. WM388
 Trickle Charger (6d.) .. Jan. 5, '35 AW462

Short-wave Adapter (1/-) .. AW456
 Superhet Converter (1/-) .. AW457
 B.L.D.L.C. Short-wave Converter (1/-) .. May '36 WM405

Wilson Tone Master (1/-) .. June '36 WM406
 The W.M. A.C. Short-wave Converter (1/-) .. WM403

Miscellaneous Advertisements

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," Tower House, Southampton Street, Strand, London, W.C.2.

RECEIVERS, COMPONENTS AND ACCESSORIES
Surplus, Clearance or Secondhand, etc.

SOUTHERN RADIO'S Radio Bargains.

50/- SUNBEAM 4-valve A.C./D.C. superhet. table receivers. Last few at fraction of cost. Brand new in sealed cartons. 2 watts output. Full size speaker and cabinet. Wonderful performance. A full size set bargain. Not a midget.

22/6 5-BAND Pentode Battery Kits. Southern's 1939 all-wave kits with metal chassis and panels. 10-2,000 metres. World-wide reception guaranteed. Works speaker or phones. Band-spread, new super-regeneration circuit, etc. The season's best value. Illustrated leaflet on receipt of stamp. Price with valves, 34/6.

10/- A.R.P. Radio Outfits. Comprise high-grade crystal receiver, pair headphones, aerial and earth equipment. A complete emergency radio installation.

3/11 A.R.P. Crystal Receivers in attractive bakelite cases. 4/11 High-grade headphones. 2/11 cheaper pattern.

5/- SOUTHERN'S famous bargain parcels of useful components. Bigger value than ever. Value over 20/- 5/6. American valves, all types.

3/6 TELSEN Midget Iron-core coils. W349: dual-range coils, 2/6; with aerial series condenser W76, 3/3; triple-gang superhet W476, 14/6; triple band-pass W477, 14/6; twin-gang W478, 9/-.

8/6 TELSEN A.C./D.C. Multimeters, 5 range.

2d. Garrard Radiogram Units, brand new, 42/-.

2d. STAMP brings complete lists by return post. Remember, Southern Radio for the biggest and soundest bargains.

SOUTHERN RADIO, 46, Lisle Street, Leicester Square, London, W.C.1. Gerrard 6653. Open Saturdays to 9.0 p.m.

CONVERSION UNIT for operating D.C. Receivers from A.C. Mains, improved type, 120 watt output at £2/10/0. Send for our comprehensive list of speakers, resistances and other components.

WARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

ALL goods previously advertised are standard lines still available. Post card for list free.

VAUXHALL UTILITIES, 165a, Strand, W.C.2. Over Denny's the Booksellers. (Temple Bar 9338.)

BANKRUPT BARGAINS.—List free. 10th year of advertising. All new goods. Ferguson 5v. all-wave superhet chassis, M.C. and valves, 75/-; Portadyne 1938/9 9gn. all-wave 5v. superhets, A.C. or A.C./D.C., £5/10/0. Portadyne 3v. battery all-wave, 85/-; Portadyne 5v. all-wave mains full-sized radiograms, 10gns. Decca 1939 5v. press-button superhet, £8/10/0. HSP 5v. A.C., 14gn. 1938 all-wave superhets, £6/10/0. Spencer 5v. all-wave A.C./D.C. 4-band superhets, £5/15/0. Truphonic 1938 11gn. all-wave superhets, £6/17/6. Full stock valves, components.—Butlin, 6, Stanford Avenue, Brighton.

NEW RECEIVERS, COMPONENTS AND ACCESSORIES

BANKRUPT BARGAINS.—Brand new 1938 radio sets in makers' cartons with guarantees at less than half retail prices: send 1d. stamp for list bargains.—261-3, Lichfield Road, Aston, Birmingham.

NEW RECEIVERS AND CHASSIS

ALL ARMSTRONG Radio chassis, including Press Button models, exhibited at Radiolympia can be seen and heard at our Showrooms. Demonstrations daily. Armstrong chassis are sent on 7 days' approval, carriage and packing free. Armstrong Company have fully illustrated technical catalogue describing all models.—Armstrong Company, 100, St. Pancras Way (formerly Kings Road), Camden Town, London, N.W.1. Gulliver 3105.

VALVES

AMERICAN Valves in Sealed Cartons, all types—5/6 post paid.—Valves, 661/3, Harrow Road, N.W.10.

PREMIER 1939 RADIO

ALL GOODS PREVIOUSLY ADVERTISED ARE STILL AVAILABLE.
PREMIER BATTERY CHARGERS. Westinghouse Rectification. Complete. Ready for use. To charge 2 volts at 1/2 amp., 10/-; 6 volts at 1/2 amp., 16/6; 6 volts at 1 amp., 19/6; 12 volts at 1 amp., 21/-; 6 volts at 2 amps., 32/6.
AUTO TRANSFORMERS, Step up or down A.C. mains between 100-250 volts. 60 watts, 9/-; 100 watts, 11/6.

PREMIER 1939 HIGH FIDELITY AMPLIFIERS

A NEW COMPLETE RANGE OF 7 HIGH FIDELITY PA AMPLIFIERS FOR A.C. OR A.C./D.C. MAINS OPERATION.

With the exception of the 3-watt models, all Premier Amplifiers incorporate the new Premier Match-maker Output Transformer, enabling any single or combination of speakers to be used. 6-, 8/10-, and 15-watt systems are provided with two separate input channels which can be mixed to any level. The 30- and 60-watt systems have 3 input channels. The built-in Pre-Amplifiers ensure that the gain is sufficient for any low-level crystal or velocity microphone. The actual gain of the 6-, 15-, 30- and 60-watt amplifiers is over 100 decibels. Tone controls are also incorporated.

	Kit of Parts	Wired and Valves.	Completely Tested.
3-watt A.C. Amplifier	£2 0 0	£2 15 0	
3-watt A.C./D.C. "	£2 0 0	£2 15 0	
6-watt A.C. "	£5 5 0	£6 0 0	
8-10-watt A.C./D.C. "	£4 10 0	£5 5 0	
15-watt A.C. "	£5 15 0	£7 0 0	

Black Crackle Steel Cabinet 15/- extra.

MOVING COIL SPEAKERS. Magnavox Sin. P.M.s with Output Transformer, 10/6. Magnavox Sin. Energised, 2,500 ohm field with Transformer, 9/11. Rola Sin. P.M. with Transformer, 15/-; Rola 10in. P.M., 19/11. B.T.H. 10in. Energised L.S., 1,650 ohm field, less Transformer 9/11. Rola G.12 12in. High-Fidelity Speakers with Output Transformer, Energised, 1,250 or 2,500 ohm field, 59/6. P.M. model, 79/6.

Premier Transverse Current Microphone, 20/-; Microphone Transformer, 6/-.

UTILITY Micro Cursor Dials, Direct and 100-1 Ratios, 3/9.

PREMIER Short-Wave Condensers, all-brass construction with Trolitul insulation. 15 mmf., 1/6; 25 mmf., 1/7; 40 mmf., 1/9; 100 mmf., 2/-; 160 mmf., 2/3; 250 mmf., 2/6.

SHORT-WAVE COILS, 4- and 6-pin types, 13-25, 22-47, 41-94, 78-170 metres, 1/9 each, with circuit. Special set of S.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 3-band S.W. coil, 11-25, 19-43, 38-86 metres. Suitable any type circuit, 2/6.

COIL FORMERS, 4- or 6-pin low-loss, 1/- each. Have you had our 1939 Catalogue, Handbook and Valve Manual? 90 pages of Radio Bargains and Interesting Data. Price 6d.

ALL POST ORDERS TO: Jubilee Works, 167, Lower Clapton Road, London, E.5. Amherst 4723.
CALLERS TO: Jubilee Works, or 165, Fleet Street, E.C.4. Central 2833, or 50, High Street, Clapham, S.W.4. Macaulay 2381.

WRITE FOR PRICE LIST AND FULL PARTICULARS OF LATEST MODELS OF ARMSTRONG CHASSIS ON LOWEST EASY TERMS

WE ALSO SUPPLY on the most favourable terms all well-known Sets, Radiograms, Speakers, etc., also all Domestic Electrical Equipment. All Carr. paid. Prompt delivery.

WRITE STATING REQUIREMENTS AND WE WILL QUOTE BY RETURN POST. (Phone National 6828-9)

LONDON RADIO SUPPLY COMPANY
EST. 1925
11, OAT LANE, NOBLE STREET, LONDON, E.C.2

FREE ADVICE BUREAU COUPON
This coupon is available until January 21st, 1939, and must accompany all Queries and Wrinkles.
PRACTICAL AND AMATEUR WIRELESS
14/1/39.

LOUDSPEAKER REPAIRS

REPAIRS in Moving Coil Speakers, Cones and Coils fitted and Rewound. Fields altered. Prices Quoted including Eliminators. Loudspeakers Repaired, 4/-; L.F. and Speech Transformers, 4/-, post free. Trade invited. Guaranteed. Satisfaction. Prompt Service, Estimates Free.—L.S. Repair Service, 5, Balham Grove, London, S.W.12. Battersea 1321.

LLOUDSPEAKER repairs, British, American, any L make, 24-hour service, moderate prices.—Sinclair Speakers, Alma Grove, Copenhagen Street, London, N.1.

REPAIRS AND SERVICE

S.T. and all other home-constructed and commercial receivers serviced by Clark and Randall, late Assistant Editors of "Popular Wireless." Special receivers built, diagrams prepared and all kinds of radio work executed.—15, Nimrod Road, S.W.16. Phone: Streatham 4560.

MISCELLANEOUS

VIBRATOR H.T. Units.—Excellent range, 2 to 12 volts input. Lists, stamp. Trade and export supplied.—Simmonds Bros., Rabone Lane, Smethwick.

PRACTISE receiving the Morse Code by gramophone records. All speeds. Particulars.—Masters, Orchard House, Wokingham, Berks.

HEADPHONES, Crystals, Crystal Sets, Microphones, etc. List with diagrams free.—Post Radio, 2, Copenhagen Street, London, N.1.

SITUATIONS VACANT

WANTED.—Ambitious young men to prepare for well-paid posts in TELEVISION, the great career of the future. Apply for free booklet from BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 18F, Stratford Place, W.1.

ENGINEERING—FREE OFFER. The new 1939 GUIDE explains how all the best jobs are secured. It shows how to obtain such valuable qualifications as A.M.I.Mech.E., A.M.I.E.E., etc., and describes numerous diploma courses for entrance and promotion in draughtsmanship: electrical, aero, wireless and auto engineering, civil service, etc. For FREE copy and details of remarkable SUCCESS GUARANTEE, write NATIONAL INSTITUTE OF ENGINEERING (Dept. 3), Staple Inn Buildings, W.C.1.

ROYAL AIR FORCE

Expert instructors will teach you a skilled trade in the R.A.F.

Men of good education are now required for enlistment and training as **WIRELESS OPERATORS** and **ARMOURERS**. Age limits 17-35.

Apply for free booklet "A Life for Men," to R.A.F. Recruiting Depot, Victory House, Kingsway, W.C.2, or to any R.A.F. Recruiting Depot or Post Office.

ENGINEERING OPPORTUNITIES
Free!
268 PAGES
This unique Handbook shows the easy way to secure A.M.T.C.E., A.M.I.Mech.E., A.M.I.E.E., A.M.I.A.E., A.M.I.W.T., A.M.I.R.E., and similar qualifications. **WE GUARANTEE—NO PASS—NO FEE.** Details are given of over 150 Diploma Courses in all branches of Civil, Mech., Elec., Motor, Aero, Radio and Television Engineering, Building, Government Employment, etc. Write for this enlightening Handbook to-day FREE and post free.
British Institute of Engineering Technology, 409, Shakespeare House, 17, 18, 19, Stratford Pl., W.1

New.. FROM COVER TO COVER..

"COMPLETE ELECTRICAL ENGINEERING"

STUDY the information contained in this great new work and you will add considerably to your earning capacity in the electrical engineering world! COMPLETE ELECTRICAL ENGINEERING is offered to you at a price you can afford to pay. It is a complete library—a ready reference to the thousand and one applications of present-day electrical engineering. Its contents are absolutely comprehensive and deal with everything you can possibly want to know—from Electrical Power Supply to Talking Picture Equipment; from the Wiring of Modern Flats to Electrical Timing Instruments; from Emergency Storage-Battery Systems to Testing Electrical Machinery; from Lift Operation and Control to Garage Electrical Testing Equipment; from Time Switches and Time-Delay Devices to Electrical Welding Plant; from Refrigeration to Electric Meters and Cookers, etc.

It is impossible in this space to include details of the 160 Sections, but the special brochure which is yours for the asking—and without obligation to purchase—will show you that COMPLETE ELECTRICAL ENGINEERING is the very work you have been looking for. It can be yours within a few days!

63 EXPERT CONTRIBUTORS

OVER 3,000 PAGES of Exclusive, Practical, Worth-While Information

OVER 2,500 Action Photographs, Plans, Tables and Calculations.

SPECIAL CHART CASE containing 48 Invaluable Electrical Data Charts.

TWO YEARS' ELECTRICAL POSTAL ADVISORY SERVICE

FREE
The Electrical Engineers' Pocket Book presented to every purchaser.

Complete in 8 Vols.

Read what satisfied buyers say!

Valuable Information

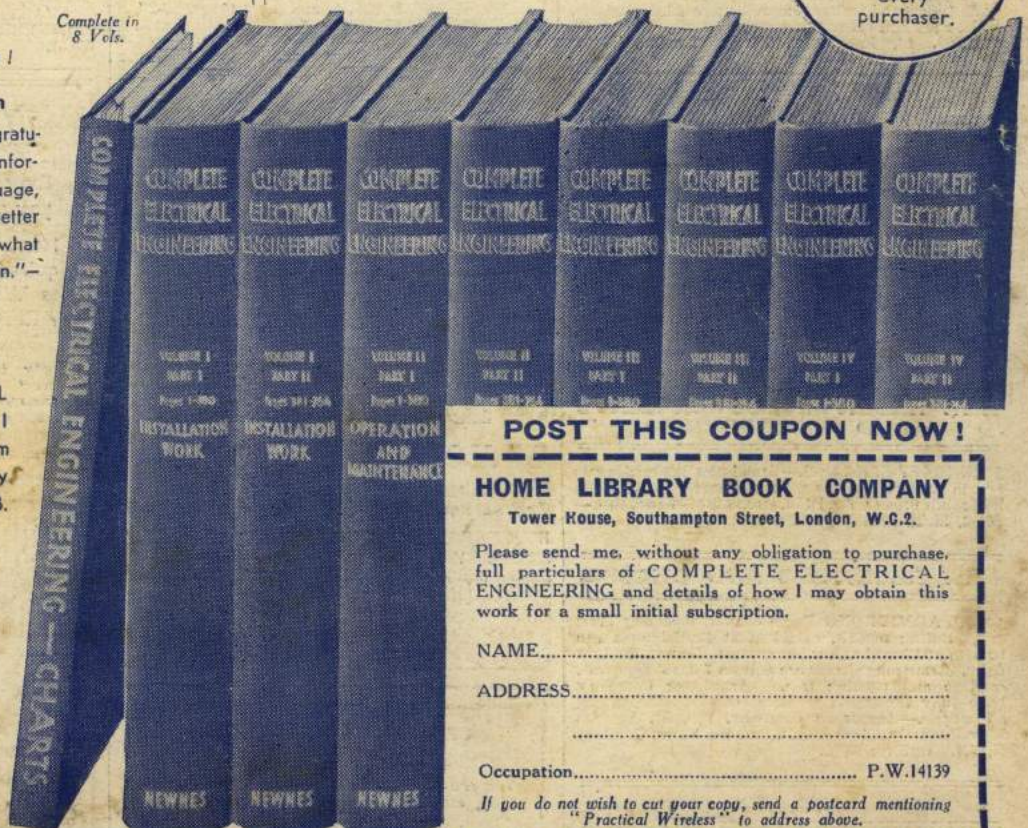
"I cannot refrain from congratulating you... The valuable information is given in simple language, which achieves its aim far better than if it had been written in what I would call a high-brow fashion."—J. L. P. P. (Hull).

Meets Requirements

"COMPLETE ELECTRICAL ENGINEERING is just the book I have been looking for. I am pleased to say that it meets my requirements admirably."—C. B. (Colindale, N.W.9).

Electrical Education

"I have gained much pleasure and most valuable education from reading COMPLETE ELECTRICAL ENGINEERING. It has already repaid me its cost."—T. A. (Southport).



POST THIS COUPON NOW!

HOME LIBRARY BOOK COMPANY

Tower House, Southampton Street, London, W.C.2.

Please send me, without any obligation to purchase, full particulars of COMPLETE ELECTRICAL ENGINEERING and details of how I may obtain this work for a small initial subscription.

NAME.....

ADDRESS.....

Occupation..... P.W.14139

If you do not wish to cut your copy, send a postcard mentioning "Practical Wireless" to address above.

George Newnes, Ltd.