

**THE SIMPLEST ALL-WAVER—** See page 454

# Practical and Amateur Wireless

**3<sup>D</sup>**  
EVERY  
WEDNESDAY

Edited by F.J. CAMM

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July 23rd, 1938.

**AND PRACTICAL TELEVISION**

**AUTO-TUNING**  
for  
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**EVERY  
FRIDAY**

**The Weekly Every Home is Reading**

# A NOVEL QUALITY RECEIVER—SEE PAGE 453



## 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. XII. No. 305. July 23rd, 1938.

# ROUND *the* WORLD of WIRELESS

### Automatic Tuning

THE majority of the receivers at this year's Radio Exhibition will undoubtedly feature push-button or automatic tuning as the main point, and in this issue we give another article on the method of making use of the principle with existing equipment. It must be pointed out that at the moment push-button units are not generally available. One or two manufacturers are proceeding with plans and should be able to supply ready-assembled units at the Show which could be incorporated into any receiver with a minimum of difficulty. A scheme which we favour, and which we hope to describe as soon as the button units are available, is the building of a complete tuner unit on the superhet principle which could be built into a receiver, used as a separate unit, or even as a remote-control device. It would employ the superhet circuit and be, more or less, a superhet converter. This would enable any set to be modified by the connection of about three leads and would introduce a complete automatic tuning assembly in the minimum of time. No doubt a unit of this type will be on the market before long, and will enable many existing receivers to be brought up to date.

### Scottish Transmitter

THE new B.B.C. transmitter at Kincorth, near Aberdeen, is being tested on the air, and signals may be picked up on a wavelength of 233.5 metres after midnight. Details are not yet available concerning the probable date when the station will be put into operation.

### Another Lucerne Plan

AS mentioned recently there is a possibility of another wavelength shuffle next year. At the meeting of the I.B.U. to be held in October the recommendations of the Cairo Conference will be considered and it is reported that the Technical Committee of the I.B.U. has already held preliminary discussions regarding the matter. According to the I.B.U., the number of receivers registered in the world at the end of 1937 was 87,400,000; and of these approximately 31,200,000 were in Europe—excluding the U.S.S.R.

### P.A. Equipment

TO control huge crowds in mass demonstrations, speakers have been buried in the ground at certain foreign centres.

We now understand that this principle is adopted at the Birmingham Pageant which is held this month, and the Pageant Master directs operations through a microphone. This scheme ensures that everyone hears the orders simultaneously and there is no delay due to the sound having to travel over ground to be deflected by wind, etc.

### Car Radio

FROM an American station special programmes are broadcast on Sunday afternoon for the entertainment of car

body upsets the balance and trips a relay or carries out any other work which raises an alarm.

### Radiolympia Poster

AS television is playing a large part in this year's radio show, the poster to be used for advertising is to combine the eye and an ear. On a black ground an orange eye with a white ear superimposed will attract attention and indicate that the exhibition is to appeal to the viewer as well as the listener.

### Paris Television

IN response to many enquiries we are able to point out that standard television equipment as used for the B.B.C. requires no modification to receive the Paris television transmissions. The wavelength is close to the B.B.C. wavelength and the line definition is 445. Further details will be given as soon as they become available.

### Another Questionnaire

THE B.B.C. is anxious to obtain data from listeners regarding their summer listening habits. A special form will be sent to every listener who applies on a postcard, and this form carries a list of twenty-one programmes, ranging from orchestral music to running commentaries on sport, and listeners are asked to put a cross against the type of programme they like. Their remarks may be made in a special place provided. No signature is required.

### Colwyn Follies

THESE popular entertainers, under the direction of Ernest Binns, will broadcast from the Pier Pavilion, Colwyn Bay, on July 22nd.

### Television Land-line

IT is announced that the twin television cable between London and Manchester is practically completed by the Post Office and the section from London to Birmingham is now in partial use. Orders have been placed for an extension to Newcastle. The London-Birmingham section is being employed for 40 telephone lines and it is stated that the cable may be used for the simultaneous transmission of 300 two-way telephone conversations. It is anticipated that a second B.B.C. television transmitter will be constructed at either Birmingham or Manchester.

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drivers. It is claimed that this gives the driver something to occupy his mind and prevent him from speeding, with a consequent reduction in the number or risk of accidents. We understand that the B.B.C. has in hand plans for propaganda for car radio, and will encourage its use by special programme references from time to time.

### Radio Burglar Alarms

VARIOUS suggestions have been made from time to time for the use of ordinary radio apparatus as a burglar alarm. The use of the light-sensitive cell is well known, and now a new suggestion has been put forward in which a circuit is finely balanced and the presence of a human

# ROUND the WORLD of WIRELESS (Continued)

## Broadcasting in the U.S.A.

IT has been computed that there are, in the U.S.A., no fewer than 725 broadcasting stations, and these are controlled by some 600 different companies; 280 of the stations are wholly or partially owned by newspapers.

## Vienna Station's New Home

WE are informed that the "Reichssender Wien," formerly Ravag, has moved at last to the new Broadcasting House in

## INTERESTING and TOPICAL NEWS and NOTES

### Music Broadcasts

BEETHOVEN'S ballet music, "Prometheus," conducted by Sir Adrian Boult, will be broadcast by the B.B.C. Orchestra on August 4th (Regional), and on August 2nd (Regional) a performance of

## Industrial News Bulletin!

WE understand that the B.B.C. has been considering including, in the interests of British industry as a whole, a short weekly bulletin of industrial news. The matter has not yet got beyond the stage of preliminary enquiry.

## Cabaret from Bournemouth

DANCE Cabaret will be broadcast from the Royal Bath Hotel Ballroom, Bournemouth, in the Regional and West of England programmes on July 27th. The artists will include Billy Thorburn and his Music, with Eddie Gurey and the Billy Boys.

## Song Recital

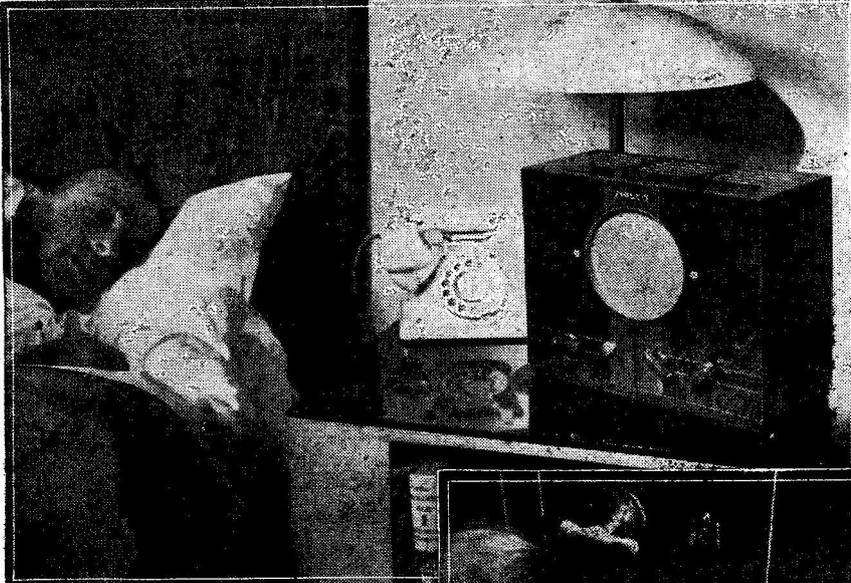
MIDLAND listeners are to hear, on July 20th, a second broadcast in the series entitled, "Songs I Like," in which the singer gives personal reasons for the choice of songs included in the programme. This time the singer will be the well-known soprano, Miriam Licette.

## Military Bands Broadcast

THE most famous military band in France, the Garde Républicaine, will share a programme with the B.B.C. Military Band on July 24th. The Garde Républicaine Band will be heard playing from Paris in the first half of the programme, while the B.B.C. Military Band will broadcast from London.

## Variety from the North-East

"BON-ACCORD" is the title of a studio variety entertainment with a strong flavour of the North-East, to be broadcast on July 21st. Among those taking part will be Roland Smith, assisted by Flossie Miller, in a sketch telling how Mrs. McHaggis fared at the Empire Exhibition; Lizzie Blacklaw, in an original monologue; and Leslie and Cowe, broadcasting accordion duets for the first time. The show will be presented by Howard M. Lockhart.



These illustrations show how a shopkeeper protects his safe by placing a Philco phone underneath it where it cannot be seen. Should anyone approach the safe, the slightest noise will be intensified in the master unit, in his bedroom upstairs, sufficiently to awaken him.

the park of the Theresianum College, founded nearly 200 years ago by the Empress Maria Theresa. The College, which was the Austrian Eton, still remains, and retains plenty of ground, with old trees, bushes and turf, for all its practical needs. Active broadcasting will not begin till September, but most of the executive departments, with staffs, have been transferred.

## New R.A.F. Wireless School

IN order to meet the increased requirements of the R.A.F. for wireless personnel, a temporary school to accommodate approximately 3,000 airmen pupils and a staff of about 200 airmen and civilian instructors is to be opened in the autumn at Yatesbury, Wiltshire. A site for the permanent school will be selected later.

## Esperanto in Italy

IN a recent international radio competition, organised by the Italian Broadcasting Authorities, more entries were received in Esperanto than in all other languages (English, German, French, Dutch) together. This is the fourth such competition, and in consequence of the result the authorities have now increased their broadcasts in Esperanto. Many other countries are also broadcasting in Esperanto nowadays; there are, in fact, over eighty broadcasts in the language every month.



Bach's B minor Mass, by the Eisteddfod Choir and the London Philharmonic Orchestra, will be broadcast from Wales. The forty-fourth season of Promenade Concerts in the Queen's Hall will begin on the evening of August 6th. Sir Henry J. Wood will again conduct, and the season will last for eight weeks. The whole of the opening night will be broadcast in the National programme.

## Exploring Caves

THE limestone country at the head of the Tawe and Neath valleys has in recent years been yielding up its secrets. Huge caves have been discovered, with stalactites and underground rivers. The explorers who were the first to discover this new world will come to the Western studio on July 28th and tell the story of their adventures in a programme entitled "Exploring Caves."

## SOLVE THIS!

### PROBLEM No. 305

Atkinson made a four-valve short-wave receiver and a tuning indicator endeavoured to make use of a 1 mA. meter which he had in his junk box. He connected this in the anode circuit of his anode-bend detector, but found that the needle went right off the scale. He accordingly decided that the meter was useless and purchased a new one. How could he have utilised the original model without difficulty, and at the same time given it wider scope than his new model? Three books will be awarded for the first three correct solutions opened. Envelopes should be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 305 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, July 25th, 1938.

### Solution to Problem No. 304

When Jonson made the alteration he overlooked the fact that a fixed condenser had to be joined between the anode and the primary winding. Without this his H.T. supply was short-circuited. The following three readers successfully solved Problem No. 303, and books have accordingly been forwarded to them: J. Hoyle, 5, Barnes Avenue, Rawtenstall, Rossendale, Lancs.; L. Cowan, 44, Norman Street, Glasgow, S.E.; A. H. Poulton, Horsbrook, South Brent, Devon.

# An Interesting Conversion

## How an Obsolete Battery-operated Receiver was Adapted to A.C. Mains Operation

**M**ANY experimenters have an obsolete battery set in their workshop, so a few notes by one who has just converted an old set to A.C. mains operation, with very satisfactory results, may prove of interest and benefit to other readers.

The schematic diagram of the original receiver is shown in Fig. 1 from which it will be noted that the circuit consists of a screen-grid amplifier preceded by a pair of band-pass coils, and followed by an H.F.

valve reduced when receiving a very powerful signal, but the signal strength itself is cut down. This arrangement gives very good control of the volume and also helps selectivity.

An H.F. pentode (Marconi type W.42) was chosen for this stage, and for its operation only two extra resistances and two non-inductive condensers were required. The only additions to the detector circuit were a decoupling resistance and

self-contained cabinet with speaker and battery compartment at the top, and it was decided to mount the mains equipment on the battery shelf, which was first of all covered with copper sheeting.

The mains transformer, rectifier, voltage doubler condensers, thermal delay switch, and electrolytic smoothing condenser were then mounted in position. A bracket was made to fit the latter, which was of the cylindrical-can variety, although the bracket can be dispensed with if a condenser in a rectangular impregnated carton is available.

The thermal delay switch (Bulgin type S.100) was deemed desirable to enable existing condensers to be used. The switch is joined between the positive terminal of the rectifier and the speaker field (or smoothing choke if this is used instead), and does not switch on the H.T. supply until the receiving valves themselves have warmed up sufficiently to ensure that they take their full current immediately the H.T. voltage is applied. This prevents any voltage surge, and as the smoothed H.T. supply at the full valve load is about 200 volts, the existing condensers may safely be used.

### Power Pack

The power pack was then wired up, all "earth" leads being taken to the copper foil covering the shelf, and sufficient length of wire to reach the receiving chassis itself was left available for the H.T. positive, "earth," and valve heater lines.

The on-off switch S.6 is mounted on the same spindle as switches S.1-S.7 which control the wave-range, dial lights, etc., so one side of the mains had to be taken through this switch on the receiver chassis, and then back to the mains transformer.

The H.F. pentode and mains output valve used were of the 7-pin type, so new valveholders were provided for these stages, and one of the 5-pin valveholders thus removed was transferred to the detector

(Continued on next page)

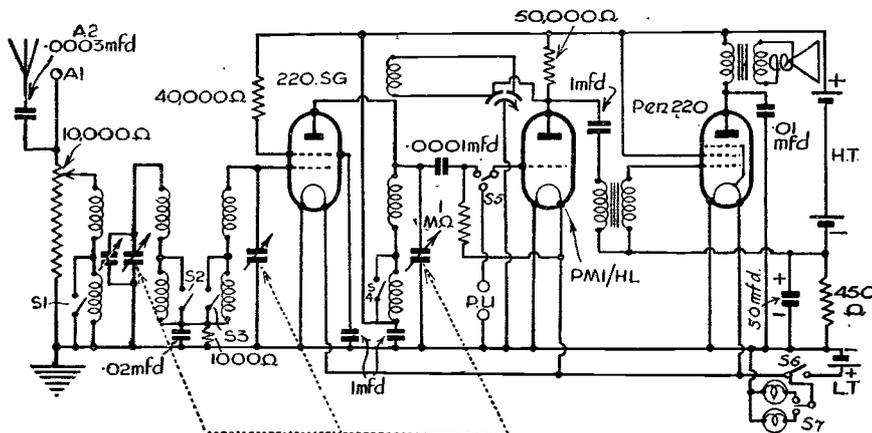


Fig. 1.—Circuit diagram of the original battery receiver.

transformer connected to a leaky-grid triode detector. The latter is, in turn, connected to a pentode output valve through a parallel-fed transformer, and automatic bias is applied to the output stage by means of a 450-ohm resistor. Volume control is by means of a potentiometer connected across the aerial coil.

As was to be expected, all the valves had long outlived their useful life, and there were three schemes to be considered, viz.:

(1) Whether to purchase new battery valves, an H.T. battery and an L.T. accumulator.

(2) Obtain new battery valves, and an L.T. accumulator, and get the H.T. supply from the mains through an eliminator.

(3) To convert the set to all-mains operation with mains-operated valves.

Suggestion 1 was ruled out straightaway as it was decided that the valve combination available would hardly give sufficient selectivity and volume to meet present-day conditions.

As regards scheme 2, the cost of this was almost as much as a complete conversion. It was certainly simpler than scheme 3, but would not give quite the same results as complete all-mains operation, and the latter was eventually decided upon.

### Using Existing Components

An examination of the chassis and components showed that, providing surges in H.T. voltage were avoided, most of the components could be utilised and, excepting the mains equipment, very few extra parts would be required. The circuit was then redrawn for mains operation, and Fig. 2 should now be compared with Fig. 1.

The original aerial potentiometer is now also part of the cathode bias resistance, so that not only is the sensitivity of the H.F.

condenser in the anode lead, while the output valve required only the substitution of a different value of bias resistance.

The battery receiver was fitted with a P.M. moving-coil speaker, but a spare energised model was available, so it was decided to use that with a Westinghouse metal rectifier, style H.T.16, for the power supply. This, together with its mains transformer and smoothing condensers, hardly costs more than a good H.T. battery and new accumulator, and will certainly last a good deal longer.

The original receiver was fitted in a

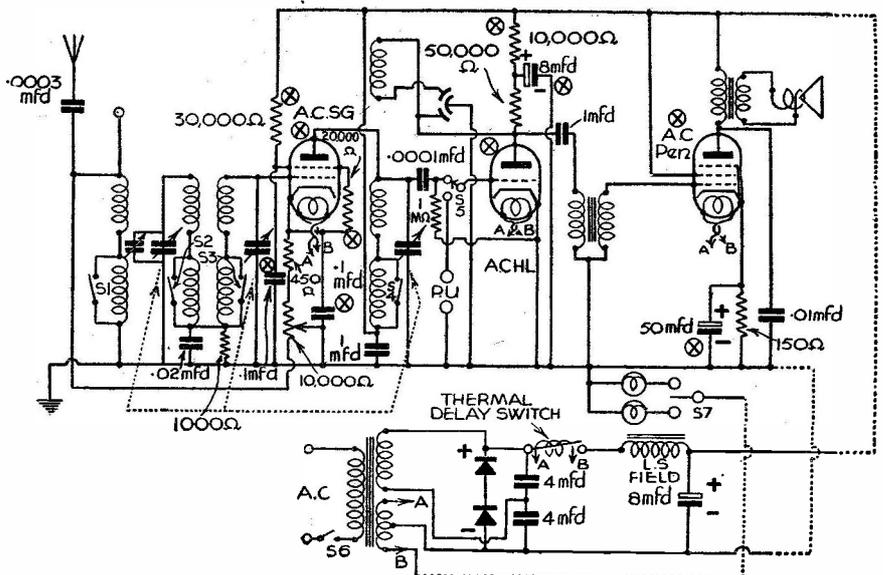


Fig. 2.—Theoretical circuit diagram of the A.C. mains version. The only new components utilised are marked X.

## AN INTERESTING CONVERSION

(Continued from previous page)

stage to provide for the 5-pin valve to be fitted there.

The L.T. wiring to the valveholders was retained intact, with the exception of the lead from the output valve to chassis. A new lead from this valve leg to one side of the L.T. winding on the mains transformer was provided, the other side of this winding being taken to S.7. 2.5-volt lamps were used for the dial lights, as these were connected across one half of the L.T. winding only and the voltage available was therefore only 2 volts. The grid leads to the three valves were then reconnected as no alterations were necessary to this part of the circuit.

A terminal, insulated from chassis, was then fixed in a convenient position and used for H.T. connections, or might quite easily have been the screen valve-leg of the output valve, as the screen of this stage is subjected to the full H.T. supply.

The anode of the H.F. pentode receives the full H.T. volts, while the potentiometer arrangement used for the screen voltage follows normal procedure, and is quite easily wired up. Note that the two 0.1 mfd. decoupling condensers should be of the tubular non-inductive variety.

The addition of the decoupling resistance and condenser in the anode lead to the detector valve was but a few moments' work, and the low-potential end of the two windings of the intervalve transformer were then taken direct to earth, instead of through the 450-ohm resistance to chassis.

The cathode of the output valve was quickly wired, using the existing 50-mfd. electrolytic condenser, and a new 150-ohm resistance; a lead was then taken from the anode to one side of the speaker output transformer, the other side of which was connected direct to the smoothed side of the L.S. field-winding.

## Excellent Results

A number of foreign programmes were received at full loudspeaker strength, a particularly good performance for a receiver which was designed and constructed some eight years ago.

Total cost of the complete conversion was between £4 and £4 10s., and when considering this cost, it must be remembered that the cost of a new set of battery valves, H.T. battery and L.T. accumulator would account for an expenditure of approximately £2 10s., so the extra power, quality of

	2 7-pin valveholders (Bulgin).
	1 8-mfd. electrolytic condenser (Dubilier).
	2 0.1 tubular condensers (Dubilier).
	1 10,000-ohm resistance (Bulgin $\frac{1}{2}$ -watt).
	1 20,000-ohm resistance (Bulgin 1-watt).
	1 30,000-ohm resistance (Bulgin 1-watt).
	1 150-ohm resistance (Bulgin 1-watt).
VALVES	1 W.42 (Marconi).
	1 AC/HL (Mazda).
	1 AC2/Pen (Mazda).
POWER PACK	1 Westinghouse Metal Rectifier style H.T.16 (Premier Supply Stores).
	1 Mains transformer or same with 4-volt c.t. L.T. winding (Premier Supply Stores).
	2 4-mfd. condensers (Dubilier BE. 355) (one block).
	1 8-mfd. electrolytic condenser (Dubilier).
	1 Thermal delay switch (Bulgin type S.100).

output, and lasting performance of the power pack were well worth the extra cost of less than £2.—W.A.F.

# IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, July 20th.—*The Pageant of Radio, in memory of Marconi, 1874-1937.*

Thursday, July 21st.—*The Dark Lady of the Sonnets, by George Bernard Shaw.*

Friday, July 22nd.—*Dance Band programme.*

Saturday, July 23rd.—*Commentaries on the Fourth Test Match, from Headingley, Leeds, and White City Athletics: Princeton and Cornell v. Oxford and Cambridge.*

**REGIONAL (342.1 m.)**

Wednesday, July 20th.—*Variety from the Argyle Theatre, Birkenhead.*

Thursday, July 21st.—*Dialect Spelling Bee, from Northern and Western.*

Friday, July 22nd.—*Reflections, a musical reminiscence.*

Saturday, July 23rd.—*Barnet's Folly, a Devonshire comedy by Jan Stewer.*

**MIDLAND (297.2 m.)**

Wednesday, July 20th.—*Songs I Like—2, Miriam Licette.*

Thursday, July 21st.—*Variety from the New Hippodrome Theatre, Coventry.*

Friday, July 22nd.—*Reflections, a musical reminiscence.*

Saturday, July 23rd.—*Folk Dance Party: a programme of English Country Dances.*

**WEST OF ENGLAND (285.7 m.)**

Wednesday, July 20th.—*How to Look at a Map, a talk.*

Thursday, July 21st.—*Week-end Away: The Blackdown Hills, a talk.*

Friday, July 22nd.—*Speedway: Bristol v. Harringay, a commentary on part of the match, from Knowle Stadium, Bristol.*

Saturday, July 23rd.—*Barnet's Folly, a Devonshire comedy by Jan Stewer.*

**WELSH (373.1 m.)**

Wednesday, July 20th.—*Christmas Evens, a dramatic programme.*

Thursday, July 21st.—*Llanidloes Children's Music Festival, from China Street Schoolroom, Llanidloes.*

Friday, July 22nd.—*The Haslerood Diamond, a play for the radio by Arthur Watkyn.*

Saturday, July 23rd.—*Dance Band programme from the Craigsidde Hotel Hydro, Llandudno.*

**NORTHERN (449.1 m.)**

Wednesday, July 20th.—*Music at Twilight, instrumental and vocal programme.*

Thursday, July 21st.—*Dialect Spelling Bee, from Northern and Western.*

Friday, July 22nd.—*Orchestra and organ in Handel organ concerto, from Manchester Town Hall.*

Saturday, July 23rd.—*Water Polo: England v. Scotland, a running commentary on part of the International Water Polo Match, from Roundhay Baths, Leeds.*

**SCOTTISH (391.1 m.)**

Wednesday, July 20th.—*Speeches at the Installation of Lord Tweedsmuir as Chancellor of the University, from the McEwan Hall, Edinburgh.*

Thursday, July 21st.—*Bon Accord, a studio variety entertainment.*

Friday, July 22nd.—*Orchestral programme, from the Concert Hall, the Empire Exhibition (Scotland).*

Saturday, July 23rd.—*Orchestral programme.*

**NORTHERN IRELAND (307.1 m.)**

Wednesday, July 20th.—*Band concert.*

Thursday, July 21st.—*Portrus's night, feature programme.*

Friday, July 22nd.—*A Hymn recital from St. Anne's Cathedral, Belfast.*

Saturday, July 23rd.—*Piping, fiddling and singing programme.*

## "EXHIBITION"

### A COMING TELEVISION PROGRAMME

It is interesting to note that although television cameras cannot travel to Glasgow, something of the spirit of the Glasgow Exhibition will, it is hoped, be captured in a special "Exhibition" programme to be televised in the afternoon on August 2nd and again in the evening on August 4th.

The Empire Exhibition at Glasgow is, in this programme, treated as the climax to the whole gamut of exhibitions since this form of public display began at the end of the eighteenth century. In a series of swift vignettes viewers will see how exhibitions have been staged since that first show of merchandize at the Castle of St. Cloud, Paris, just after the French Revolution, when an effort was made to interest the public in Sevres porcelain and Gobelin's tapestry.

Queen Victoria, Prince Albert, and an almost forgotten worthy, Paxton, designer of the Great Exhibition of 1851, will appear; from this it will be a short step to the great Exhibition of 1889, which saw the erection of the Eiffel Tower; then by easy stages viewers will arrive via Wembley, and the various international exhibitions to Glasgow, 1938.

Original methods of treating cold facts have been attempted by the authors, Reginald Beckwith and Andrew Cruickshank, both of whom are familiar with the television medium. For example, to make interesting some facts and figures concerning the Crystal Palace of 1851, the television camera will alight upon a bored school boy contemplating a bowl of goldfish. From time to time his attention is attracted by the voice of the lecturer until there comes a moment when miraculously the bowl of fish is transformed into the glass structure which amazed visitors to the Great Exhibition in Hyde Park.

Models and film will help to bring the Glasgow Exhibition to life on the television screen, and an attempt will be made to portray scenes at the Exhibition with a touch of Glaswegian comedy. "Exhibition" will be produced for television by Moultrie Kelsall, himself a native of Glasgow.

# A Novel Quality Receiver

*Details of an Unusual Three-valve Receiver for High-quality Reproduction*

WE have published several interesting circuits from time to time in these pages, and readers have submitted details of special receivers which they have built up. The accompanying circuit shows an arrangement which has been developed by Mr. Standford, of King's Lynn, and the design is very interesting from many points of view. This reader claims to be able to justify every component, both from its theoretical and practical point of view. The following are his comments regarding the components which he has incorporated in the completed receiver:

- (1) The speaker is the Magnavox Duode 33 (1,250 ohm field).
- (2) The best output transformer I have found to be the Sound Sales 036.
- (3) The smoothing choke may be any well-known make with an inductance of more than 10 henries and rated to carry 120 mA. In series with this choke there should be a resistance (to carry 120 mA) of such value that, added to the D.C. resistance of the choke, should total about

nearest point on a 16 S.W.G. aluminium chassis—a suitable size is 18in. by 12in. by 3½ in.

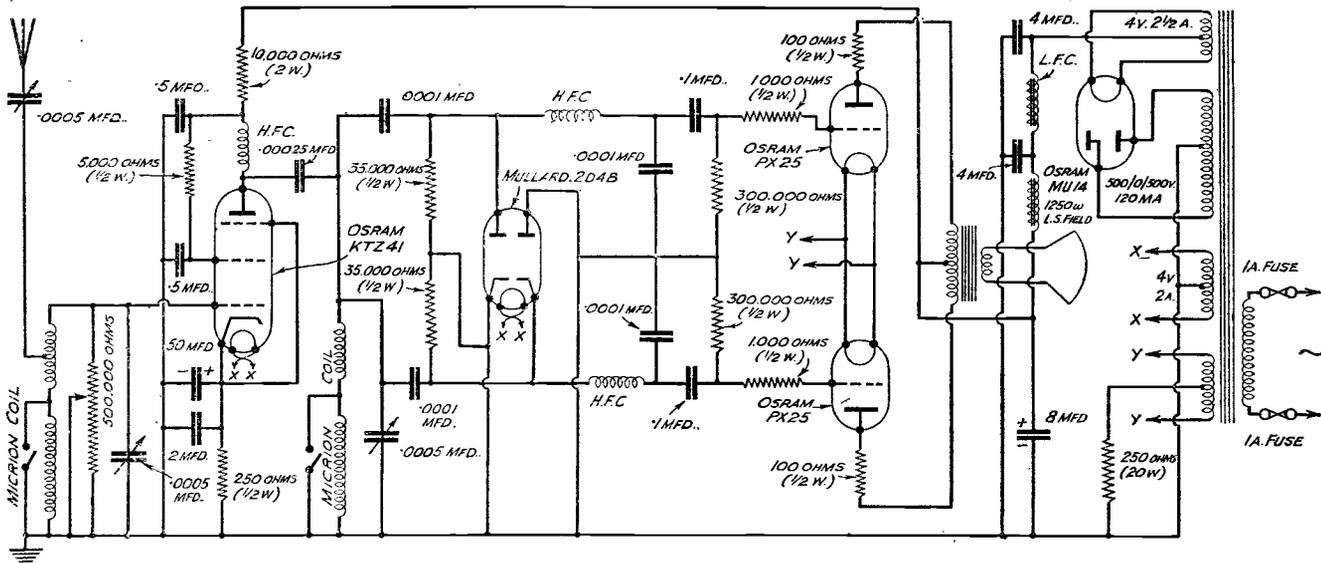
(10) I know of no substitute for the R.L. Micron coils in this circuit.

**Details**

There are a number of novel points in the circuit and it would be as well to enlarge upon them somewhat:

- (a) A variable series condenser in the aerial, when adjusted in conjunction with the parallel tuning condenser, gives subtle variations of selectivity and sensitivity. A two-gang tuning condenser is definitely not suitable for the two coils.
- (b) Only an Osram KTZ41 can give the large and flat output needed. It is not a valve intended for other than short-wave work, but in this circuit it is abundantly worth while. It does, however, get quite hot under working conditions, but this need occasion no alarm.
- (c) The push-pull diode detector circuit is used for the double purpose of greater sensitivity and greater output. The

and I experience no difficulty whatever on the grounds either of sensitivity or selectivity. Were I much nearer London I feel certain I could get all the extra selectivity needed (I could then afford to lose some sensitivity) by using a tapping on the intervalve coil, by reducing the intervalve coupling condenser from .00025 mfd. to .00005 mfd., and by using a fixed series aerial condenser of .00001 mfd. If this did not suffice, I would resort to band-pass (top-coupling) in the aerial input circuit but, frankly, I dislike the double-hump, whatever may be its width. However, this circuit is offered mainly for the benefit of readers similarly placed to myself—and of these there must be a large number. "The total consumption of the set is 111 mA and the mains current consumption approximately 100 watts, and I think I can safely assert that all causes of distortion (added L.F. stages, reaction, instability, non-linear H.F. output, non-linear rectification, and valve-developed harmonics) have been reduced to the barest possible minimum. Further, the signal-to-



Circuit of the novel quality receiver suggested by Mr. Standford.

400 ohms. A Sound Sales type H2512 choke, with no series resistance, is suitable.

(4) An indirectly-heated rectifier valve is essential. Departure from the Osram MU14 is not advisable.

(5) The common bias resistance for the output valves can well be a Bulgin wire-wound type.

(6) The critical condenser is the .00025 mfd. from the anode of the KTZ41 valve. Messrs. T.C.C. make a .00025 mfd. 1,500 volts working mica condenser, which is safe beyond all doubt and is not expensive.

(7) The three H.F. by-pass condensers (.5 mfd. + .5 mfd. + 2 mfd.) can be Dubilier non-inductive cylindrical aluminium types, LCG, LCG, and 9200.

(8) The H.F. chokes can be the Eddystone copper screened type.

(9) Screening need not be elaborate, and all earth returns can be direct to the

Mullard 2D4B is a splendid valve for this purpose. The load resistances of 35,000 ohms each are specially chosen to give the correct feeds to the output valves; and the rectification is practically perfect up to 90 per cent. modulation.

(d) The PX25 valves work at 325 volts anode minus 25 volts grid, and 50mA consumption each. Their output (combined) under these conditions is approximately 7 watts maximum undistorted. This is obtained with the 2D4B working under its maximum conditions in this circuit, and, conveniently, 7 watts is also the maximum acceptance of the Magnavox Duode 33 (1,250 ohms field) speaker.

Mr. Standford goes on to say: "I am here roughly 100 miles each from Droitwich and London Regional (the only two stations I personally want to listen to from the point of view of entertainment),

noise ratio is very great indeed, and transients are splendidly reproduced."

**NOW READY!**

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

*Edited by*

**F. J. CAMM**

2/6, or 2/10 by post from Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

# THE SIMPLEST ALL-WAVER

The Conversion of a Simple Single-valve Receiver into an All-wave Set is Described in this Article

THE "Simplest Short-wave Two," described in PRACTICAL AND AMATEUR WIRELESS dated April 3rd, 1937, and which first appeared as a single-valve receiver in the issue dated September 14th, 1935, has proved so popular that there are probably many readers who would like to try the experiment of converting it into an all-wave receiver. In order to do so we will confine our attention to the detector stage as the L.F. stage needs no alteration.

There are a number of arrangements which can produce satisfactory results. Roughly, the various methods can be classed under three types:

1. Arrangements in which a number of separate coils are used, and are brought into circuit, as required, by selector switches.

on the short waves, and also that a small fixed condenser should be placed in series with the main tuning condenser; this to be cut out automatically when not required on medium and long waves. Also, whatever form of switching was adopted, it was desirable to include automatic control of the L.T. current.

### Simple Switching

At first it seemed that the usual more or less complicated switching would be required, but after one or two experiments it was found possible to achieve all this by using a Bulgian 10-point 5-way rotary switch, No. S.153. As this switch also

Many readers will, no doubt, have all the material on hand, except the switch, therefore an alternative home-made one has been included which, if carefully made, will operate quite efficiently.

If the reader will now examine the theoretical and pictorial diagrams (Figs. 1 to 3) he will see that one end of the short-wave coil is permanently in circuit and all that is necessary is to join the other end to earth. Similarly, to tune in the medium waves we have simply to connect points 2 and 6 to earth. The L.T. and H.T. nega-

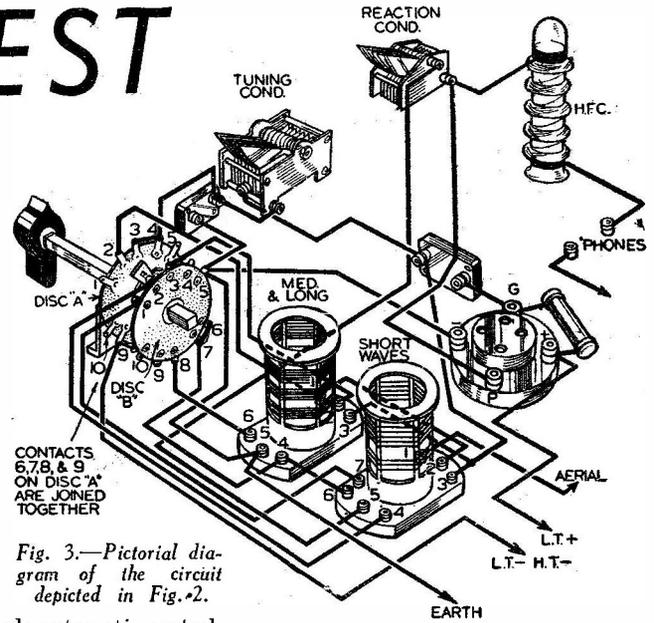


Fig. 3.—Pictorial diagram of the circuit depicted in Fig. 2.

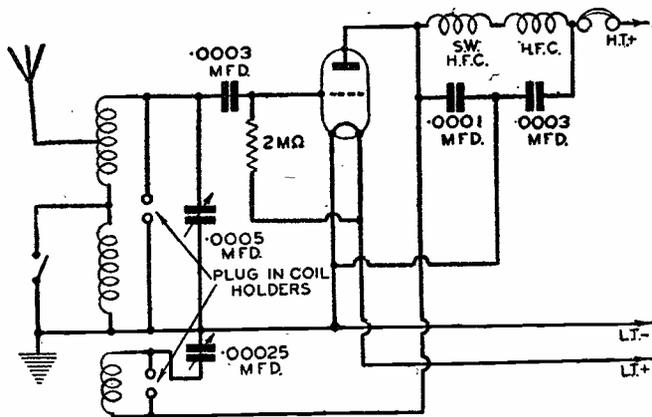


Fig. 1.—A simple scheme for an all-wave set. Plug-in coils may be added.

2. Triple-range coils, in which a number of coils are wound on one former and made to operate over at least three separate wavebands.

3. Plug-in coils, by means of which any waveband within certain limits may be covered.

There is, however, another arrangement which has received little attention, but which lends itself very well to amateur use. This arrangement is shown in Fig. 1. Here the set is a normal medium- and long-wave receiver, using a dual-range coil, while sockets are provided for plugging in coils to cover the short-wave ranges. To tune to the short waves the receiver was set for the medium waveband, and then the short-wave coil was plugged in. The medium- and short-wave coils were thus actually in parallel. This system appeared in PRACTICAL WIRELESS in November, 1933, and has been used in the circuit now to be described. Instead of plug-in coils, however, an on-off switch has been used, as being more suitable to present-day needs.

### Aperiodic Aerial Coupling

It was felt desirable that provision should be made for an aperiodic aerial coupling

controls L.T. current, the finished receiver has only three controls, viz., tuning condenser, reaction condenser, and switch.

tives are joined together, and as the switch is rotated, they, too, are joined to earth, thus completing the current circuit.

The rotary switch which has five positions has provision for two short-wave ranges.

1. Short-wave range
2. Short-wave range
3. Medium waves—also shorts out of circuit a small fixed condenser.
4. Long waves—also shorts out of circuit a small fixed condenser.
5. Off position—L.T. and H.T. negative disconnected.

### Components

The medium- and long-wave coil is a standard component, but it must have a separate aerial winding, while all the

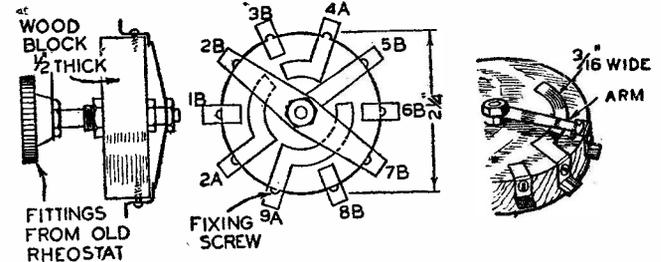


Fig. 4.—Details of the home-made switch.

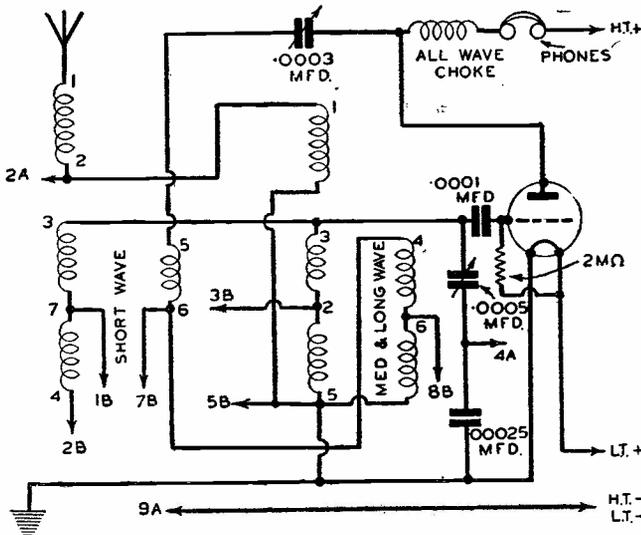


Fig. 2.—A comprehensive all-wave arrangement with self-contained switching.

(Continued on page 467.)

# ON YOUR WAVELENGTH



## "Communications" Receiver

I DO not know why it is that we must always borrow our technical terms from other countries, particularly English speaking countries, newer than our own. It is understandable in industries such as aviation and the motor car that we should use such words as hangar, fuselage, volplane, cabane, chauffeur, garage, and so on, because those industries were really born abroad.

In wireless, we are very fond of borrowing Americanisms and including them as part of our standard vocabulary. Such words as tweeter, woofer, toob, and so on, have been imported from America, and I am sorry to see that we are bagging their latest monstrosity "communications" as descriptive of a special type of high fidelity receiver. Apart from the paradox of the term "communications" receiver the word itself is non-descriptive of the particular features of the set. I cannot see any reason for its use, especially as there are so many dozens of other words which could be used. I therefore do not propose to use it.

## The Wireless Public

AT a recent meeting of the International Broadcasting Union it was mentioned that the total number of radio receivers, according to official licence statistics, in use throughout the world was nearly 87,500,000 at the end of 1937, and allowing an average of four for a family we arrive at the total of about 350,000,000 listeners. It is considered that of the total number of radio receivers 31,200,000 are in use in Europe, representing about 120,000,000 listeners. This sounds a lot, but when you remember that the entire population of the world could be accommodated in a box having one mile sides you will appreciate that the world is a very small place. It is impossible to imagine any individual who is not a listener, if we exclude the babes and sucklings and, of course, the crooners!

## Our Stand at the Exhibition

WILL readers please note that our Stand has been changed from No. 10 to No. 9. The change is one of digitation only for the site is the same as formerly. I am hopeful

## By Thermion

this year that I shall meet even more readers than I did last, and I hope also that someone will claim that guinea! It will be interesting to observe the result of doing away with the cabaret, and whether the inclusion of a piano section will give a fillip to that industry. Considering that radio has so badly affected the sale of pianos, and that at the Exhibition they will be sold side by side in competition with radio sets, it would indeed seem that the lion is lying down with the lamb. The piano is still the most perfect instrument; self-contained and the only one upon which you can obtain orchestral effect. It seems such a pity that so few people now learn to play the piano.

## Another Lucerne Play

THE International Broadcasting Union has just concluded its summer meeting at Ouchy, Lausanne. These meetings, which took place under the presidency of Monsieur Antoine Dubois (Director of Nozema, Holland), were attended by sixty-six delegates representing the broadcasting services of twenty-three European countries, three American chains, Porto Rico and the Dutch East Indies, and the observers of ten European Postal - Telegraph administrations; by the Japanese Postal-Telegraph administration, the Bureau of the International Telecommunications Union at Berne, the International Institute of Intellectual Cooperation and by the Section of Communications and Transit of the League of Nations.

In the course of the meeting the Greek broadcasting service and the Spanish Republican broadcasting service were elected active members of the I.B.U. In addition the following associate members were elected: the Argentine Government station LRA of Buenos Aires; the broad-

casting service of the Department for Press and Propaganda attached to the Mexican Foreign Office and the Mutual Broadcasting System (United States). The broadcasting service of General Franco's administration was admitted as a special member.

The meetings had a particular importance owing to the fact that the World Telecommunications Conference, which was held in Cairo last spring, had invited them to draft the basis of a plan for revising the wavelengths for European broadcasting with a view to a conference of P.T.T. administrations to be held in Switzerland next year. Preliminary discussions to this end took place in the Technical Committee in regard to certain fundamental points of this plan which will be definitely elaborated by the I.B.U. during its Brussels meeting next October.

The agenda of the Technical Committee, under the presidency of Monsieur Raymond Brailard, Director of the Brussels Checking Centre, included the preparation for the European Broadcasting Conference to be held next February in Switzerland with a view to revising the plan of Lucerne which at present controls the allocation of waves to European broadcasting stations.

As regards broadcasting on short waves, the President of the Technical Committee was asked by the Council, following the wish expressed by the Cairo Conference, to draw up a memorandum containing all useful information regarding the present aspect of the question, with a view to a possible world conference on short-wave broadcasting.

The Technical Committee has informed the Council of the results of its studies concerning certain acoustical questions and in particular the revision of the Vienna Convention standardising the pitch of the note "Ja," used internationally as a tuning note for orchestras, and suggests for this purpose that a new conference should meet as soon as possible in co-operation with the International Acoustical Committee.

The Technical Committee has studied certain questions in connection with telephone lines intended for the transmission of broadcast programmes and those of television and has submitted its proposals to the

International Consultative Telephonic Committee which has been asked by the administrations to study these problems.

Finally, it has noted the report of the Director of the Checking Centres indicating the excellent effect of the transfer of the service to the new building specially built at Brussels, which will enable it to increase its efficiency for checking, on an international basis, broadcast transmissions, a work which it has carried on for the last eleven years.

The question of the unauthorised recording of broadcast transmissions with a view to selling such recordings to the public—a practice which has unhappily developed in certain countries where the legislation does not seem able to check it—was the object of considerable study. The various possibilities of obtaining international protection for broadcast transmissions against any unauthorised recording were examined and measures were immediately taken to organise a campaign against such utilisation of transmissions.

#### Jubilee

ON Saturday, July 23rd, will be celebrated the 50th anniversary of the Pneumatic Tyre invention, for it was on that date in 1888 that Dunlop filed his famous specification. Those who lived in the early days of air tyres did not realise that they were living through history, any more than we realise that we are living through radio history. Amazing inventions sneak up on us, and we don't realise their significance. I suppose that it takes a few decades to mellow a thing; some of us look back on the early days of radio with feelings of veneration. We like to refer to them as the good old days, forgetful that at the time we probably considered them very bad days. I suppose that it is a sign of old age to presume that things are not so good as they were, when as a matter of fact they are progressing all the time. Much as we may criticise modern radio, it is superlatively better than the radio of 1922 vintage. It is of little avail to live in the past. It looks very picturesque to see a stage coach on the roads to-day, but business would be impossible without the Underground, the bus, motor-cars and trains. It may be nice to think of Shakespeare's Open Air Theatres, but we all enjoy the covered comfort of the modern theatre. We like to look back upon our early days in radio, but we must all admit that we prefer 2-volt valves to 6-volt, a wide choice of programme instead of only one

## Notes from the Test Bench

### Chassis Connections

**D**IFFICULTY seems still to be obtained in making satisfactory earth contacts on a metal chassis. Quite a number of receivers which fail to give good performance are eventually found to be faulty simply because of poor earth contacts. A very good plan to avoid this trouble is to make only a few common earth points, using a holding-down bolt for a component as the anchoring point. If aluminium is employed for the chassis a burr should be left when the hole is drilled and the tag should be placed immediately on this—that is, without washers or any other metal between chassis and tag. Then, when the lock-nut is tightened up the metal will spread, the sharp points will penetrate the tag and a sound contact will be obtained. If possible, one such point should be provided for each stage, and all earth connections should then be taken to the appropriate tag.

### Earthed Spindles

**A** CASE was recently experienced where a constructor had substituted a volume control of alternative make and had ruined three valves. The reason was that the spindle in the specified component was insulated from the component and was, in an electrical sense, "dead." Certain volume controls and potentiometers now on the market have the spindle "live"—that is, the moving arm is in direct electrical contact with the spindle and mounting bush, and accordingly, if it is mounted on a metal panel which is earthed there is a risk of damage, or at the very least the component will be shorted and will not function. This point should, therefore, be borne in mind when mounting any control of the type mentioned on a metal panel.

### Modifying Coils

**I**N an endeavour to modify the tuning range of a coil a constructor connected various fixed condensers in parallel and series, with complicated switching. Such a scheme is not advisable, as maximum signal strength is obtained with a definite L/C ratio and in most cases it will be found preferable to remove turns to enable a tuning range to be lowered, or to add turns to enable it to be raised. On the medium and short waves it will be found in most cases that maximum volume is obtained with the minimum parallel capacity and thus the inductance should be as large as possible for the wave-range which it is desired to cover.

or two. It may have been exciting in those days to wait for Writtle's weekly half-hour programmes, and we may like to talk of 2MT. It may impress the more youthful hand, and perhaps our knowledge of those early days makes us better judges, even if more critical. There is only one thing which was better in those days—we did not have to suffer crooners with diseased throats, raving lunatic band conductors, jazz and spelling bees. By means of radio we have no doubt learned how the other half lives. The experience, however, has not been altogether pleasant. The Yankee method of pronunciation, and the gross liberties they take with our language, hurt the English ear. Notwithstanding all this, radio is vastly better to-day and it will be still better 20 years hence.

### Car Radio

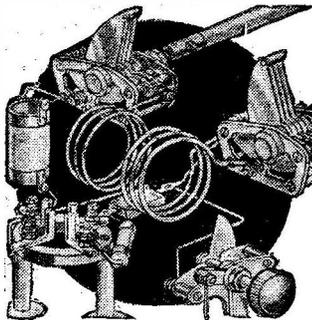
**A** QUERY I frequently receive relates to licences for car radios. If the car radio is installed in the car you require an extra receiving licence. If it is a portable receiver which may be removed from the car you do not require another licence. Thus it would seem that car radios are subject to a 10s. tax. Personally, I think that it is wrong, and is operating against the popularity of car radio.

### Another Listeners' Vote

**C**ARRYING its researches a stage further, the B.B.C. is now inviting listeners to name the kinds of programmes they like and to answer some questions about summer listening habits.

The questions are set out on a special form which will be sent to every listener who applies for it; all that is needed to secure it being a postcard bearing the listener's name and address and the number of forms required. Listeners willing to help the B.B.C. in this fresh effort to discover what listeners want are asked to address their postcards to the B.B.C., Broadcasting House, London, W.1, and to write the word "Questions" in the bottom left-hand corner.

On one side of the coloured forms which will be sent to all applicants is a list of twenty-one types of programme, ranging from orchestral music to running commentaries on cricket, and listeners are asked to put a cross against the kinds of programme they like. Alongside is a big space for listeners' remarks. On the other side of the form are three questions about summer listening and a special question for those who like serious opera.



# Short Wave Section

## SIMPLE 5-METRE CIRCUITS

Details for the Construction of a Simple Under-10-metre Receiver or Adapter, with Instructions for Making the Coils and H.F. Choke.

It appears that comparatively few experimenters yet take a really active interest in the wavelengths below 10 metres. One reason is that they are not at all sure that there is anything worth while to listen to, another is that the fact that television receivers are of a rather complicated nature leads them to believe that an ultra-short-wave receiver of any type must be similarly involved, and another is that they are under the impression that a suitable set for reception must be expensive.

All of these are fallacies. Many amateur transmitters in all parts of the country regularly work on the 60 megacycle (5-metre) band; if you do not believe this, just listen to some of them on 20 and 40 metres on Sunday mornings, when you will frequently hear them discussing 5-metre work and telling each other when next they are to carry out tests on the ultra-high frequencies. It is true that the range of reception is usually limited to the so-called optical range, but that gives added interest to any "freak" reception over greater distances and adds a little more of the "spice" with which S.W. work abounds.

### Simplest Circuit

The complication of a television receiver is largely due to the fact that it consists of two sets in one—one for sound, the other for vision—as well as powerful amplifiers and the time-base; the two last mentioned are frequently far more involved than all the rest of the outfit. It is a fact that a very simple type of receiver is capable of providing extremely interesting results, especially if a little care is taken to keep the design "clean" and to find the most effective aerial system. For example, a super-simple circuit such as that shown in Fig. 1 is perfectly satisfactory in normal conditions, whether it is used as a single-valve receiver or as an adapter in conjunction with an amplifier or existing receiver. When used with a receiver it can be connected to the pick-up terminals if the pick-up bias voltage is cut down to zero.

It will be seen that a three-turn aerial winding is used, and this should, for preference, be connected to a dipole or doublet aerial. Alternatively, the lower end can be connected to earth and a normal aerial (better still a short-wave aerial) joined to the upper end through a neutralising condenser or an air-dielectric trimmer. The grid coil is a five-turn component with centre tapping joined to the earth line. The full coil is tuned by means of a good-quality tuning condenser with a maximum capacity of between 20 and 50 mmfds., and fitted with a good slow-motion drive. Reaction is controlled by means of a similar variable condenser, but preferably with a maximum capacity of not less than 45 mmfds., and also fitted with some form of slow-motion control.

### Output Feed

The H.F. choke should be of the special ultra-short-wave pattern, and details of

construction will be given later, as also will particulars of the coil. Other components are standard. Although resistance-capacity output feed is shown, this is not essential, but it is desirable, because it helps to isolate the phones or amplifier from the anode circuit of the U.S.W. unit. Another method of feeding phones is shown in Fig. 3, where it will be seen that a standard de-

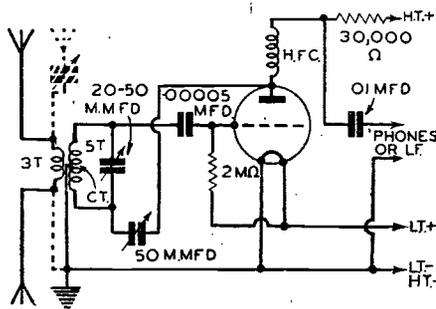


Fig. 1.—Theoretical circuit diagram of a super-simple single-valve short-wave receiver.

coupling circuit is employed to prevent instability.

### Baseboard Construction

Component layout is more important than the actual circuit, but this is perfectly straightforward, and the only precaution to be taken is that all leads are short and direct, and that everything is rigid; it will be appreciated that slight vibration of wires or coil turns can easily cause "tuning flutter" to such an extent that reception is impossible. The parts can well be placed on a small wooden baseboard as suggested in Fig. 2. If the coils are wound on paxolin tubes and do not require a connector base,

the ends can be attached directly to the terminals of the tuning condenser. If they are of the type requiring connecting sockets, the sockets should be mounted on small pillars or wooden blocks so that they are as near as possible to the condenser terminals.

There are plenty of ready-made coils available in various types, and any is suitable for this circuit. If they are to be home-made it is best to use 16- or 18-gauge bare tinned copper wire, winding this as tightly as possible on paxolin tubes about  $\frac{5}{16}$  in. in diameter. The turns should be spaced about  $\frac{3}{16}$  in., and it will usually be found best to anchor the ends by means of metal clips pushed through the tubing or by tying with thinner wire passed through holes in the tube.

When using this form of construction, the principal difficulty is to prevent the turns from springing open. For this reason it is often better to wind the wire on a  $\frac{1}{8}$  in. rod, allowing the coil to spring back to roughly  $\frac{5}{16}$  in. in diameter, and then to clamp them by means of a couple of fibre or ebonite strips, notched to receive the turns and held together at the ends with short bolts and nuts.

### Silver-plated Coils

The best form of coil is that made from silver-plated copper tubing. This is perfectly rigid, whether the ends are fitted to a two-pin plug or to a seatite base with soldering tags. In either case it is a simple matter to ensure that the connections are short. In addition to the slightly greater efficiency of the silver-plated tubing over solid wire there is the further advantage, when the coils are of the plug-in type, that they can easily be interchanged to cover two or three wavelength ranges between, say, 4 and 10 metres. If desired, they can, in fact, be replaced by coils wound to tune to the normal short-wave bands.

### H.F. Choke

If it is desired to make the H.F. choke, this can be done quite easily by winding about 40 turns of 30-gauge enamelled wire on a paxolin or glass tube from  $\frac{1}{4}$  in. to  $\frac{3}{16}$  in. in diameter. Arrange the winding in four

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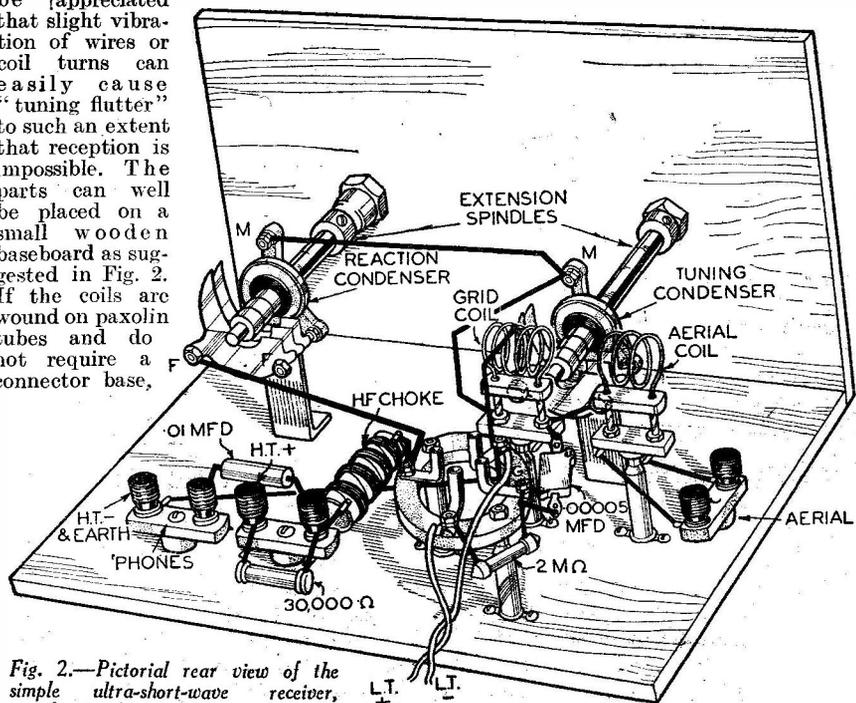


Fig. 2.—Pictorial rear view of the simple ultra-short-wave receiver, showing layout of components.

(Continued from previous page)

sections of five turns each, spacing these about  $\frac{1}{8}$  in. apart. The spacing is to reduce the capacity as much as possible.

The ends of the winding can be brought out to small terminals fitted to the ends of the tube, although it is rather better to use soldering tags held in place with small rivets. The ends of the winding can be soldered to the rivet heads, connecting leads being soldered to the tags. This method of making connections is preferred because of the lower capacity provided when the choke is fairly near to other components, particularly those in the grid circuit. It will be understood that terminals, being of greater surface area, can form a condenser of greater capacity than tags.

### Tapping the Coil

It will be seen from the circuit that a tapping is made to the centre of the grid coil, and this should be made by soldering a length of stout-gauge copper wire or tinned-copper wire to the middle of the winding. Take reasonable care to make the connection exactly in the centre, because this position is most satisfactory; it is scarcely necessary to emphasise that an error of  $\frac{1}{8}$  in. in finding the centre is fairly appreciable in a winding only about 10 ins. long.

The valve may be of almost any type, but an H.L. or L type is as good as any. It should be fitted in a good short-wave valveholder which may be mounted on insulating

pillars, which are made in various lengths by manufacturers of short-wave components such as Eddystone, B.T.S. and Bulgin. The insulators cost only a few pence each, and are better than wooden supports for both the valveholder and the coils.

### Suitable Aerials

Despite the fact that almost any type of reasonably efficient aerial can be used, it

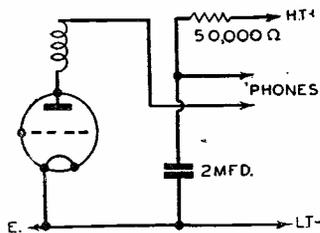


Fig. 3.—Showing an alternative method of feeding the phones.

is certainly worth while to experiment with a few simple patterns with a view to finding that which is most suitable in the particular circumstances and location. A doublet with 8ft. arms and cross-feeder type of lead-in is generally as efficient as any, and can be erected horizontally, vertically or at an angle. It is still better to use a couple of 8ft. copper tubes clamped

between two blocks of teak, or to use one of the various 5-metre aerials of this type which can be bought ready for erection.

### Directional Effects

One important advantage of this type of aerial is that it can be mounted on a short pole or clothes-prop in such a manner that it can easily be turned to different angles. It is often found that useful directional effects can be put to good use by orientating the aerial in this way, and it will nearly always be found that optimum signal strength from one particular transmitter is obtained with the aerial in one, fairly critical, position. Those who are fortunate enough to be within about 25 miles of Alexandra Palace can make some interesting tests by using the transmissions from there as "test signals," since they are of sensibly uniform strength.

Even when using a doublet aerial it will be found worth while to try it in a few different positions. In all cases it should, of course, be as far away from walls and trees as convenient, whilst it is wise to keep it as far as possible away from main motor roads; the ignition system of cars and heavy motor vehicles are powerful "transmitters" on the ultra-short waves.

Apart from a superhet the super-regenerative circuit is probably the most efficient on the ultra-short waves, but this is rather more expensive to build and is not as convenient for the newcomer to 5-metre work as that described.

## Leaves from a Short-wave Log

### Vatican City on Various Channels

HVJ, Vatican City (Italy), is trying out new frequencies. On weekdays a broadcast is still regularly made on 19.84 m. (15.12 mc/s) between G.M.T. 15.30-15.45. From 19.00-19.15, the 50.26 m. (5.968 mc/s) channel has been abandoned in favour of 49.75 m. (6.03 mc/s). On Sunday morning at G.M.T. 10.00 religious music and an English talk are now given on 31.41 m. (9.55 mc/s).

### Hawaii Calls

A SPECIAL broadcast made through KKP, Kahuku, on 18.71 m. (16.03 mc/s), each Monday morning from G.M.T. 01.30, has been made a regular feature for relay through the Columbia Broadcasting System network throughout the U.S.A.

### Albania on Short Waves?

It is reported that a 3.5-kilowatt transmitter is to be installed in the vicinity of Tirana. So far, Albania has not possessed a broadcasting service.

### Better Signals from Brazil

ALTHOUGH sharing the same channel as COCO, Havana (Cuba), in the earlier evening hours, namely, from G.M.T. 21.40, the radio programme provided by the Radio Club of Pernambuco can be heard at good volume through PRA8, Recife (Brazil) on 49.92 m. (6.01 mc/s). Identification of the broadcast is facilitated by the five bell-like notes struck at intervals. The power of the transmitter is now 5 kilowatts.

### Listen to South Africa

ZRJ, Johannesburg, on 49.2 m. (6.097 mc/s), now works daily from G.M.T. 04.45-16.30 with programmes both in English and Afrikaans (Cape Dutch). The 7-kilowatt Pretoria station ZRH, at Roberts Heights, for its broadcast from G.M.T. 04.45-12.30 uses the 31.5 m. (9.523 mc/s) channel, changing over to 49.94 m. (6 mc/s) for the evening session from G.M.T. 15.00-21.00. ZRK, Cape Town, of which the 7-kW transmitter is at Klipheuvel, the centre of the Wireless Telegraphy and Telephony system of the Union of South Africa, is on the air on 31.23 m. (9.6 mc/s) from G.M.T. 04.45-16.45, and again on 49.2 m. (6.1 mc/s) from 17.00-21.00, with programmes alternately in English and Cape Dutch. Finally, ZRD, Durban, on 48.8 m. (6.15 mc/s), operates from G.M.T. 04.45-05.45; 08.30-12.30, and 14.00-20.45 or 21.00 on weekdays, and on Sundays from 13.00-16.30 and 17.00-20.00. Although only rated at 10 watts the broadcasts have been heard in Great Britain. Small experimental stations are also operated at Salisbury and Mafeking.

### The 61-Metre Band

THE short-wave band over 60 metres has become an interesting one for DX searchers inasmuch as to this position a number of South American short-wave stations have recently moved whilst seizing the opportunity to increase their power. A recent sitting provided many additions to the log. HJ3ABH, Bogota (Colombia), on 61.22 m. (4.9 mc/s), *La Voz de la Victoria*, may be identified by its three chimes reminiscent of the N.B.C. (U.S.A.). The studio closes down towards G.M.T. 03.00 with Schumann's *Träumerei*. On 61.35 m. (4.89 mc/s) will be found the new 5-kW station YV1RX, Maracaibo (Venezuela), and on 61.48 m. (4.88 mc/s) another 5-kilowatt, HJ4ABP, Medellin (Colombia), *Emisora Philco*, now moved up from 48.9 m. (6.135 mc/s). The recently constructed HJ3ABO, Bogota (Col.), is also testing on 61.6 m. (4.87 mc/s). HJ1ABE, Cartagena (Col.), with its bugle call and rendering of a Sousa march every hour, remains a regular signal on 61.73 m. (4.86 mc/s), whilst HJ3ABD, Bogota, calling *Columbia Broadcasting*, may be picked up on almost any night on 61.9 m. (4.84 mc/s). On 62.11 m. (4.83 mc/s) HJ1ABD, *Ondas de la Heroica*, has been identified by an announced address: Apartado Postal, 252, Cartagena (Colombia). HJ7ABD, Bucaramanga (Col.), previously logged on 51.17 m. (5.853 mc/s), now appears to be testing on 62.24 m. (4.82 mc/s). This studio gives a bugle call followed by a series of chimes. Slightly above, on 62.37 m. (4.81 mc/s), HJ2ABA, Tunja (Col.), has also been logged with its slogan: *Ecos de Boyaca*. Transmission times announced corresponded to G.M.T. 18.00-19.00 and 00.30-02.30. Power is 5 kilowatts.

HJ2ABC, Cucuta (Col.), moved up from 31.34 m. (9.572 mc/s), is now firmly established on 62.63 m. (4.799 mc/s). Interval signal: 5 notes (C, D, E, F, C). Has been heard working to G.M.T. 03.30.

And, finally, HJ1ABB, Barranquilla (Col.), with its three deep gong tone notes, is now on 62.75 m. (4.78 mc/s).

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

Edited by F. J. CAMM.

2/6, or 2/10 by post from Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

A PAGE OF PRACTICAL HINTS

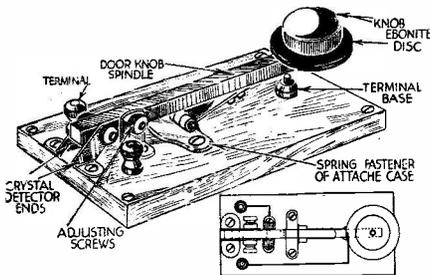
**SUBMIT YOUR IDEA**

**READERS WRINKLES**

**THE HALF-GUINEA PAGE**

**A Simple Morse Key**

I HAVE often desired an efficient morse key, but was unable to afford to buy one. However, I have managed to construct one for myself.



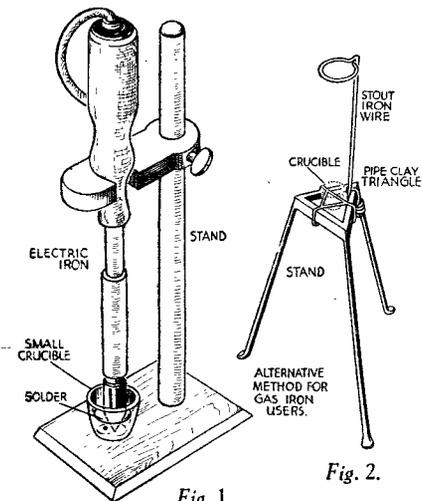
A simple but efficient morse key.

The accompanying sketch clearly shows the required necessities. The baseboard is made of an old crystal tuning coil, with spring of a disused attaché-case fastener, and the bar is a door knob spindle.—DAVID JONES (N.W.6).

**Keeping Soldering Irons Tinned**

ELECTRIC soldering irons sometimes get a little too hot, and the solder on the iron becomes covered with a coating of oxide. This nearly always happens when the iron is left for a short while, so to prevent this I kept the copper bit immersed in solder. How this was done is illustrated in Fig. 1, and the tinned part of the bit is thus kept covered with the molten solder, and remains well tinned.

Before I used an electric iron I heated my old bit with the point in the solder. This was done by heating the crucible in which the bit was resting. The crucible is a narrow one, to avoid wasting the heat.



A novel method of keeping soldering irons tinned while in use.

**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**

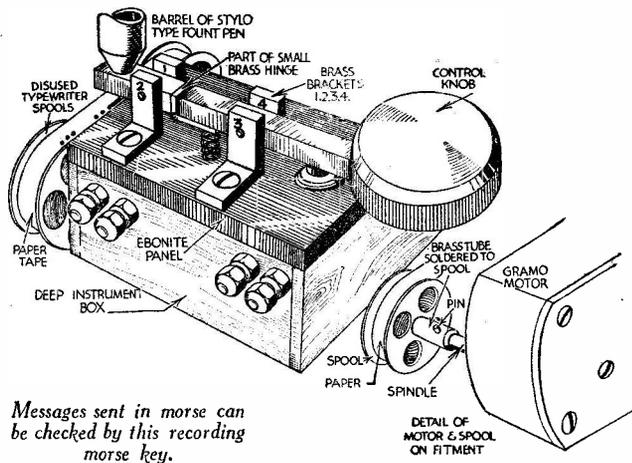
All wrinkles in future must be accompanied by the coupon cut from page iii of cover.

The crucible is held in place by a pipe-clay triangle (Fig. 2). A piece of thick wire is twisted round the iron support with the loop for holding the handle of the iron. I heated the crucible with a blow lamp, but any convenient source of heat is suitable. This method also keeps the iron nicely tinned. The crucibles can be obtained from any chemist.—J. A. PAYTON (Oundle).

**A Recording Morse Key**

I RECENTLY made the morse key illustrated, and I thought that the use of a record for checking the message sent would be helpful. I managed this by using a gramophone motor, two disused spools from a typewriter, and a stylo fountain pen. The contact bar was cut, and a small hinge soldered to each end giving the play necessary for the movement.

Two extra brackets (1 and 2) were screwed into position, and the pen fitted. The spools of paper are kept continually moving by the gramophone motor, and the paper is kept in close contact with the pen by two round pegs driven in the side of the box. By pasting the paper tape to the sheet of paper I have a record of progress.—A. WARD (Edgware).



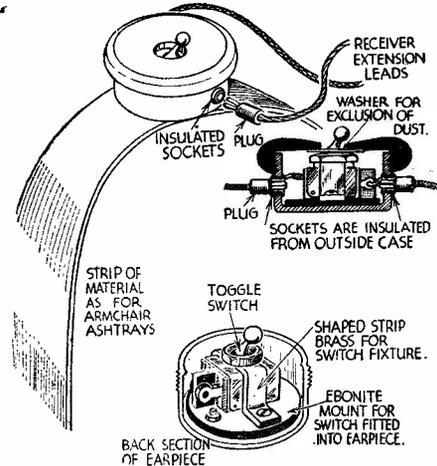
Messages sent in morse can be checked by this recording morse key.

**An Extension Switch**

A DETACHABLE switch and mounting were made for extension purposes in the following way. An earphone was dismantled, and the case only used, the coils, etc., being put on one side for future use.

A piece of ebonite is cut to fit into the base of the earpiece, and a toggle switch is fitted to it by means of a piece of brass

bent to shape, as shown. The whole is dropped into the casing and bolted into place, soldered connections being made to



A handy switch arrangement for extension purposes.

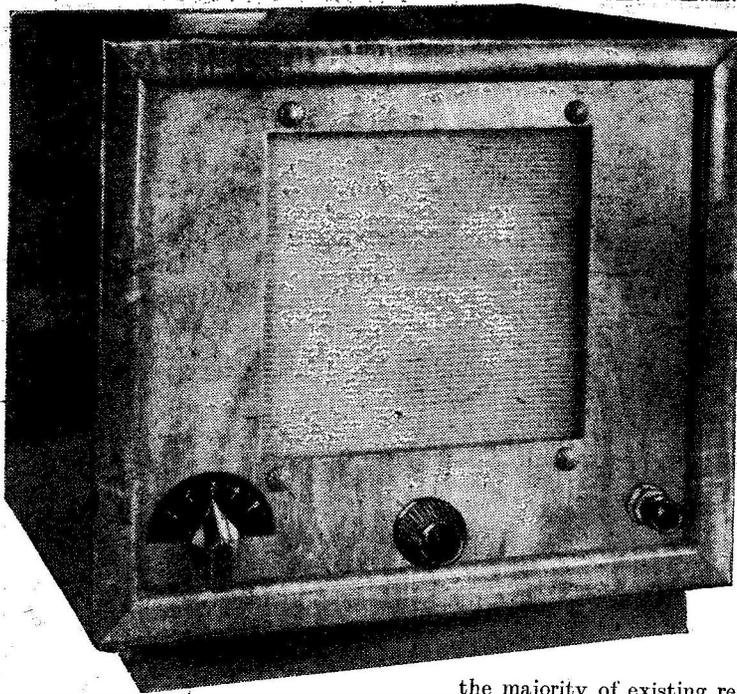
insulated sockets in the side of the case, and plugs attached to extension leads. A thin washer can be placed over the dolly of the switch to prevent dust, etc., getting inside. The finished switch and mount is fastened to a piece of leatherette in the manner of armchair ashtrays, and enam-

elled to match the colour scheme of the furniture.—W. EMERSON (Huddersfield).

**EVERYMAN'S WIRELESS BOOK**

By F. J. CAMM

3/6 or 4/- by post from Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2



# AUTO-TUNING

Suggestions for Conversion  
Selection of a Few Stations

the only additional panel device. The set is switched on and off by the right-hand control and the appropriate station selected by a ganged rotary switch of the Bulgin S.154 type.

Fig. 1.—A simple automatic receiver in which station selection is carried out by means of a rotary switch.

## Circuit Arrangements

To make the use of these switches perfectly clear we show in Fig. 2 to 7 the method of use, and in each case it should be noted that a switch or a contact for "manual" control may be provided so that the normal tuning condenser may be retained for normal operation. In Fig. 2, two ordinary on-off switches are shown, the one marked "M" being used for manual operation, or in other words switching in

THIS season's commercial receivers will feature mainly the push-button or dial method of tuning, and will consequently appeal to the non-technical members of the family. The idea is not new, as we have already explained, but the housewife who is at home all day will undoubtedly find that a receiver in which the operation of a switch or a button selects a station, without the problem of finding the right spot on the dial, is not only a time-saver, but also an advantage. Many housewives fail to use the standard domestic receiver as often as they would prefer, simply because they are rather confused

the majority of existing receivers so that the advantages of automatic tuning may be incorporated, and although it is obviously impossible in a single article to explain how every individual receiver may be modified, the following instructions will serve to indicate the lines of procedure, and from them it should be possible to make the adjustments to most standard receivers.

## Buttons or Switches

The manufacturers are not yet able to supply complete push-button units which may be built into a receiver, but as soon as they become generally available they will be described in these pages. Consequently, the constructor must make use of switches for station selection, and whilst these will operate in just the same manner they have the disadvantage that when a change of station is needed the switch in use will have to be returned to its original position before the new switch is operated. This is the only drawback to the use of standard toggle switches. It is not a difficult matter to follow this point, however, as should a new switch be operated without the former one being set back the station will not be received and a glance will show that more than one switch is in the "On" position. For a simple receiver the ordinary on-off or two-point switch may be used, and naturally with such a receiver only two or three stations will be heard. With a more ambitious receiver, where about half-a-dozen stations or more can be tuned in, more than one tuning circuit will be in use, and thus multi-point switches will have to be used. Bulgin four-point toggle switches, type S.88, will enable four circuits to be switched, but care will have to be taken to avoid interaction where an H.F. and Detector stage is controlled on one switch.

Where three or more circuits are to be operated, or where the risk of interaction is to be avoided without modifying the wiring, the multi-contact rotary type of switch should be employed and this will actually enable a neat automatic receiver to be built up on the lines of that illustrated in Fig. 1. This is a five-station set of the superhet type, with a volume control as

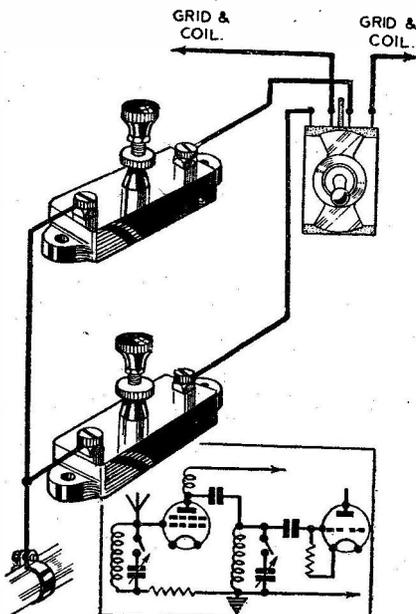


Fig. 2—A simple scheme in which ordinary on/off switches are employed. Only two are shown, but any number may be used.

by the number of controls, or are uncertain just how to set the tuning indicator. Fortunately, it is a simple matter to modify

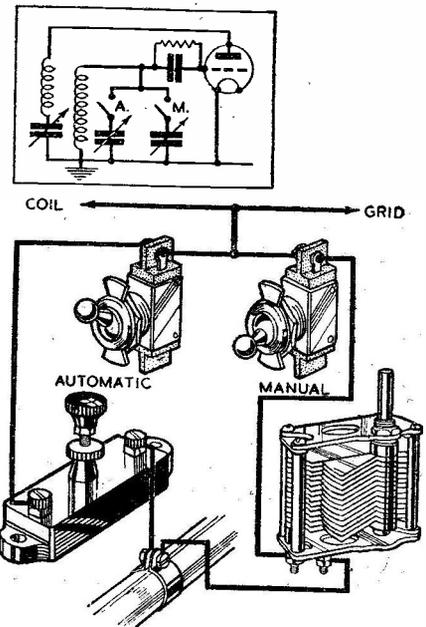


Fig. 3—For tuning more than one circuit, combination switches of this type may be employed.

the ordinary variable condenser. This is a simple detector circuit and the reaction control would be brought out as a panel control merely to increase the strength of a weak station should it be required. The second switch brings into circuit an ordinary pre-set condenser with a maximum capacity of .0005mfd. or .0003 mfd., and this should be adjusted to one of the stations it is required to hear. The lock-nut attached to the adjusting screw of the pre-set should be tightened when the station is accurately tuned, so that it will not move and upset the adjustment. A similar pre-set and associated switch should be provided for each station which can be obtained, and all the switches may be placed in a neat row on a small bakelite or ebonite panel inset into the cabinet on the lines shown in the cover illustration this week. If desired, to simplify matters the manual control switch may be placed apart so that it will not be overlooked when it is desired to change from manual to automatic.

# FOR AMATEURS

## Existing Receivers for the Automatic By W. J. DELANEY

### Switching Several Circuits

In Fig. 3 a two-circuit device is indicated, and the Bulgin S.88 switch is shown here. Although the two pre-sets for each station are here shown in a line they may, of course, be placed anywhere on the chassis, preferably close to the coils which they tune, and the leads run by the most direct route to each condenser. Some

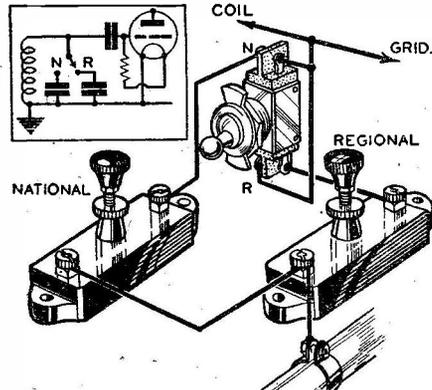


Fig. 4—A change-over switch to bring in the required pre-set.

shielding may be found necessary, but where possible it should be avoided as it will raise the capacity and in some cases may prevent the condenser from tuning low enough to obtain the required station. A similar scheme to this may be employed in a simple superhet, which will require two or three tuned circuits, but in this case the oscillator

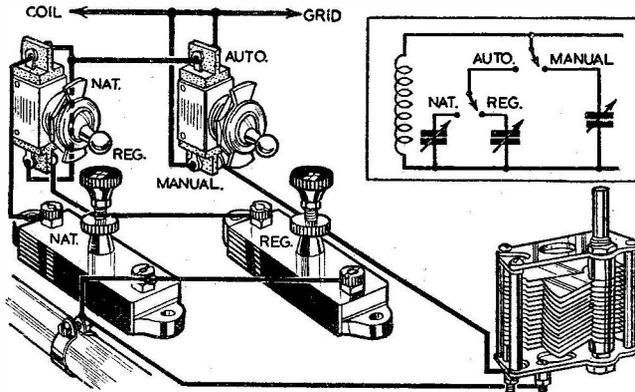


Fig. 5—A change-over switch to bring in auto or manual tuning.

tuning condenser must be carefully placed as it must not be capable of interaction with the remaining circuits.

### Change-over Switch

It may be thought desirable in some districts merely to provide two stations for normal use, say, the National and Regional. In this case the matter is simplified and a simple single switch of the change-over type may be employed. In Fig. 4 is seen how such a switch should be wired for a simple circuit of the type indicated in Fig. 2, one pre-set being connected to each pole of the switch. In this case, of course, manual control is not available unless a separate on/off switch is used to bring into action the change-over switch, and this could be effected by a separate switch as shown in Fig. 5.

### Plug and Socket

There is a further scheme which will avoid the necessity for returning a switch when a change is desired, and which will

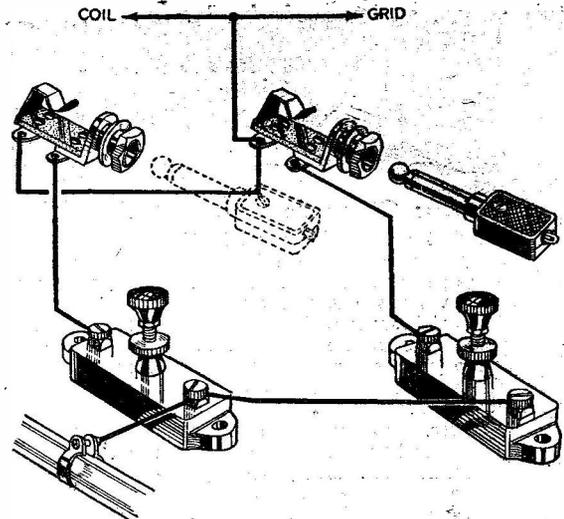


Fig. 6—Using jacks and a plug instead of switches. This scheme may be used to prevent unauthorised use of the set.

ensure that all difficulties are removed. This consists of the plug-and-socket method of connection, and is illustrated in Fig. 6. For this ordinary single-circuit jacks are needed and these cost slightly less than the ordinary toggle switches. Used in conjunction with them is an ordinary jack plug and this should be provided with a short-circuiting wire, and the jacks should, of course, be arranged in a row fairly close together as in the case of the switches. One contact on each jack should be joined to a condenser and the frames of each jack connected to earth. For manual control a separate jack may be provided and wired as shown in Fig. 7. The jack may be left in any plug, according to the station being received, and if it is desired to safeguard it against loss two short lengths of flex may be attached in place of the shorting wire and these may be anchored inside the receiver at a shorting strip of metal.

In view of the fact that the pre-set may work out of adjustment due to vibration or atmospheric conditions, a good plan is to mount all the condensers on a strip in such a position that the adjusting screw

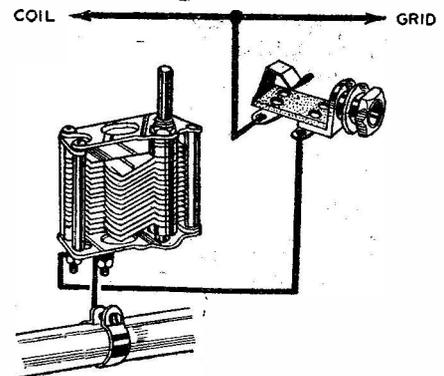


Fig. 7—A separate jack enables manual tuning to be used.

may be easily accessible through holes in the cabinet or panel. Then an ordinary screwdriver may be used, as desired, for readjusting those which require it.

At least one of the ideas mentioned should be found applicable to the various types of receiver now being used by our readers.

## TELEVISION at RADIOLYMPIA

AS each individual television receiver manufacturer has this year to make his own viewing arrangements within the allotted stand space at Radiolympia, it is not yet known how satisfactory these will be when compared with other attempts on a more general scale. One thing will have to be studied carefully, however, and that concerns the correct viewing distance to do justice to the reproduced results on the varying sized screens. It is hoped that there will be no limitations of space which will necessitate some of the distributed audiences witnessing pictures when too close to the set. It is well known that if an artist's painting is seen at close range, almost all the brush marks will be apparent, and quite a wrong impression given of the picture's value. To anyone seated in the front rows of a cinema the figures on the

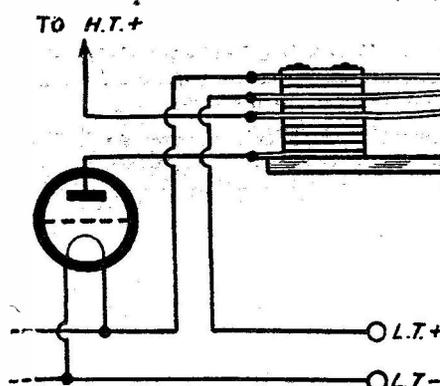
screen become quite out of proportion, while scratches or defects on the film's celluloid surface are grossly magnified and tend to destroy much of the pleasure secured under more favourable circumstances. It is the same with television receivers. Although, comparatively speaking, the pictures themselves are not very large, since they are traced out at high speed by a series of lines of varying intensity along their length, it is important for the correct viewing distance to be ascertained so that the normal texture of the lines is not visible. This adds in quite a large measure to the enjoyment furnished by this miracle of modern science, and as a general rule a minimum of six to eight feet has been found satisfactory for home viewing to secure the best pictorial effect. The question of light is not so important.

# British Long-Distance Listeners' Club

## TELEVISIONS

### Speaker-phone Connections

A MEMBER who is keen on logging American stations sits up until the early hours of the morning and finds that at times the volume from the loudspeaker is so great that there is a risk of annoying sleeping members of the household. He wishes to use 'phones in a simple manner so that during normal hours it will be possible to put those stations which are good enough on the speaker. Obviously the best plan in such a case is to use the plug-and-jack method of connection. In the accompany-



ing illustration is seen a very good scheme in which the output valve may be switched out at the same time and thus the battery-user will find this a very economical scheme. An ordinary short-circuiting jack is, of course, joined in the anode circuit of the preceding valve and both phones and speaker are fitted with a plug. When the plug is removed from the output stage the output valve filament circuit is broken. With this scheme the phones may be used with a smaller number of valves for searching, and if a very weak station is located they may speedily be transferred to the output stage to obtain the advantage of the additional amplification. Similarly, the speaker may be used in the previous stage if the signal warrants it, or if the accumulator is running low and economy is desired.

### Quench Coil Details

A MEMBER who is experimenting with super-regenerative circuits wishes to wind his own quench coil and asks for details. Actually this is not a difficult job, but, as with all similar components, some experiment may be necessary to obtain the maximum performance under all conditions and with various circuit arrangements. A good standard scheme is to make up a former from two 1in. discs of wood and three 2in. discs. These are bolted together to form two bobbins as shown in the second sketch on this page. The two quench coils are then wound with 36 gauge wire of the enamelled type and the ends held in position merely by winding a few turns of thin tape round the bobbins. The coil may be kept in position by the wiring, or may be bolted to the chassis by using a very long bolt or length of studding for the centre locking device of the coil former.

### Aerial Feeders

THE use of twin feeders for ultra-efficient dipole and similar aerials is becoming more general. A member is experimenting with the television transmissions and has noted that the impedance of the lead has been mentioned in various reports and he has accordingly been trying various types of lead to obtain different surge impedance values. He asks if there is any data on the subject. The following short table gives the spacing, in inches, of two leads to obtain various surge impedance values and perhaps this will be of interest to other members who are experimenting in this direction.

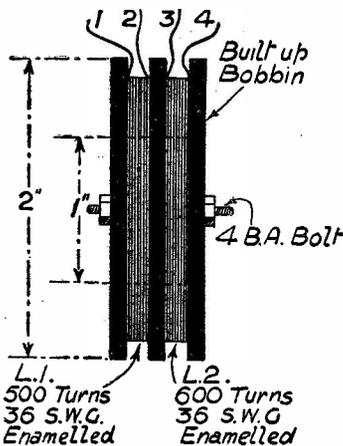
When using twisted feeders they should not be tuned, as standing waves on the feeder will produce excessive losses. If it is desired to tune the feeder, then the two wires should be kept parallel throughout their length. If, however, the feeder has to turn the corner of a house or make an angle for any reason, or if it has to run close to a large, earthed body, then the twisted arrangement should be employed.

Wire

Gauge	200 ohms	300 ohms	400 ohms	500 ohms	600 ohms
8	.42	.987	2.28	5.26	12.1
10	.339	.783	1.81	4.17	9.61
12	.269	.621	1.44	3.31	7.62
14	.213	.493	1.14	2.62	6.04
16	.169	.391	.903	2.08	4.79
18	.134	.309	.716	1.65	3.80
19	.106	.264	.568	1.31	3.01

### Unusual Ideas

WE have not received, for some time, details from members regarding the results of unusual or unorthodox ideas



Constructional details of a quench coil.

which they have tried out. Such work is full of surprises and many interesting facts emerge from work carried out in this connection, and we should be pleased to pass on any ideas which may have occurred to members in this connection.

### Magnetic Focusing

THE essential feature for good magnetic focusing in cathode-ray tube television reproducers is a uniform axial field with negligible fringing or leakage flux at the ends. This is generally produced by a solenoidal coil through which is passed a steady direct current, the magnitude of which can be adjusted at will to give the sharp focused lines of the picture. As a rule different forms of compensating devices are desirable to allow for any irregularities. Local heating will cause the resistance of the coil to alter, and this brings about a change in the current, which if excessive gives fluffy picture lines. Also, as has been mentioned before in these columns, changes in beam intensity while modulating it with incoming picture signals alter the size of the scanning spot, and this can be reduced in effect by a reversed focusing coil arrangement. It seems strange, however, that some form of permanent-magnet focusing has not been found to give the type of field required. Permanent-magnet loudspeakers work side by side with their electromagnetic counterparts, and it is only natural to expect that a similar development would occur with cathode-ray tubes. As far as is known, there is no commercial television set available with permanent-magnet focusing. It should be quite a simple matter to add a solenoidal coil to give a range of field intensity variation sufficient to cover any focus changes that may be necessary for the set user. Alternatively, the magnet could be designed so as to have a form of flux bypath which could be altered to bring about the necessary changes. Perhaps as the science progresses and set controls are still further reduced in number, permanent-magnet focusing will be possible, and the scheme certainly seems worthy of close investigation.

### Good News

THE country of Czechoslovakia has been in the news recently for more reasons than one, but it is not known generally that the Ministry of Posts has been undertaking experimental television transmissions with a view to securing technical data, prior to the introduction of a regular service of signals. Although undertaken on quite modest lines, considerable success has been obtained, and as soon as the political situation has returned to normality, it is proposed to open public viewing rooms in Prague so that the public can become familiar with the type of programme radiated. Naturally, the final decision concerning the magnitude of the service will depend almost entirely on the public reaction, but it is anticipated that this will be favourable. Perhaps the most important item of news associated with this Czechoslovakian enterprise is that the Post Office has decided to employ the British television picture standards. These were found satisfactory during the test transmissions, and this course was adopted because the relatively small market would have meant that sets could only be manufactured at very high cost. As it is, British sets can be used in that country, and this will provide an initial outlet for receiver export for those enterprising manufacturers who take advantage of the service. It is expected that the wavelength for vision will be approximately 6 metres, so very little alteration will be necessary to adapt a standard English set for use abroad.

# Automatic Record Changers

An Explanation of the Manner in which Some of the Popular Changers Work

**T**AKEN as a whole, the human race is a lazy one and it generally hails with enthusiasm the advent of any device or mechanism which can save the carrying out of some monotonous process. I suppose that it is this natural laziness which has contributed so largely to the popularity of the automatic gramophone. In spite of the fact that these automatic mechanisms are by no means cheap, more than two thousand are sold in England every week, and if it were not for the comparatively high price which one must pay for such complicated luxuries, the number

out. Foreexample, there is the placing of the record on the turntable, the lifting of the tone-arm or pick-up, the movement of the pick-up over the edge of the record, the dropping of the pick-up on to the edge of the record and the feeding-in to the playing grooves—to name only the few motions concerned with the start of a record, and when one considers also the various operations at the end of a record, the changing or repeating mechanism, and the necessary

provision for different sizes of records, it will be realised that an automatic gramophone cannot be a very simple affair. In fact, the various devices which control the sequence of operations are among the most ingenious of modern mechanisms.

Although the various operations which are carried out are complicated, they follow each other in a definite sequence. This fact enables the actions to be controlled by various types of cam gearing, and the cam arrangements really constitute the "brains" of the whole mechanism.

### Four Cams

There are too many individual actions which operate simultaneously for one cam to be able to control all, and the majority of automatic mechanisms contain no fewer

than four. In the H.M.V. mechanism, which is perhaps one of the best known, two of the cams control the jaws which support the records and drop them, one at a time, on to the turntable; another cam controls the lifting of the pick-up arm, and a fourth controls the lateral movement of the arm. The contours of the respective cams are so designed that each motion takes place in its proper sequence, but since the automatic sequence only comes into action at the start or end of a record, the cam gear must be declutched and out of action during the actual playing period.

The following brief description of the H.M.V. mechanism will serve to give a general idea of the operations which have to be carried out by an automatic gramophone, and although the constructional details are very different in the various makes, the changing sequence is similar in all.

At the end of a record, or at the beginning of a fresh series, the changing mechanism requires to be brought into action in order to place the next record on the turntable and bring the pick-up on to the disc. In the H.M.V., the cam gear is brought into operation by means of a "trip" mechanism which is shown in Fig. 5.

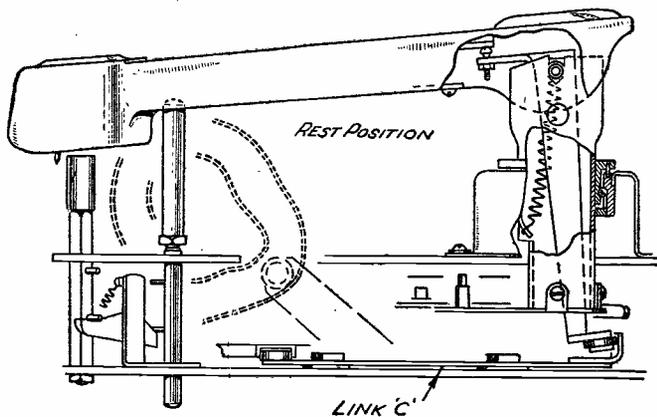


Fig. 2.—Diagram of pick-up lifting mechanism.

sold would undoubtedly be considerably higher.

### Important Features

A complete description of even one of the many delightful mechanisms now available would be far too long for these pages, but a brief outline of the more important features and some of the mechanical "dodges" may be of interest. In the operation of a gramophone there are a number of separate operations to be carried

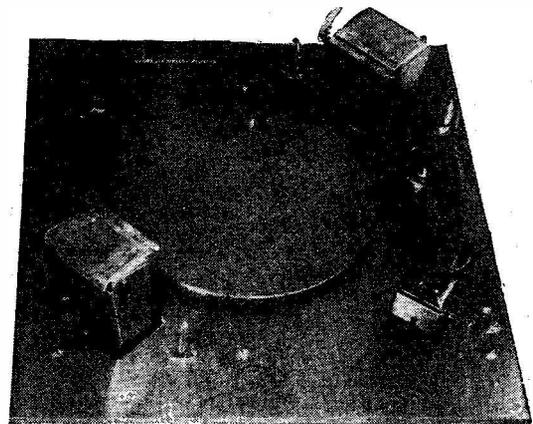


Fig. 1.—The H.M.V. Automatic Record Changer. The records are supported by the blades of the two pillars, which may be set for either 10 in. or 12 in. records.

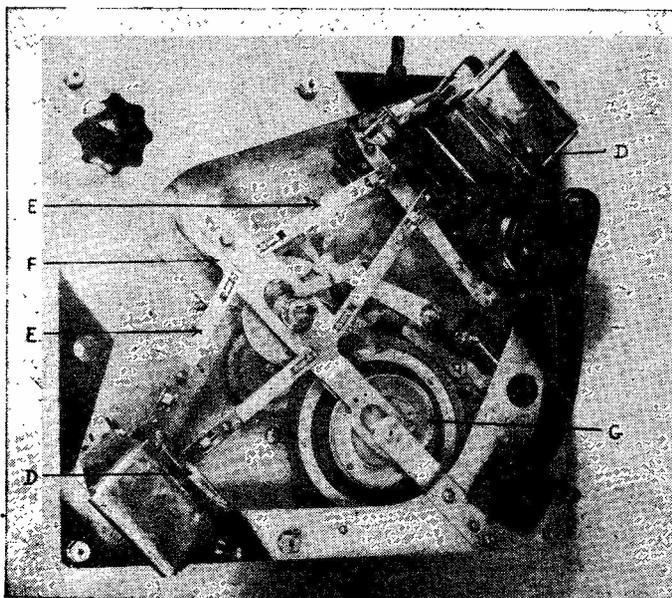
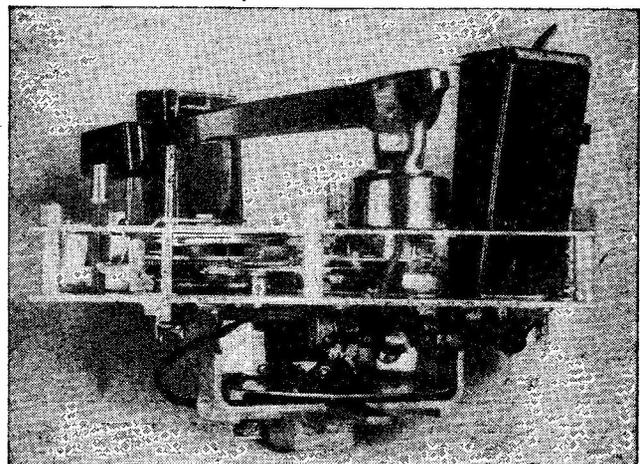


Fig. 3.—Showing the cams, links, and guide-plates of the record-dropping mechanism.

Fig. 4.—(Below) A side view of the H.M.V. mechanism.



**The Trip Arm**

It will be seen that the turntable spindle carries a small wheel which rotates with the turntable and which has a single square-shaped tooth. When the mechanism is tripped, either by pressing the starting button or automatically by the pick-up reaching the end of a record, the trip arm releases the point of the clutch lever and the square tooth on the turntable spindle engages with a similar tooth on the clutch lever and carries the whole clutch assembly round with it. The clutch wheel is geared through an idler wheel with the set of cam gears and hence, as soon as the mechanism is tripped, either by depression of the starting button or by the pick-up reaching the end of a record, the cam gear commences to make a single rotation and the changing cycle is carried out.

Since the cam gear comprises four independent cams, it will be clear that four separate sequences occur together, two of which—those connected with the raising and traversing of the pick-up—can be followed in Fig. 5. The cams are shown in the positions which they occupy during the actual playing of a record, and they remain stationary until the mechanism is tripped, when they commence to rotate quite slowly in a clockwise direction.

**The Pick-up Traverse Cam**

The top cam, shown black in Fig. 5, is called the "pick-up traverse cam" and engages with a small roller on the end of lever A. This lever is pivoted near its centre and at the other end it engages with the lower part of the pick-up pillar. It thus controls the lateral traverse of the pick-up.

As the cam rotates, the roller end of lever A is gathered in by the edges of the cam, and by the time it has completed half a turn, the roller is at the point of minimum radius, B, and the pick-up is then right outside the periphery of the record.

During the time when the pick-up has been moved outside the record, it has also been raised above the record surface by means of the second cam shown dotted in Fig. 5. This cam engages with a roller on the end of the link C which is connected to the bottom of the pick-up lifting lever as shown in Fig. 2.

While the pick-up is raised and right outside the periphery of the record as described above, the next record, which has hitherto been resting on the rest plates D (Fig. 3), is allowed to drop on to the turntable by the withdrawal of the links E, the

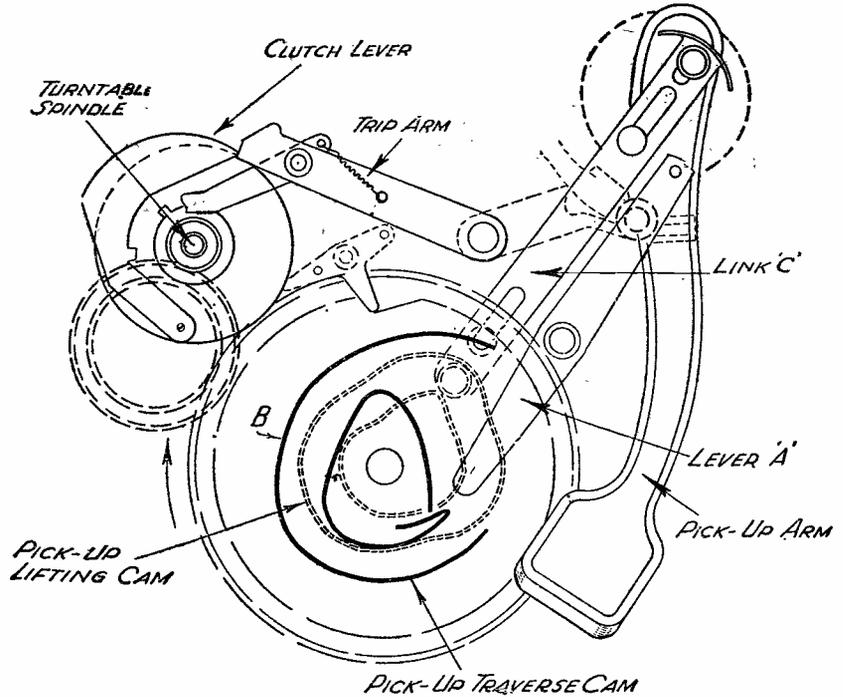


Fig. 5.—Simplified diagram of the H.M.V. unit showing clutch mechanism, gearing, and pick-up cams.

sliding guide plate F, and the heart-shaped cam G.

Further rotation of the cams brings the pick-up again over the edge of the record, and at this point the increasing radius of the dotted cam in Fig. 5 causes the pick-up to be lowered on to the record and fed into the playing grooves. The rest plates have now returned to their normal position, and the separator plates, which have been isolating the bottom record to be shifted slightly to the right, thus passing over the shoulder of the spindle of the pile of records on the bottom rest plates.

**The Mechanical Sequence**

The cam assembly has only made one rotation during the changing cycle, which is now complete, and the clutch gear is

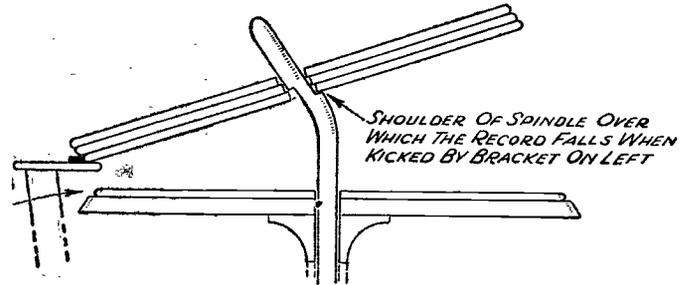


Fig. 6.—Diagram showing the principle of operation of the latest Garrard mechanism. The little pegs on the arms of the bracket shown on the left cause the bottom record to be shifted slightly to the right, thus passing over the shoulder of the spindle.

thrown out of action. The playing of the record proceeds and the changing cycle is not repeated until the mechanism is again tripped by the pick-up reaching the end of a record or by the pressing of the rejector button.

(To be continued)

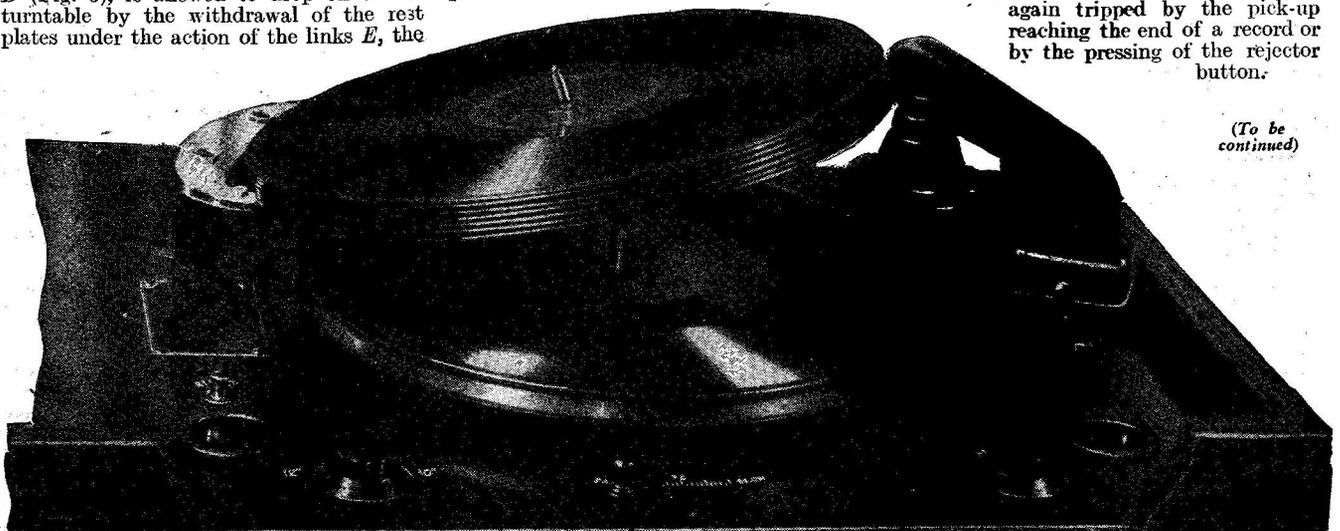
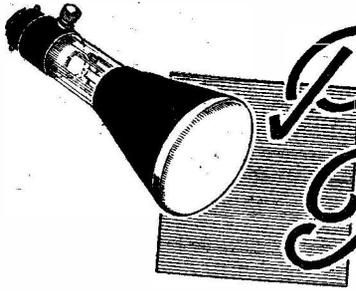


Fig. 7.—The latest model introduced by the Garrard Company. The records are supported partly by the bracket seen on the left and partly by a special notched spindle which, of course, does not rotate.



# Practical Television

July 23rd, 1938. Vol. 3. No. 110.

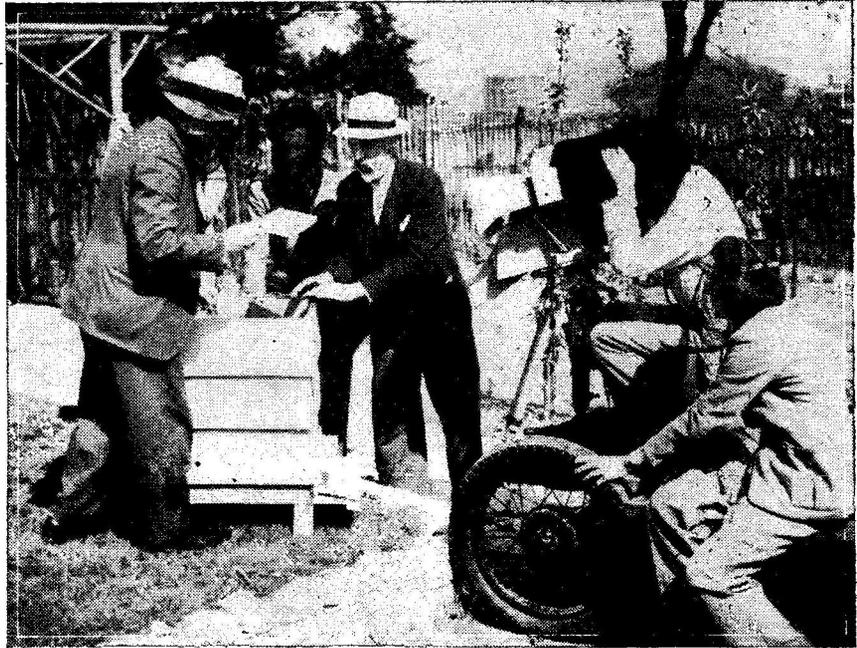
## The German Standard

THE standards to be employed for the German television service have now been decided upon, and it is expected that they will be inaugurated early in August so as to coincide with the opening of the Berlin Radio Exhibition. Interlaced scanning is to be employed with 50 frames, 25 pictures per second; the total line definition being 441. No picture ratio has been stated but no doubt, as in this country, it will be five to four. Following also on B.B.C. practice, and decided upon after months of test transmissions, positive modulation is to be employed. Full white will be represented by 100 per cent. modulation, and the black picture level is 25 per cent. carrier. This is 5 per cent. lower than our own service, and seems to indicate that the form of synchronising to be employed by the German manufactured sets will be of a high standard. Bearing in mind the reverse form of modulation proposed for the U.S.A., which, however, has been strongly criticised by technicians in that country, it is gratifying to find support for the English method forthcoming from another European nation. The average picture brightness, or D.C. component, as it is so often referred to, will be included in the radiated picture signal, and as readers know, this scheme is a most efficient one, giving a pictorial picture value very superior to any television transmission in which it is absent. Although the sound and vision carrier waves in Britain have a separation of 3.5 megacycles, in Germany this has been reduced to 2.8 megacycles. Assuming a picture format of 5 horizontal to 4 vertical, the maximum modulation frequency calculated on standard lines is approximately 3 megacycles. It is obvious, therefore, that with the carrier separation chosen the full value of the picture definition cannot be radiated. It would have seemed a better plan to have decided upon the English standard of 405, for this would have fallen within the frequency and had the additional advantage that a step forward would have been made towards picture standardisation, which is so essential if receiving equipment is to be interchanged and an export market opened.

## Carrier Arrangements

FOLLOWING also on proved English practice, the carrier frequency for vision has been chosen higher than that for radiating the sound signals. The transmitters at Berlin, and the Feldberg, in Taunus, are to operate on the same wavelengths of 6.28 metres for vision and 6.6 metres for sound. Field tests have proved that with the powers to be employed by these stations and the distance separating them geographically, there is little risk of mutual interference, even for receivers on the fringes of the anticipated service areas. The ultra-short-wave television transmitting station established on the Brocken, however, will operate on 7 metres for vision and 7.5 metres for sound. With this choice there is room for another station inside the allotted band, and no doubt as

soon as the German service gets into its stride a fourth station will be erected. This will establish a lead for the Germans which will be the envy of the English provinces, for after almost two years' service from Alexandra Palace a decision concerning further B.B.C. television stations seems as far off as ever. In the light of this position, people in the Midlands and North should redouble their agitation for the establishment of their station claims. For programme distribution purposes, cables have linked up the three German stations, and it has been decided to employ a carrier frequency of approximately 4 megacycles for relay purposes, and it is possible that



For the first time in history, a television broadcast was recently given with bees as the subject. The broadcast was given from the grounds of Alexandra Palace and viewers saw bees of the Wood Green and Southgate District Beekeepers' Association. The illustration shows 70-year-old Mr. Ernest Stebbings, a member of the Association, handling bees nonchalantly without wearing a net during the broadcast.

suppressed carrier methods will be employed for the work. It is claimed that this method will enable the cables to be used to their fullest capacity, and although difficulties may be encountered with modulation at the relatively low cable carrier frequencies, it is felt that this is preferable to an expensive cable designed for very high carrier frequencies. In announcing this technical data, it has also been suggested that receiver manufacturers employing superheterodynes should embody an intermediate frequency of 8 megacycles, but whether this will be followed remains to be seen when the sets are on show at the Berlin Radio Exhibition.

## Extending Television's Scope

A FEW years ago designs for an apparatus were published which had as its main object the televising of scenes from the bed

of the ocean. With television still undeveloped, the scheme was never put to practical use, but with the present good pictures using high-definition standards the idea has been resuscitated. The scheme is to house in a suitable metal container having glass window ports a television transmitter which is cable-linked to a distant receiver. This container could be used from a salvage boat to survey wreckage prior to the diver making his descent. No synchronising difficulties would arise, since the scanners at the receiving and transmitting ends are fed from a common source of supply. An alternative to this scheme is for a submarine to use similar apparatus to act as an extended periscope. Instead of the submarine rising, it would remain at maximum depth, and allow the television equipment to rise to the surface, and so furnish observations via the boat's receiver.

## Producing Saw-tooth Pulses

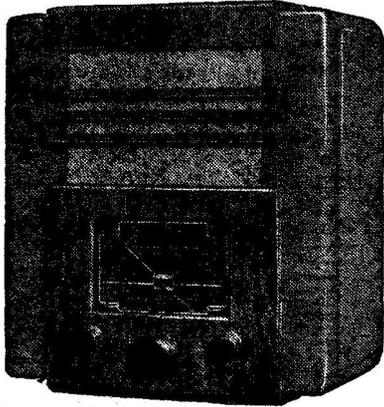
SEVERAL methods have been used quite successfully in order to produce the saw-tooth shaped pulses so essential for line and frame deflection purposes in cathode-ray tube television work. One simple way was to use a slotted disc which served to chop a bright beam of light

focused on to the cathode surface of a photo-electric cell. This gave a square-topped impulse which, when fed to the grid of a suitably coupled valve, produced a definite saw-tooth pulse. Valve generators with "shapers" are also used, and another proposal is to employ a miniature cathode-ray tube. A local valve oscillator feeds sine-wave oscillations to two deflector plates of the tube, and this has the effect of sweeping the tube's electron beam across two slotted electrodes. The result is a narrow rectangular shaped pulse produced by the beam's sine-wave movement, and when this is applied to the grid of the appropriate time-base generator valve a saw-tooth pulse is generated. This method is said to be simple and accurate, and capable of operation over a very wide frequency range.

# FERRANTI MODEL 513AM

Review and Test Report of a  
New Universal 3-Band Receiver

THE accompanying illustration shows the general appearance of this Ferranti model, and one of the first points which strikes the eye is the inclusion of side controls. As will be mentioned later, this enables the tone control to be placed in an easily accessible but out-of-the-way position, and keeps down the number of controls mounted on the panel front. The cabinet is neatly finished with a three-colour tuning dial. The circuit employed is a superhet, with an octode frequency-changer; pentode I.F. stage;



Model 513AM reviewed on this page.

double-diode-triode as second detector, A.V.C. and L.F. amplifier; and a double-diode-pentode in the output stage. A half-wave rectifier is included in the mains section to rectify the A.C. supply when the set is used on this type of mains. There are one or two novel points in the frequency-changing stage, the first of which is the inclusion of a stabilising resistance in series with the control grid. The oscillator grid is coupled to the control grid by means of a few turns of twisted wire, whilst a special tuned circuit prevents interference from unused wavebands. The intermediate-frequency employed is 450 kc/s., and resistance-capacity coupling is employed between the L.F. and output stages.

## Controls

The tuning is carried out by a single control, operating a double-ended pointer. Medium waves are marked round the sides and top of the rectangular dial, whilst long waves are marked at the lower edge. The short-wave stations are indicated in the centre, and three separate colours are employed for the markings. Green is employed for the medium waves, red for the short waves, and blue for the long waves, and the wavechange selector switch (on the right) carries three dots with these colours so that the waveband in use

may easily be seen. On the left is the combined on/off volume control, which operates on the grid of the double-diode-triode valve. The tone control, which is mounted in a sunken escutcheon on the left of the cabinet, is joined across the triode section of this valve and consists of the usual condenser and resistance in series.

On the mains side a simple input scheme is provided, and two chokes with a by-pass condenser are included to remove the risk of interference which might be carried via the mains supply. In place of the customary fuse a thin wire is provided as connection between one mains pin and one of the chokes just mentioned and this is designed to blow in the event of an overload. An external speaker may be joined to a pair of sockets appropriately marked.

## Test Report

The receiver was tested on an A.C. mains supply on our usual aerial and gave a very good performance. Hum was negligible, and selectivity was sufficiently good to enable all worth-while stations to be received. The gain was particularly high on the long waveband and very little interference was experienced on the German station. On the medium waves the performance was quite up to standard, although in the particular model submitted for test the pointer had apparently become loose and thus the station names were not accurately registered. On the short waves the performance was very good and no noticeable drift was observed. The gain was very good for a receiver of this type, and the efficiency of the input interference circuit was particularly noticeable in this receiver. The quality of reproduction was particularly good and the effect of the tone control most marked. The maximum output from the last valve could be fully handled by the speaker without risk of cabinet boom or resonance.

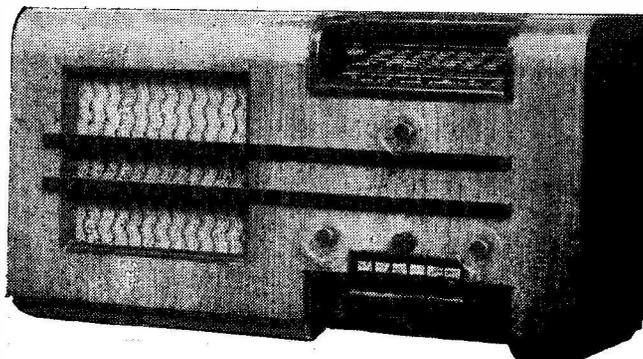
The ranges covered in the receiver are from 16.5 to 51, from 200 to 550, and from 900 to 2,000 metres. The price is 13½ guineas.

**THE WIRELESS CONSTRUCTOR'S  
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A new Ferranti push-button receiver—Model 617PB.

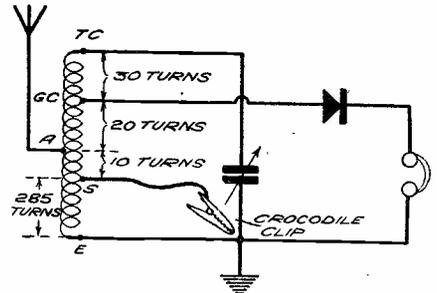
# THE SCHOOLBOY'S CRYSTAL RECEIVER

How to make the coil for the receiver  
which is shown in Blueprint AW427

AS the copy of PRACTICAL AND AMATEUR WIRELESS in which details for building this crystal receiver is now out of print, we are reprinting here the constructional details of the coil, as many readers are desirous of making up this interesting and simple receiver. The coil is a very efficient unit, covering both medium and long wavebands, and is made up on two separate formers. These are of paxolin, and are 4ins. in length. The larger of the formers is 2½ins. in diameter, and the other 1½ins. in diameter, the latter being held in position in the centre of the large former. For this purpose small spacers of ebonite are employed, and are held in position with short screws. Alternatively a disc of wood may be cut and screwed to the baseboard to which the inner tube may be attached, and the outer tube may be held in position with small metal angle brackets.

## Winding Details

The inner tube carries the long-wave winding, consisting of 285 turns of 36 gauge enamelled wire, arranged in the centre of the tube. On the large tube are wound sixty turns of 26 gauge enamelled wire, also exactly in the centre of the tube. When placing this winding on, however, you must make a tapping at the tenth and twentieth turns from the lower end.



Theoretical circuit of the Schoolboy's Crystal Receiver. Blueprint AW.427 shows the wiring, and may be obtained for 6d. from this office.

Anchor the ends of the windings by passing the wire through two small holes pierced about ¼in. apart. To the top of the larger tube a single terminal is fitted, and this should be immediately above the holes where the end of the winding comes. At the bottom of the larger tube four terminals are mounted, and the connections to these are as follows: The top of the inner winding is joined to the bottom of the outer winding, and the two wires are joined to the terminal on the bottom marked S in the blueprint (one side of the wave-change switch). The bottom of the inner winding is connected to the next terminal marked "E" (Earth). The top of the outer winding is joined to the top terminal marked "TC" (fixed plates of the tuning condenser), and the tapping points on this winding are joined to the remaining terminals in the following order. The lowest tapping, that is, the one which is ten turns from the bottom of the coil, is joined to the A terminal, and the centre tap is joined to the GC terminal, which in this set is connected to the crystal detector.

The theoretical diagram of this receiver is given here for those who wish to make up the circuit, and who are interested in the theoretical connections.

# 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 EXETER AND DISTRICT WIRELESS SOCIETY

THE second of the summer visits by the above society took place on Monday, July 4th, and members were conducted over the Exeter Gas Works. The visit lasted well over two hours, and the whole process of making gas was explained: all the apparatus shown in action. One of the most interesting processes was that where the gas is washed and scrubbed to dispose of ammonia, and after this has taken place, the gas is passed into a number of purifiers which contain many tons of iron oxide. The calorimeter room was also shown together with the company's laboratory.

Although this visit is not strictly connected with radio, it shows the varied fare which the Exeter and District Wireless Society serves to their members during the season when no weekly meetings are held. Meetings will commence in September, and full details will appear in due course. Hon. sec., W. J. Ching, 9, Siwell Place, Heavitree, Exeter.

## GLOUCESTER RADIO CLUB

THIS club, founded early this year, has been fortunate in being able to maintain good attendances through the summer. As many similar organisations disband during the light evenings this is regarded as a promising omen for the winter season, when we should like to see a further increase in membership.

On Sunday, July 3rd, a field day was held in the Stroud area, the band chosen being 160 metres. The transmitter, built and kindly loaned by Mr. J. Hamilton (G5JH), was installed in a deep hollow in Crauham Woods, and was operated by Mr. Fred Hitchcock (G5HC). The first party to locate it was that led by Mr. G. Otley (G8BK), and at the high tea, held later at a nearby hostelry, everyone declared that it was the most enjoyable event yet held. A further and more ambitious field day will be held early in August, and we shall be pleased to welcome anyone interested.

On Wednesday, July 6th, Mr. Lane delivered an excellent impromptu address on "Transmitter Design and Operation," which feature was greatly appreciated by the members of the club. Hon. sec., Geoffrey G. E. Lewis, 30, Kitchener Avenue, Gloucester.

## BRADFORD SHORT-WAVE CLUB

THIS club has now obtained its full licence, and the call sign allotted is G3NN. During the next three weeks, tests will be carried out under this call, in readiness for the coming field day, which is to be held on Baildon Moor on July 30th and 31st.

Camping equipment will play a large part in this event, which, it is hoped, will surpass its predecessors. Power for the transmitter will be obtained from a generator driven by a 6-volt accumulator, and it is hoped that a few tests will be carried out which may help the QRP fan. Further details may be obtained from the secretary, S. Fischer, Edenbank, 10, Highfield Avenue, Idle, Bradford.

## EASTBOURNE AND DISTRICT RADIO SOCIETY

AT the meeting of the Eastbourne and District Radio Society held in the Science Room at Cavendish Senior School at 7.30 p.m. on June 27th, a Morse test and instruction conducted by one of the members, Mr. W. A. Morgan, and a demonstration of the Lissen Hi-Q-Short-Wave Superhet Four were held.

The Lissen superhet attracted considerable attention and proved very sensitive. Mr. S. M. Thorpe, A.M.I.R.E., also demonstrated at the end of the meeting a spark coil giving about 60,000 volts output.

Full information for those interested in the society can be had from the hon. sec., F. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex. Annual subscription only 5s. per annum.

## CHADWELL HEATH RADIO SOCIETY

THE above society has changed its name to Romford and District Amateur Radio Society, with headquarters at Y.M.C.A. Red Triangle Club, North Street, Romford. New members are welcomed either at the above address on Tuesdays at 8.30 p.m., or they can apply to hon. sec., Rowland C. E. Beardow (G3FT), 3, Geneva Gardens, Chadwell Heath, Essex.

## THE EAST SURREY SHORT-WAVE CLUB

AT a meeting on July 7th Mr. Gunn (G8HP) related his experiences gathered from the recent Newfoundland Expedition, of which he was a member.

In what proved to be one of the most interesting lectures to date, Mr. Gunn told of the valuable experimental work which was carried out with the help of Newfoundland amateur transmitters.

The Junk Sale referred to in our last report realised £1 17s. 6d. towards club funds. On Thursday, July 21st, there will be a lecture on frequency measurement, commencing at 8 p.m. All local enthusiasts are welcome, at 111, Station Road, Redhill, or they

should get in touch with Leslie Knight (G5LK), hon. sec., 13a, Hatchlands Road, Redhill, Surrey.

## CLAYESMORE RADIO CLUB

THIS club has only recently been formed and we still have but a handful of members. Although our membership is small, much useful work has been done in the past few weeks.

A complete P.A. system was rigged up by the club for the school speech day, and sports announcements were made with great success. The P.W. 12-watt amplifier constructed by R. L. Turney was used. Many receivers have been designed and constructed by members, including a very successful "all-waver." The members have also built two new club-rooms. Recently a visit was paid to the Dorchester Beam Wireless Station. Hon. Sec., A. M. K. Turney, Clayesmore School, Iwerne Minster, Blandford, Dorset.

## THE SIMPLEST ALL-WAVER

(Continued from page 454)

remaining components can be as already described for the simplest short-waver. An ordinary broadcast choke should be included in series with the short-wave choke, or, alternatively, one of the all-wave type could be used. The short-wave coil described has only one range, but if the grid coil has two or three more turns added, and a tapping is taken after four turns from the grid end, it can be made to cover two ranges. As regards the switch, if the Bulgian component is used, a small wire must be soldered to the two rotating contacts so as to join them together, and another piece of wire fixed as a pigtail connection between the rotating contacts and terminal 5 on plate B (see Fig. 5), which is joined to earth.

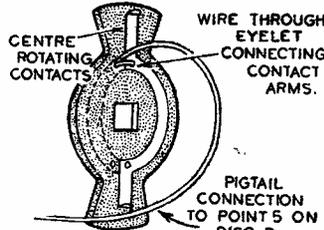


Fig. 5.—Modifying the switch.

The set has been described as a single-valve receiver, but it can be very easily converted into a two-valve receiver, using one of the methods described frequently in PRACTICAL AND AMATEUR WIRELESS. An excellent output stage with transformer coupling was described in the issue dated June 11th, 1938.

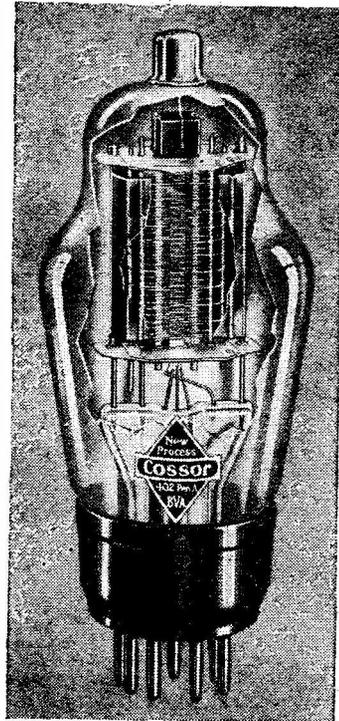
## AN APPEAL

THE holiday season is here again. All those around you, and maybe you yourself, are packing your bags for an interval of rest and peace and enjoyment. You have been looking forward for weeks, months maybe, to your holiday. So have your family. The kiddies are dreaming of paddling, bathing and of those castles which they are going to build on the sand. But to other children, less fortunate, those castles are but castles in the air. Week after week, month after month, they have lived their poor, drab little lives. They do not complain. But they have their dreams as well. Some of them may have been lucky. They may have been chosen to go on holiday which PEARSON'S FRESH AIR FUND provides for thousands of the children of poorer London, through the generosity of our readers. But the Fund, alas, is not limitless, and many are left behind. Help is still needed—desperately—and I beg of you, those of you who can afford it, to send something, however small, immediately, to PEARSON'S FRESH AIR FUND, c/o THE EDITOR, C. A. PEARSON, LTD., TOWER HOUSE, SOUTHAMPTON STREET, STRAND, LONDON, W.C.2.

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# LETTERS FROM READERS

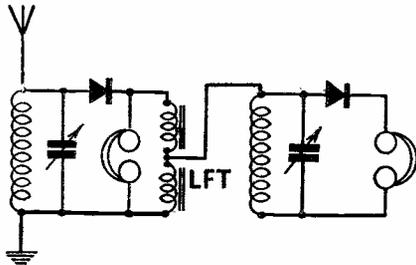
The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## Crystal Detectors

SIR,—I was interested in the article on experiments with crystal detectors published in the July 2nd issue.

I have done no experiments with a crystal during recent years, but some of my old experiments will no doubt prove of interest to other readers. I enclose a circuit for experimental use, in which you will see that it makes use of a double detector system.

There are many experiments which readers can carry out in this connection, and there is nothing to prevent three circuits being used if desired, but, of course, only one pair of 'phones are necessary.



Circuit diagram of a double crystal detector system mentioned in Mr. D'Arcy Ford's letter.

The circuits can be connected together by any kind of coupling, such as L.F. transformer, H.F. transformer, R.C. coupling, or resistance coupling without the capacity. With many forms of coupling a continuous earth line can be used. Two-gang or 3-gang condensers can be used, if desired, for single tuning control.

It would appear that "amplification" can be obtained with a crystal in certain circumstances. As stated in the article, if the aerial is connected to a tap down the coil, this will have the effect of improving the selectivity, but sensitivity will decrease. If, therefore, the circuit can be arranged so as to transfer the maximum signal strength with a minimum of circuit losses to the next tuned circuit, it would appear to be possible that in obtaining an increased selectivity by the use of two or three tuned circuits, the full signal strength can be maintained.

It would be interesting if readers would report the results they have obtained with different types of circuits.

The theoretical explanation of the matter is to be found in the new theory of detection.—D'ARCY FORD (Exeter).

## S.W. Logs: Ideal Circuits

SIR,—I am writing to you in response to two notes which appeared in PRACTICAL AND AMATEUR WIRELESS for July 9th. The first matter is that referring to S.W. logs, upon which subject you invite readers to express their views. I must say that I am in agreement with Mr. E. J. Logan, that many short-wave listeners with a very

small collection of QSL cards (if they have one at all) would be able to submit very useful DX logs. What has somewhat disappointed me in the past, however, has been the publication of m/cs logs containing 20 or so G stations, or 14 mc/s logs in which the bulk of the entries are European, North African, or common W'phone stations. Anyone with a tolerable receiver can, under fair conditions, easily obtain numerous stations in this category, but it takes a good receiver, coupled with a reliable aerial-and-earth system, and some experience, to pull in real low-power DX.

I would therefore suggest that you accept logs unaccompanied by veris, but that the following calls be deleted on 3.5, 7, 14 and 28 mc/s: all European, North African, VO, VE1-2, W1-4 and 8-9, and that details of apparatus used, etc., as suggested by Mr. Logan, be sent with logs. Then, again, more attention should be paid to the 7 and 3.5 mc/s bands, as DX on these bands is more difficult to obtain than on the higher frequency bands. Also, 1.7 mc/s and 56 mc/s logs serve a more useful scientific purpose than logs of the other bands. I think that by sending logs of only low-power DX, a really useful end can be attained.

The other point concerns the articles by "The Experimenters" on various people's ideal circuits. As they ask for other readers to send in their suggestions, I am taking them at their word. The remarks of Mr. F. Lawson were very interesting to me, as I share in some degree his dislike of superhets.

My ideal receiver would be a "straight" type, being a modification of a 2-v-2. The two R.F. tuning controls would be ganged and provided with slow motion, adequate band-spreading being fitted to the detector stage. Plug-in coils would be used so as to give maximum efficiency, while further to increase sensitivity and selectivity regeneration would be applied to the second R.F. valve and the detector, by means of separate reactor valves. Adjustable bias would be fitted to the R.F. section as a selectivity control. The A.F. stages would have to be capable of considerable amplification, because I should want to include some form of frequency-response filter to the final (or possibly the penultimate) stage, so as to give maximum selectivity on the amateur bands, on which part of the short-wave spectrum the receiver would be chiefly used. Push-pull output might have to be used to include this feature satisfactorily. The power supply would come from the mains, which would be carefully smoothed and filtered to reduce the noise-to-signal ratio, and a send-receive switch would be a useful accessory when I obtain (as I hope, eventually) my transmitting licence. Additional features would be A.V.C., an R-meter, 'phone-jack, separate tone controls

for bass and treble to reduce QRM, provision for various aerials, with the whole assembly mounted with a moving-coil loudspeaker and power pack in a steel cabinet.—H. OWEN (Newcastle).

SIR,—I have been a keen reader of your wonderful journal for a long time, but have never written to you regarding any of the subjects discussed in it each week. However, I read with deep interest Mr. Ernest J. Logan's letter of the 9th inst., and must comment on it.

May I say that I agree with Mr. Logan in every respect; my case is one which he writes about. I am a short-wave enthusiast but rarely collect QSLs; nevertheless I compile a log of every station.

I have gained a great deal from your short-wave logs, which were published until quite recently, and I think this is the case with every reader. Surely a space could be found for such a valuable contribution, if readers would make their logs short (not too short), describe their receivers and aerials as briefly as possible and, as Mr. Logan writes, keep to real DX.—F. WILLIAMS (Herne Hill).

SIR,—I heartily agree with your correspondent, Ernest J. Logan, in his plea for the return of the short-wave logs as formerly printed in the "Letters from Readers" section of your valuable paper. These were decidedly of very great interest and assistance not only to myself, but to all of my several radio friends who join in with my request to you to withdraw your ban on these logs. As your correspondent points out, logs of DX stations (verified) are practically useless, and serve no useful purpose at all, whereas an up-to-the-minute log of stations, with time of reception, etc., and details of receiver, antenna and so on, are invaluable to the keen enthusiast.—L. SINGLETARY (Wisbech).

## CUT THIS OUT EACH WEEK

# Do you know

—THAT small biasing cells are permissible in the grid circuit of amplifiers instead of other auto bias schemes.

—THAT standard plug-in coil formers may be used for ultra-short-wave work by cutting away all spare material.

—THAT an ordinary speaker may be used at a low-impedance extension point by disconnecting the input transformer.

—THAT condensers used for mains-aerial coupling should be capable of withstanding the mains voltage.

—THAT when mounting control knobs on high-voltage apparatus the grub screws should be recessed and wax filled.

—THAT friction between dissimilar metals can give rise to noises in a short-wave receiver, even when the metals are not included in the receiver.

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# Impressions on the Wax

## A REVIEW OF THE LATEST GRAMOPHONE RECORDS

### H.M.V.

IT must be a difficult task to decide what music to use for each successive year's Tattoo at Aldershot. Yet the problem is always solved, and the first records, comprising purely musical items from the 1938 event, are now to be had. Extraordinary care was taken to secure really good records, and I learn that a special "recording parade" was called so that, should it be necessary, pieces could be repeated by the massed bands of nearly 1,000 performers, an option that could not be exercised during one of the public performances. The "big" piece for this year is Friedemann's "Slavonic Rhapsody"—H.M.V. B 8755. The other records are of marches—"Royal Review" and "Tudor Rose" (this last for combined bands and bugles), H.M.V. B 8756, and "Tournament" and "The Standard of St. George," H.M.V. B 8757.

### Light Vocal

RADIO, films and stage share this month's artists in about equal proportions. Harry Richman, this season's attraction at Ciro's, sings "Sweetest Sweetheart of All" and "Weep and You Dance Alone," the latter from the film "Happy Returns," on H.M.V. B 8760. Revnell and West (the Two Cockney Kids) put some good Cockney humour into "A Trip to the Zoo" on H.M.V. BD 566. Max Miller's latest contributions are "I Bought a Horse" and "Does She Still Remember?" on H.M.V. BD 563. Dan Donovan sings "God Remembers Everything" and "Springtime in County Clare"—H.M.V. BD 562; and Al Bowly has recorded "Good night, Angel," from the film "Radio City Revels," coupled with "When the Organ Played 'Oh, Promise Me,'" on H.M.V. BD 565. A record that will create a lot of attention is Maxine Sullivan's "Swing" treatment of "Black Eyes," the Russian gypsy folk song, and "It was a Lover and his Lass" (words by Shakespeare, tune by Thomas Morley)—H.M.V. B. 8759. Maxine is America's No. 1 swing singer, and these vocal treatments, in which body rhythm accompanies the singing, are now called "vocalances" in America. This is something quite new.

### Light Orchestral

CALLENDER'S Senior Band have made an excellent record of Wood's Three Dale Dances. Very tuneful and well recorded—H.M.V. BD 560. Barnabas Von Gecky's Orchestra is one of the most popular light combinations in Central Europe to-day. Their latest medley is a medley of Paul Lincke's melodies on H.M.V. B 8751. Anton and the Paramount Theatre Orchestra, with Al Bollington at the organ, play a bright selection from "The Girl of the Golden West" on H.M.V. BD 561. Another famous cinema orchestra, the "Gaumont State," led by Alfred Van Dam, contributes two colourful pieces, "In the Sudan" and "Babylonian Nights"—H.M.V. BD 564.

Reginald Foort at the B.B.C. Theatre Organ combines talking with playing in his latest fantasy, "My Dream Garden," H.M.V. BD 559, while Reginald Forsythe and Arthur Young follow up their successful debut last month with "Tunes of To-day" No. 2, for two pianos, on H.M.V. BD 567.

### Parlophone

LIGHT orchestral recordings are supplied by The Grand Symphony Orchestra with "Women of Vienna" (two parts) on Parlophone R 2525, and "Die Schönbrunner," coupled with "Aquarellen," is played by the Orchestra Mascotte on Parlophone R 2528.

Ronald Frankau, the popular stage and radio comedian, has made an amusing recording this month—"And they Lived Unhappily Ever After" and "Major Wimple and Lady Snurdge" on Parlophone R 2527. He is assisted by Monte Crick at the piano.

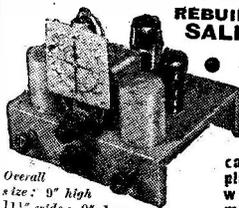
Leslie Hutchinson ("Hutch") has two new records this month—feature songs from the films. "So Little Time" and "My Heaven on Earth" (from the film, "Start Cheering")—Parlophone F 1143, and "Love Walked In," from the film, "Goldwyn Follies," coupled with "Weep and You Dance Alone," from the film, "Happy Returns," on Parlophone F 1144.

### Variety

IVOR MORETON and Dave Kaye pound the ivories with drum and string bass accompaniment in a "Quick Step Medley" and a "Fox Trot Medley" on Parlophone F 1142. Reginald Foort's popular radio combination, "The Organ, the Dance Band and Me" have two records this month. "Meet Me Down in Sunset Valley," coupled with "In Santa Margherita," on Parlophone F 1131, and "The Down and Out Blues" and "Sunday in the Park" on Parlophone F 1145. Tessie O'Shea, the comedienne, with her banjule and orchestra sings "He Never Slept a Wink all Night" and "Hymie and Amy" on Parlophone F 1147. Nat Gonella and his Georgians are to be heard on Parlophone F 1132 playing "Somebody's Thinking Of You To-night" and "Oh! Ma-Ma," and on Parlophone F 1135, playing "Swingin' in the Corn" and "Who Stole the Jam?" In the second new "Rhythm Style" series we have Louis Armstrong's Original Washboard Beaters giving their version of "Candy Lips" with a "scat" chorus by Clarence Williams, and "Nobody but my Baby" on Parlophone R 2531. Also in this series is Frankie Trumbauer with Bex Beiderbecke and Ed. Lang (in their three-piece orchestra) playing "Wringin' and Twistin'" and "For No Reason At All" on Parlophone R 2532. Piano solos with drum accompaniment are played by Billy Thorburn—"Quick Step and Fox Trot Medleys"—Parlophone F 1141 and Gerry Moore—"This Time It's Real" and "So Little Time"—Parlophone F 1140.

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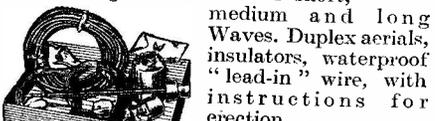
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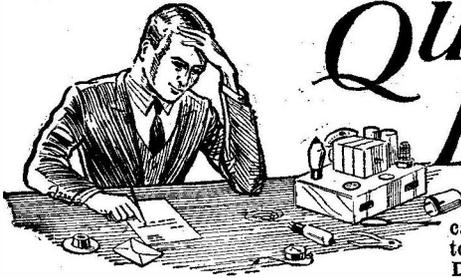
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Harris Electrogram (battery amplifier) (1/-) .. WM399  
De-Luxe Concert A.C. Electrogram .. Mar. '36 WM403  
New Style Short-wave Adapter (1/-) .. WM388  
Trickle Charger (6d.) .. Jan. 5, '35 AW463  
Short-wave Adapter (1/-) .. AW457  
Superhet Converter (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



# QUERIES and ENQUIRIES

## Wire Data

"I am going to wind a transformer and propose to use some wire which I have by me. This is, I think, 24 gauge enamelled, and I should like to know its current carrying capacity so that I can decide upon its use for the particular job I have in hand."—H. I. A. (Boston).

THE rating of this wire is .38 amps. at 1,000 turns per square inch. The resistance per 1,000 yards is 63.16 ohms and the resistance per lb. is 14.366 ohms.

## Speaker Modification

"I have an old model speaker with a 6-volt field winding. I should like to use this in my present set as it gives such good results. I had a battery set and used an accumulator for the field, but now I have converted the set to all-mains and should like to energise the field from the mains. Also, the transformer only has one input and as this may not match I should like to know whether I could fit an ordinary vari-ratio transformer to it."—F. D. (N.W.9).

THE speaker may be used with your new set and the best plan is to use a metal rectifier and transformer to supply the necessary voltage. You will probably find that the field was rated at 9 volts maximum and that an A4 rectifier will be suitable. This delivers 9 volts at 2 amps, and requires a transformer with an output of 14 volts to feed it. You could certainly remove the existing transformer and fit a multi-ratio component connected to the speech coil windings so that better matching may be obtained.

## Speaker Extension

"I have used an extension speaker on my set but so far with disappointing results. The output is high resistance, and my speaker is low resistance, but to overcome this trouble I have bought a new matching transformer and have connected this to the output sockets. The volume is very poor on any tapping and I wonder if you can explain this, as I should like to get the thing to work properly."—K. L. (Perth).

WITHOUT more complete details it is not possible to give a definite reply, but if the speaker and transformer are in order the most likely cause of your trouble is to be found in the way you have made the connections. We assume that you have placed the transformer at some distance from the set—that is, close to the speaker. This may have resulted in loss of voltage on the output valve due to the long leads. On the other hand, if an output filter is employed this trouble would not arise, but then, if the transformer is placed close to the receiver, the long leads on the secondary side may have introduced trouble as they may have a greater resistance than the speaker. Attention to both of these points may enable you to overcome the trouble.

## Superhet Circuit

"I am making a superhet receiver but am uncertain regarding the best method of tuning. Shall I use a straight-ganged con-

denser (that is, with equal sections) or a special shaped condenser? In the former case, what would be the values of the padders to obtain the necessary tracking?"—D. R. E. (South Croydon).

THE problem cannot be solved without knowledge of the coils. Some inductance values are such that the required frequency is obtained with a special shaped oscillator section, and in other makes of coil padders are needed. In view of the fact that the average amateur finds trimming such a difficulty in a superhet, we think the special shaped condenser unit is to be preferred, as, provided the correct type of coil is used, this will automatically provide the required intermediate-frequency and will thus reduce the amount of adjustment needed on the trimmers.

## Reaction Circuit

"I find it difficult to obtain smooth reaction on my set which uses home-made coils for all waves and a built-up switch. On

### 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.

some circuits the reaction is quite good, but in others it is difficult to obtain oscillation, or alternatively it goes into oscillation too quickly. I believe you have published some time ago a modified reaction circuit designed to overcome this trouble, but I cannot trace it and wonder if you can give me the necessary details."—E. Y. T. (Chelmsford).

IF the reaction windings for each wave-band are not correctly selected, you will experience difficulty. The remedy is, of course, to wind each reaction section with the required number of turns and correctly spaced from the grid winding. However, if you wish to experiment with the modified circuit we presume you refer to that wherein a series variable resistance is included in the reaction circuit and this does enable various adjustments to be obtained. A value of 2,500 ohms may be recommended, and one end is joined to the anode, whilst the other end is joined to the reaction coil, which is joined to earth through the reaction condenser in the usual way.

## Heater Leads

"I have noticed that in some commercial receivers the heater leads are twisted together throughout all the wiring, whilst in

others two separate leads are employed and run as far apart as possible. What is the merit of the latter system and why are the leads twisted in the former arrangement?"—H. T. A. (Torquay).

THE twisting of A.C. leads is to neutralise the field and keep down the risk of hum. It is true that in many cases the two leads may be run separately without introducing hum difficulties, but in most cases it is advisable to take the precaution of twisting them so that the field is reduced to a minimum. The leads should also be kept well clear of H.F. leads, and where they must pass they should do so at right angles and with as much separation as possible.



## 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. L. (Bridgend).** H.F. transformers are explained in the book in question.

**H. M. (Battersea).** The blueprint in question is no longer available.

**C. B. G. (Sussex).** We do not recommend the modification of any of our published circuit designs.

**F. S. (S.E.17).** We cannot supply blueprints of commercial receivers and we understand that the blueprint in question is no longer available.

**W. N. S. (Gorleston-on-Sea).** We are unable to supply details of the S.T. receivers. These were originally published in a contemporary, which is no longer on sale.

**J. E. (Ramsey).** We can supply blueprints, but it is essential to state which model you have. We published two designs and both were in battery and mains types.

**J. C. (Dublin).** We are unable to trace the coils and unit mentioned by you.

**T. M. (Uffoxter).** Your aerial and/or earth could be responsible for the trouble. Make certain that the valve is oscillating.

**T. A. R. (Hebburn).** We are unable to supply a blueprint for a set using the American valves mentioned.

**J. J. C. (Chiswick).** In order to avoid upsetting the working of the valves the best plan is to use a mains voltage bulb (10 watts) connected across the input. This will give a better light and will not affect the wiring.

**R. E. P. (Lowestoft).** The Hall Mark receiver should be suitable and we can supply blueprints for this in battery or mains types.

**R. J. (Didcot).** So far as we can trace the items are not now listed as standard. Write to Electradix Radios, whose advertisement appears in this issue.

**J. H. (East Kilbride).** It is impossible to help you from the brief details you give. Some further notes would be needed, together with a circuit diagram.

**T. R. A. (Stoke-on-Trent).** The point referred to was that the two cones must move out and back together, or in step. They should be joined across a small battery and carefully watched, and if it is found that one goes forward when the other goes backward the connections to one speaker should be reversed. We cannot trace any book on the subject referred to.

**G. L. (Kettering).** We understand that a book on the subject mentioned is obtainable from Percival Marshall.

**J. F. (Limerick).** The most recent series of articles will be found in the issues dated May 22nd, 1937, to July 3rd, 1937.

**T. H. M. (Rugby).** The aerial acts as the first tuned circuit and should consist of 75ft. of wire for the medium-wave winding and an additional 125ft. of wire joined in series as a loading coil for long waves. See the constructional article in the issue dated 9th July last.

**S. M. (Glasgow).** The tool may be obtained from E. Gray and Son, Ltd., 18-20, Clerkenwell Road, E.C.1.

**G. W. (Bridlington).** We suggest you study the article in our companion paper *Practical Mechanics* dated November, 1937, last.

**E. W. (W.6).** As the set is a commercial model it would be desirable to communicate with the makers, as the unit may be faulty.

**A. S. (Hale).** The wire is quite in order. The larger capacity could be used, but would not be quite so efficient as the specified component.

**F. H. P. (W.14).** We suggest you select a receiver from our blueprint list and obtain the appropriate issue. In that will be found a list of components and full operating notes for the particular set, and you should not find it difficult to build.

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

**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.

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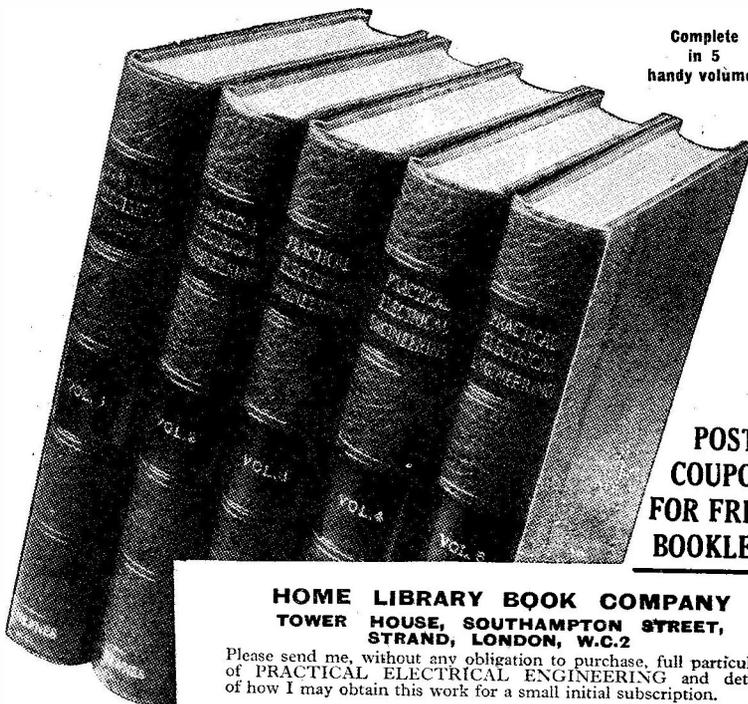
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