

# Practical and Amateur Wireless

3<sup>D</sup>  
EVERY  
WEDNESDAY

Edited by F. J. CAMM

A GEORGE  
NEWNES  
Publication

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February 18th, 1939.

AND PRACTICAL TELEVISION

## ULTRA-SHORT-WAVE Aerial Systems



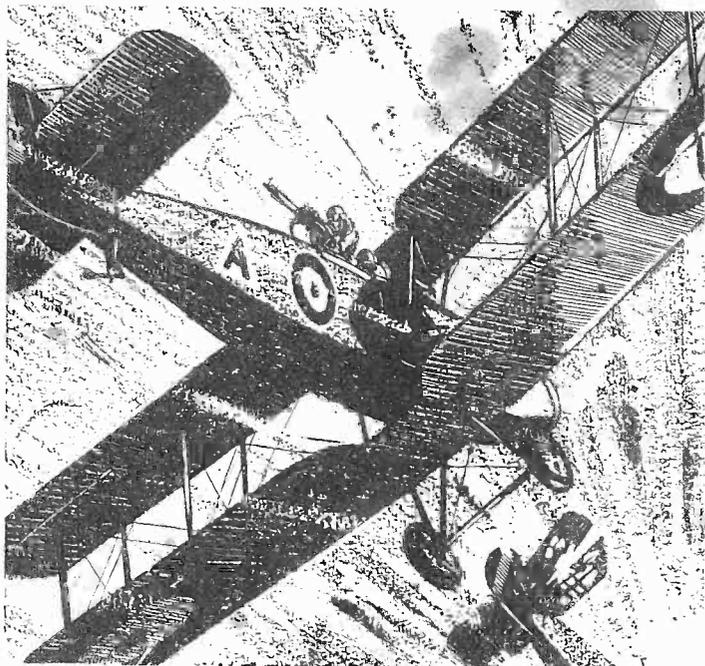
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# Practical Hints for Home-Recording See Page 565



# Practical and Amateur Wireless

*Edited by F. J. CAMM*

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

Vol. XIII, No. 335. February 18th, 1939.

## ROUND *the* WORLD of WIRELESS

### Home-recording

ONE of the most interesting "side-lines" of radio is the making of records, and it is possible to record either home-made entertainment or actual broadcasts received on standard radio apparatus. There are endless possibilities for the keen experimenter, not only in the results which may be obtained, but in the circuits and processes adopted for the purpose. We have before given details of the main requirements, and in this issue we go into the matter a little more fully, and deal with special circuits which may be needed where the work to be carried out is involved. It should be remembered in connection with this work that special records are available by means of which sounds or special types of music may be obtained and incorporated in a home-made record. Trumpet fanfares, for instance, may be used as a prelude to a spoken announcement or to conclude a short play or talk, and the home-cinema enthusiast will find that this branch of radio will greatly add to the interest of his hobby as it is not a difficult matter to make a really high-class sound accompaniment for a home-made film, to run for any length of time. For the latter purpose, of course, twin turntables and pick-ups will be needed to avoid a break between the playing of successive discs.

### America Again

FROM the U.S.A. comes the news that a machine has been built in which an oscillator and various filter and tone circuits have been so incorporated that by means of the operation of keys resembling a piano, speech sounds may be reproduced through a loud-speaker. It is stated that the machine speaks fluently in several languages, but has a slight "electrical" accent.

### "To the Public Danger"

WITH his first original work for radio, Patrick Hamilton demonstrated in "Money with Menaces" a complete appreciation of all the opportunities provided by the medium of broadcasting. His new play, to be heard on the National programme on February 25th, is first and foremost first-class radio, with a thrilling plot, clear-cut characterisation and an ingenious

use of sound effects. But it is more than merely a play: it is a persuasive and moving social document. He is concerned in the play with the problem presented by the criminally foolish type of person who drives when under the influence of alcohol. This tragic theme—for it is no less—is handled with a careful realism that is infinitely more effective than melodrama. The production will be by Val Gielgud.

### Anti-Interference

A FURTHER step in the removal of interference with radio equipment is announced from Poland, where the Vilno

### Licensing in Denmark

IN an endeavour to increase the popularity of listening in Denmark the Broadcasting Council has reduced the licence fee by 50 per cent. This concession will remain in force until March 31st next.

### News Bulletins

AS a result of research made by the authorities at Broadcasting House, it has been discovered that the 6 o'clock bulletin has the greatest audience. Next in popularity comes the 9 o'clock bulletin, followed in order by the 10 o'clock and 7 o'clock recitals. As a result of this research the B.B.C. are considering the transfer of the 10 p.m. Regional News to the National wavelength at 9 p.m.

### Shrove Tuesday Programme

A SPECIAL Shrove Tuesday programme in Welsh will be broadcast on February 21st, and will present to listeners some of the old customs and songs connected with the feast in North Wales. In England, apparently, the only social custom which survives in connection with Shrove Tuesday is the eating of pancakes, and this was probably originated because all the eggs and fats had to be used up before Lent, when these things were forbidden. In France the day is still known as Mardi Gras—"Fat Tuesday."

### West Cumberland Variety

IN 1936, Newcastle broadcast a programme called "Hark Forrard," a feature including a number of variety acts by people from West Cumberland. Listeners greatly enjoyed the broadcast, and since then there has been a second successful programme of the same kind, but with different artists. On February 23rd, again from Newcastle, listeners will be given a third edition of "Hark Forrard" and, as before, the bill will be compiled by W. S. Newall, a journalist in Whitehaven, who has contributed several items to Northern programmes. This broadcast will be on the Stagshaw and Northern wavelengths, and it is sure to be awaited with great interest by listeners who live on the Cumberland coast, for nowhere, perhaps, is criticism of variety programmes keener than in this part of the North Region.

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Hairdressers' Union has instructed its members to fit anti-interference devices to all electrical equipment.

### Television Receiver Tax

THE question as to whether or not television apparatus should be taxed has been raised in many countries. In France recently the French Senate approved a 100-franc tax on this type of apparatus, but the Chamber of Deputies rejected it as being premature.

# ROUND the WORLD of WIRELESS (Continued)

## The First Radio Stamp

AT the second National Stamp Exhibition, held recently in New York, the N.B.C. Philatelists' Club had a stand on which were exhibited all the stamps which had in any way referred to wireless. The earliest stamp in this category was of 1918 origin, and depicts the Guatemalan Government station.

## Torkildsbu Station Out of Action

THE Norwegian commercial radio station, Torkildsbu Radio, in south-east Greenland, was recently practically destroyed by a violent blizzard. No member of the staff was seriously hurt, and they were able to salvage the most valuable part of the equipment.

## To Assist Aircraft Landing in Fog

IN conjunction with the Lorenz radio directional beam which is to be installed at Ringway Airport, Manchester, the Air Ministry intends to lay down a powerfully illuminated glass-covered "fog line," about 1,400 yards long, and stretching across the aerodrome flush with the ground.

## A New Wavelength Plan

IT is probable that a number of channels allocated to European transmitters may be altered at the next meeting of the



Disguised as one of the chorus of the panto mime "Queen of Hearts," B.B.C. Announcer Lionel Gamlin recently broadcast from the stage of the Lyceum Theatre. He carried an unobtrusive little microphone, and talked during a 10-minute novelty in a 45-minute broadcast to National listeners. Mr. Gamlin, best known as the interviewer in "In Town To-Night," had considerable stage experience before joining the B.B.C. Our illustration shows Mr. Gamlin leaving his dressing-room.

Union Internationale de Radiodiffusion which is to take place on March 1st. In particular, France, Algeria and Morocco will see many changes. The wavelengths proposed for the French stations are as follows: Radio-Paris, 1,639 m. (183 kc/s);

## INTERESTING and TOPICAL NEWS and NOTES

Paris P.T.T., 419 m. (715 kc/s); Poste Parisien (Paris), 280 m. (1,071 kc/s); Eiffel Tower will remain on 206 m. (1,455 kc/s); PTT Grenoble and Lyons will take 448 m. (670 kc/s); PTT Marseilles, 376 m. (798 kc/s); PTT Toulouse-Muret, 352 m. (850 kc/s); PTT Strasbourg, 321.9 m. (932 kc/s); PTT Limoges, 301.5 m. (995 kc/s); Radio Toulouse, 288 m. (1,045 kc/s); PTT Rennes, 271 m. (1,107 kc/s); PTT

since 1936. In that time he has broadcast close on two thousand works.

## Mr. W. N. Robson's Visit Postponed

WE are informed by the B.B.C. that, owing to exceptionally heavy programme commitments in his own country, William N. Robson has been forced to postpone his visit to London. It is hoped that later in the year listeners will have an opportunity of hearing the work of this brilliant producer, whose programmes for the Columbia Workshop, the experimental Drama Department of the Columbia Broadcasting System of America, have aroused wide interest in the U.S.A.



George Formby, the popular comedian, and his actress wife Beryl, who recently visited the Ferranti Works at Moston, are here seen trying out a Ferranti Prestune receiver.

Bordeaux-Lafayette, 261 m. (1,150 kc/s); Nice Côte-d'Azur, 238.1 m. (1,260 kc/s); PTT Nord (Lille), 233 m. (1,287 kc/s); PTT Montpellier, 223 m. (1,344 kc/s); in Africa, Radio Maroc, according to French papers, would work on 489 m. (612 kc/s); and PTT Algiers, 293 m. (1,023 kc/s). Moreover, France is asking that the following channels should also be reserved for her use: 221 m. (1,357 kc/s); 217 m. (1,382 kc/s); 211 m. (1,422 kc/s); 207 m. (1,449 kc/s); and 204 m. (1,470 kc/s). The following stations which already existed at the time the *Plan de Lucerne* was brought into operation have not received, so far, any definite wavelength, and it is hoped that at the next meeting specific channels may be allotted to them. They are: Bordeaux-Sud-Ouest, Radio Cité (Paris); Radio Agen; Radio Lyons; Radio Méditerranée; Radio Normandy; Radio 37 (Paris); Poste de l'Île de France (Paris); and Radio Nîmes.

## Orchestra Deserts the Classics

A ROUSING and light-hearted concert has been arranged for February 20th by the B.B.C. Scottish Orchestra. Instead of classical compositions which demand more careful attention, listeners will hear a Sousa march, a selection from "Snow White and the Seven Dwarfs," the Prelude and Call from "Mary Rose" and Eric Coates' "Springtime" suite. The orchestra will be under its conductor, Guy Warrack, who has been with the B.B.C. in Scotland

## SOLVE THIS!

### PROBLEM No. 335

Wilkinson was not satisfied with the reproduction from his battery four-valver and decided to fit a tone-control. On looking up one or two circuits he found that the usual arrangement was a variable resistance in series with a fixed condenser across the anode circuit, and he understood it could be included in the L.F. stage between anode and earth. He decided to try this, but then found that he had no suitable condensers available. He thought the resistance alone would suffice and accordingly he joined this in the above position. What was wrong with this? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 335 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, February 20th, 1939.

### Solution to Problem No. 334

When Smith joined the transformers together as indicated he upset the inductance values. To obtain the increased selectivity he should have included a small variable condenser between the secondary of one transformer and the primary of the other, and this would have given him the desired results.

The following three readers successfully solved Problem No. 333 and books have accordingly been forwarded to them: R. J. Gumm, 65, Kirkstead Street, Hyslop Green, Nottingham; R. W. Walker, 66, Lovaine Place, Sandyford, Newcastle-on-Tyne; L. Sharrock, 108, Furlong Road, Bolton-on-Deane, Nr. Rotherham.

# Making Your Own Components—7

## Class B, Output and Microphone Transformers

Constructional Details of a Class B Input Transformer, of a Class B Output Choke, and of Transformers Suitable for Use with Microphones - - By FRANK PRESTON

**T**RANSFORMERS for use in a Class B circuit are rather more critical than the L.F. transformers which I described last week. In other words, the ratio between the primary and secondary turns must be chosen to suit the particular valves in use, whilst the D.C. resistance of the secondary of the driver transformer must be kept low. Apart from these considerations the method of construction is

If a number of other similar calculations were made for different valves they would not often come far outside the limits of 1.5 and one to one. Should it be desired to use two valves that are already on hand, it would be well to calculate the correct ratio and arrange the primary winding accordingly.

### Secondary Resistance

In general, it is desirable that the secondary winding should have an overall D.C. resistance of not more than 300 ohms, although values between 250 and 400 ohms do not affect results to any important extent in practice. To determine the most suitable number of turns, and also the most satisfactory gauge of wire for the secondary, it is necessary first to settle the question of the core size and then of the primary windings. Let us first assume that we shall employ No. 4 Stalloy stampings; these are larger than necessary, but we have previously seen the value of keeping to this popular size where convenient.

Three dozen pairs would be suitable, and the primary could well consist of a total of 3,000 turns of 38-gauge enamelled wire. As already mentioned, we should make a tapping after winding the first 1,000 turns, whilst many constructors might care to take a second tapping after 500 turns—to obtain an intermediate step-down ratio of 1.25 to one. The second tap-

From the above it will be understood that the 2,000 turns are intended for use as primary with a one-to-one ratio. That means that this number can conveniently be used as a basis for determining the correct number of secondary turns. In this respect there is an important point to bear in mind: to obtain a one-to-one ratio the secondary, which is centre-tapped to feed the two halves of the Class B valve, must have twice the number of turns on the primary. In other words, for the transformer under discussion we should want 4,000 turns, with a tapping at 2,000.

### Wire Gauge

Now to settle the gauge of wire, which is dependent upon the D.C. resistance requirement. If it is agreed to place the primary and secondary windings side by side on a spool made as described in recent articles dealing with transformer construction, the average length per turn can be taken as approximately 6in. when using the core decided on. This indicates that the length of wire in 4,000 turns is approximately 4,000 divided by 6, or about 700yd. Looking down our wire table on this page

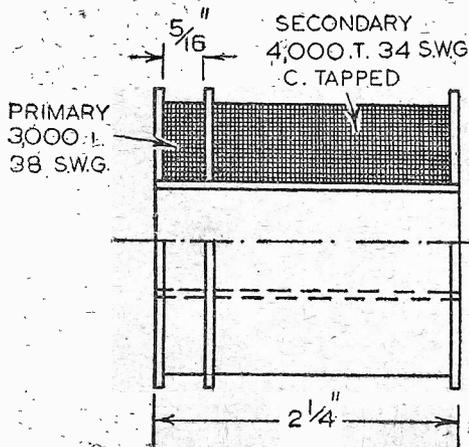


Fig. 1.—Method of dividing primary and secondary windings with a spacing cheek.

practically identical with that previously explained.

The step-down ratio of the driver transformer can be found by dividing the optimum anode load of the valve used as driver by the input impedance of the Class B valve, and then taking the square root of the result. The answer will generally be found to lie between two to one and one to one, although for most practical purposes it is convenient to make the transformer with an overall ratio of 1.5 to one and to take a tapping one-third of the way through the primary winding to provide the even ratio. When this is done there will rarely be any difficulty in finding a suitable driver valve for use in conjunction with any given Class B valve, and vice versa.

### Ratio Calculation

The matter will probably be more readily understood if we take just one example. Let us assume that we shall use the Cossor 215 P (small power) valve as driver and the Hivac B 230 in the output stage. It can be found from the makers' literature that the former has an optimum load of 9,000 ohms and that the latter has an input impedance of 4,000 ohms. Dividing 9,000 by 4,000 we get 2.25 as the answer; and the square root of 2.25 is 1.5. Thus we see that the correct ratio in this instance would be 1.5 to 1. Note carefully that the ratio is a step-down one, not step-up as is customary with normal intervalve transformers.

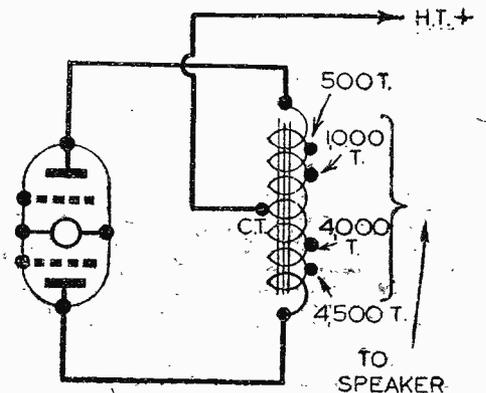


Fig. 2.—Diagram of connections and tapplings to the Class B output choke.

we find that 36-gauge wire has a resistance of 529.2 ohms per 1,000 yd.; thus the resistance of 700yd. would be something under 370 ohms. That gauge of wire could therefore be used, although the resistance would be slightly higher than the desirable maximum. At the same time, if winding space were at a premium that wire could be used with fair success. When using No. 4 stampings, however, we have ample space and it would therefore be worth while to use 34-gauge enamelled wire. This has a resistance of only 361.2 ohms per 1,000 yd., and the total secondary resistance would be in the region of 250 ohms, which is ideal.

That gives our windings as: primary 3,000 turns in all of 38-gauge enamelled wire; secondary, 4,000 turns in all of 34-gauge enamelled wire. We could place a spacing cheek on our winding spool as shown in Fig. 1, winding the primary in the smaller section and the secondary in the larger. As with the other transformers that I have previously described, it is wise to divide each winding into about four parts by means of waxed paper or oiled silk. For methods of winding and of making tapplings, you should refer to the three previous articles in this series.

### Output Choke

When using Class B it is necessary to have either an output transformer or an output choke if the transformer fitted to the speaker is not specially wound for Class B use. Of the two components a choke is generally better, and this should be tapped

USEFUL WIRE DATA		
S.W.G.	Resistance per 1,000 yd. (ohms)	Turns sq. in. (Enamelled)
28	139.55	3,760
30	198.80	5,370
32	262.1	6,890
34	361.2	9,610
36	529.2	13,500
38	849.1	20,400

ping is really optional, but is preferable if the transformer is to be used in an experimental amplifier.

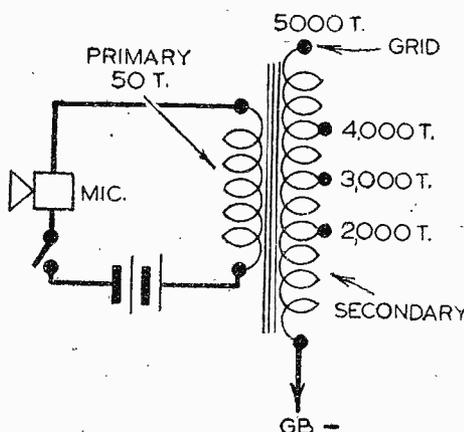


Fig. 3.—Arrangement of windings and connections in the microphone transformer described.

## MAKING YOUR OWN COMPONENTS

(Continued from previous page.)

to permit of the most satisfactory coupling ratio being found by trial. The chief point about the choke is that it should have an overall—end-to-end—D.C. resistance of not more than 400 ohms, and it must, of course, be centre-tapped. The connections for this are shown in Fig. 2.

For this component we could conveniently use a core consisting of three dozen No. 5 Stalloy stampings, and a spool with tubular centre piece (see last week). We should use about 5,000 turns in all, and the average length of these would be about 4in. or  $\frac{1}{9}$  yd. From this it is not difficult to see that the total length of wire would be one-ninth of 5,000, or about 555 yds. Again, looking at our wire tables, we see that 36-gauge enamelled wire is most suitable. To ensure that this length of wire could be accommodated on the winding spool it would be wise to dispense with separating cheeks and to put the one winding running the full length of the bobbin. We should divide the winding into four parts, with insulation as before.

### Taking the Taps

Tappings must be taken, of course, the first being at 500 turns, the next at 1,000

turns. Then there would be the centre tap at 2,500 turns, and two more at 4,000 and 4,500 turns. It is worth bearing in mind that a more symmetrical arrangement would be obtained by using a single dividing check and winding 2,500 turns on one side, then passing to the second section of the spool and winding the second 2,500 turns. The winding would be continuous and tappings would be taken as described above. If this method is to be used, the winding must be done fairly carefully and neatly to ensure that the full 5,000 turns can be accommodated.

If an output transformer for Class B were being made it would be necessary to use No. 4 stampings, when a total of 3,500 turns would suffice for the primary; this need not be tapped if the secondary had 2,000 turns, with tappings after every 500.

### Microphone Transformers

Microphone transformers are so cheap that it might not be considered worth while to make them, but those who wish to do so will not find any difficulty. One dozen No. 5 stampings could well be used for the core, although if a more compact unit were required the stampings from an old L.F. transformer could generally be used. When using the core mentioned the spool could be made on a  $\frac{3}{8}$ in. internal diameter tube, and

the primary could consist of 50 turns of 28-gauge enamelled or d.c.c. wire. To give a total step-up ratio of one to 100 the secondary should have 5,000 turns of, say, 38-gauge enamelled wire. Actually, much finer wire could be used were it not for the difficulty of handling, because the secondary does not have to carry any D.C. current.

For experimental purposes it is worth while to take tappings after about 2,000, 3,000 and 4,000 turns so that ratios of approximately one to 40, 60 and 80 will be available. Fig. 3 shows the transformer in diagrammatic form.

When using smaller core stampings, such as those from a small L.F. transformer, the number of all turns can be doubled. In this case it will almost certainly be necessary to use wire of 40-gauge, or even thinner, if the full 5,000 turns are to be wound in the available space. In practice it is generally found that the difference in results between a one-to-100 and one-to-50 ratio is too small to be of importance. When the component is to be used to feed a high-quality amplifier it is more important that the impedance of the secondary shall be fairly high; for that reason at least it is worth while to use the one-to-100 ratio, or to double the number of primary turns and base the secondary on a ratio of one to 50.

# Items of Interest

## Wireless Fund's Great Work

SINCE its inauguration eight years ago, the British "Wireless for the Blind" Fund has provided sets and relay installations in the homes of nearly 45,000 sightless people throughout the country. The motto of the Fund is "Let the Blind Hear." Originally, the sets supplied were of the one-valve headphone variety, but these have now become obsolete, and are being replaced by loudspeaker instruments of the most modern kind. These are also given to the "newly blind."

Up to the end of its past financial year, the total expenditure of the Fund had amounted to about £127,000. Of this sum, more than £117,000 had been spent on the actual provision of wireless sets. "The low cost of administration," the annual report states, "is due partly to many facilities given to the Fund by the National Institute for the Blind, and partly to the determination of the committee to ensure that donations should go as nearly as possible to the direct benefit of blind persons."

## A "Super-hotted" Superhet!

FROM the West Gloucestershire Power Company Ltd. comes the interesting story of the "super-hotted" superhet—a Marconiphone Model 557 that continued to function perfectly even after being subjected to extremes of fire and water.

The receiver, shown in the accompanying illustration, was involved in a disastrous fire recently at Cinderford, and when it was salvaged from the gutted ruins was found to be in excellent working order apart from a charred speaker cone. The speaker was replaced, and further minute examination failed to reveal any fault except slight misalignment of the L.F.s due, apparently, to the terrific heat to which the trimmers had been exposed.

Although instances of this kind are fortunately rare, the fact that this Marconiphone set continued to function perfectly

satisfactorily after such an unorthodox "hotting-up" is a significant pointer to its reliability, even under the most exacting conditions.

## Versatility of the Television Orchestra

THE B.B.C. Television Orchestra, consisting of twenty-two players, was formed in 1936 by Hyam Greenbaum, who,

under Sir Henry Wood. The Television Orchestra must be one of the most versatile in existence. It must be ready when called upon to appear in vision, the members being made up for the television cameras. In the course of the day, their programme may vary from "hot Momma" songs and high-speed variety programmes to a slow movement from a Beethoven concerto, a ballet, or an excerpt from grand opera.

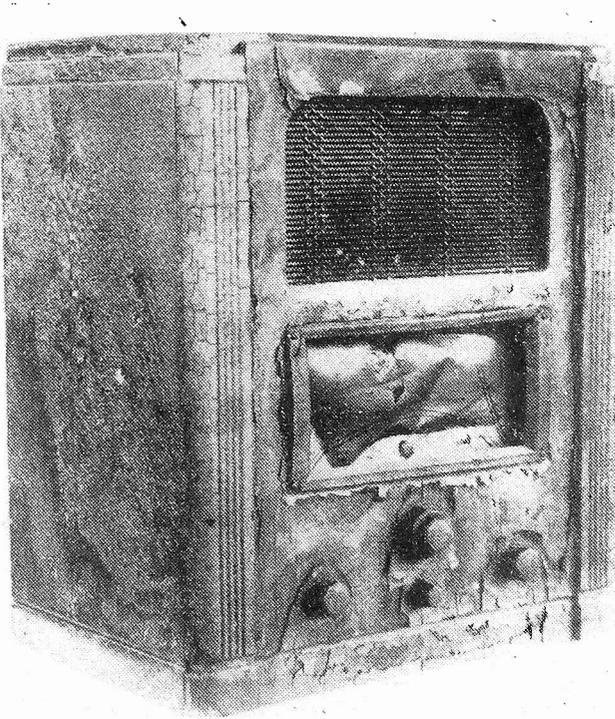
The orchestra is heard more often than it is seen, and when not in vision may be playing in a studio remote from the one in which the performance is taking place. The instrumentalists are faced by problems peculiar to television when they appear

under the lights of the studio. Care must be taken that the brass instruments do not reflect the highlights into the camera lenses, and that is why a newcomer to the studio might think that the orchestra was careless about cleaning the instruments.

"We prefer them dirty," said one of the players. "On the television screen they appear to be clean, which is all that matters, and we avoid dazzle."

## Elsie Carlisle Well Again

ELSIE CARLISLE, the popular croonette, who has just recovered from a serious illness, spent an afternoon recently making gramophone records at the "H.M.V." studio at St. John's Wood. Listeners will remember that Elsie collapsed after her broadcast just before Christmas, when she sang "Two Sleepy People," from the film "Thanks for the Memory."



Subjected to extremes of fire and water in a recent disastrous fire at Cinderford, Glos., this Marconiphone Model 557, salvaged from the ruins, was found to be in good working order.

incidentally, was for many years leading second violin in the Queen's Hall Orchestra.

# PRACTICAL HINTS for HOME-RECORDING

Unusual Arrangements are Sometimes Called For when Recording Special Programmes, and some of the Features are here Dealt With

By W. J. DELANEY

**M**ANY listeners are now interested in the subject of record making, and we have received various queries from time to time concerning the types of apparatus to use for this purpose. In our issue dated March, 1937, last we gave the main essentials concerning apparatus and circuits for simple recording at home, but there are often special types of programme required which need more

processed, according to the type of record being made.

On the input side, as has already been stated, various items may be needed, and it should be remembered that the output from a good pick-up with a standard record

In such a case the additional expense of a distortionless volume control circuit, or constant impedance control may be justified. Three volume controls are then called for and are wired as shown in Fig. 4, the values of the controls chosen according to the input impedance and the types of microphone or pick-up which are employed. This arrangement may, of course, be duplicated and used in each "leg" of the mixer circuit shown in Fig. 2.

### Tone-control

There is a resonant frequency in the ordinary type of pick-up, and this is sometimes evident on certain records. When a similar pick-up is used as a recording head there is a risk of the two frequencies clashing, and thus a slight defect may assume serious proportions and ruin a record. A special tone-control should, therefore, be used across the pick-up, the values of the components being selected to remove the resonance. Headphones in the output circuit of the complete arrangement, shown in Fig. 1 by broken lines, will enable the operator to hear whether or not this resonance is eliminated, and a circuit of the type shown in Fig. 5 will in most cases suffice to cut out the trouble.

For effects purposes various records may be obtained and it will thus be necessary to make some provision for picking out a particular section of a record at a given moment in order that it may be included in its proper place in the record being made. For this purpose an indicator should be made up and attached to the lines of the idea shown in Fig. 6 being suitable. It is then a simple matter to play through the record, and make a note of the exact point at which the particular sound or effect occurs when the needle may be instantly placed at that point, when making your special record.

The importance of elaborate mixer circuits and tone-controls of the type men-

(Continued on next page.)

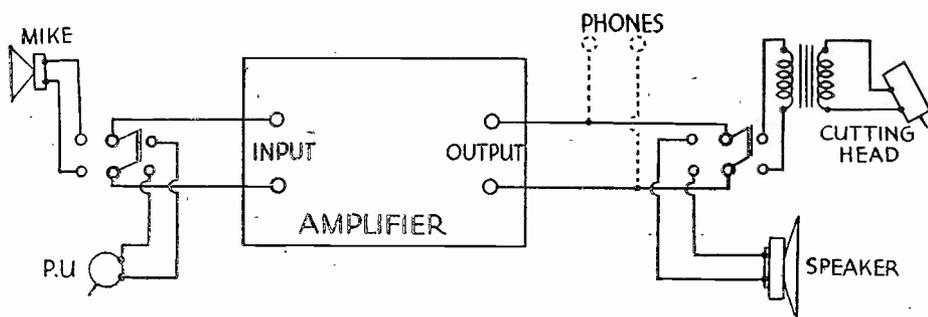


Fig. 1.—Diagrammatic layout for a complete recording system.

elaborate apparatus. For instance, a microphone may be used in order that speech may be recorded, but in addition to this it may be necessary to furnish a background of music, sound effects, or other noises which may be required in varying proportions whilst the speech is being made. In a play, for instance, it may be necessary to fade out speech as some particular sound effect is brought in, and then the position may have to be reversed. It may also be found desirable, at times, to include a portion of an actual broadcast picked up on a radio receiver, and thus special input circuits will be called for.

In the first place, the microphone will be connected to the recording amplifier via a special transformer, and thus we may assume that this will be correctly matched so far as its input impedance is concerned. If a pick-up is also to be used this will also have to be arranged in such a manner that the correct impedance is applied to the amplifier and the same applies to any other apparatus which may be used.

### "Play-back" Switching

The first essential circuit when the programme and apparatus have been decided upon, is some form of play-back switching. It is, of course, quite a simple matter to change over pick-up, mike and speaker, but this is at the best a rather troublesome process, and two simple double-pole change-over switches will enable the circuit to be changed instantly from recording to play-back. In Fig. 1 the arrangement is shown diagrammatically and it will be seen that the recording head and other items are instantly connected where required, and thus it is a simple matter to ascertain at once whether or not a record has been properly made. In this case, of course, care must be taken not to damage the new record before it is

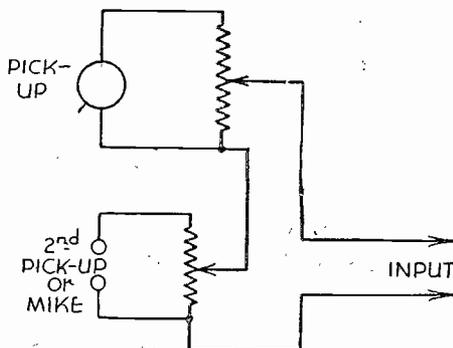


Fig. 2.—The simplest form of mixing circuit for mikes and/or pick-ups.

may be much greater than that obtained from an ordinary microphone. Consequently, an ordinary mixer circuit, such as is shown in Fig. 2, may prove of little use

owing to the fact that the maximum output from the mike may fall so much below that of the pick-up that the latter has to be operated with the volume control at such a setting that quality is impaired. This difficulty may be overcome by using an extra valve for the mike, and connecting the output from that valve to the circuit as shown in Fig. 3. With all volume controls there is a point where, due to the small amount of resistance left in circuit, some form of frequency distortion is introduced, and for recording purposes it is quite possible that this will prove a disadvantage and spoil the recorded items.

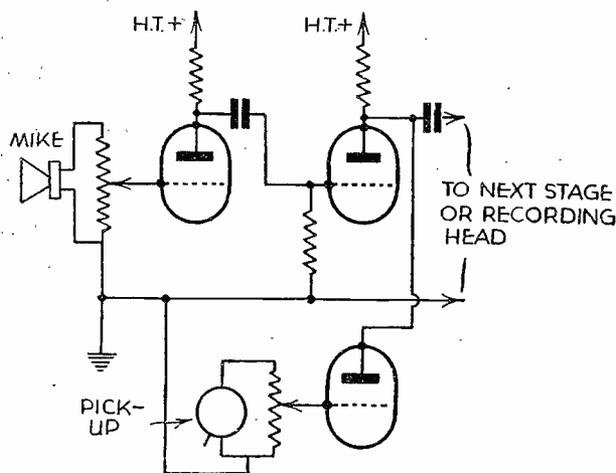


Fig. 3.—To obtain a balanced output, additional amplification for an insensitive mike may be obtained as shown here.

**PRACTICAL HINTS FOR HOME-RECORDING**

(Continued from previous page.)

tioned is realised when it is desired to make a sound record to be used as a background for home-made cinema films, and in some recent records made by the writer for this purpose, it was found necessary to use a number of

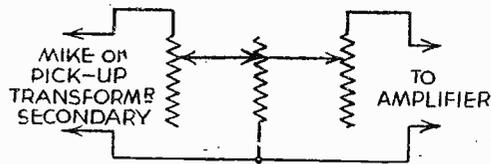


Fig. 4.—A constant impedance volume control for the input circuit.

disks, and a small point which may prove of interest to others in this connection concerns continuity. When one disk is finished it is necessary to start up the next without any break in continuity. (It is realised, of course, that two turntables will be required for this purpose.) After one or two unsuccessful attempts to make records

“join up,” it was found simpler to overlap successive records. That is to say, when the end of one disk was arrived at, during the recording session the motor was stopped, a new disk placed in position for recording, and a pick-up then placed on the last few grooves of the first record. These last grooves are then recorded at the beginning of the second record, and the record continued in the usual way. A “cue” spot painted on the disks enables the operator then to place the second pick-up at a pre-arranged

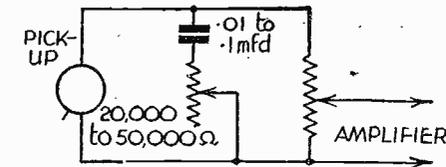


Fig. 5.—The simplest scratch filter for a pick-up.

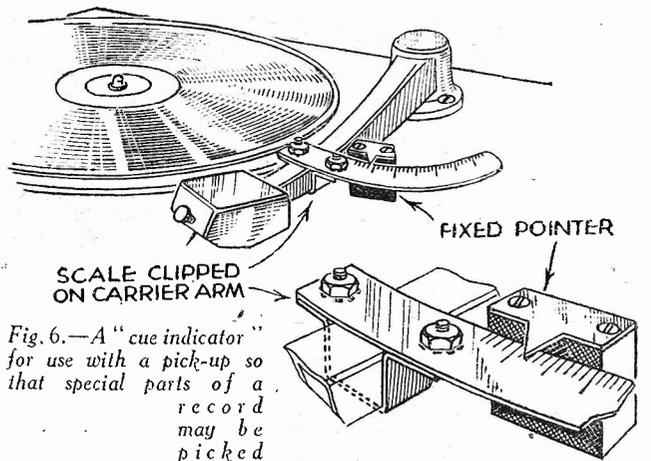


Fig. 6.—A “cue indicator” for use with a pick-up so that special parts of a record may be picked out.

simple matter to fade out the first and fade in the second, any slight jump in the two versions by this system being so slight that it is hardly noticed and there is, at any rate, no break in continuity.

# B.T.S. TROPHY 5

THIS receiver is an A.C. mains-operated multi-band receiver of the “amateur” type, and the circuit which is incorporated is shown below. A special coil unit with selector switch provides a continuous coverage from 10 to 550 metres—from which it will be noted that no provision has been made for long-wave reception. On the input side a special coil is used with flexible leads in place of sockets or terminals, and it is thus possible to use a dipole aerial or a simple aerial and earth scheme. There is no H.F. stage in this particular model the first valve being a triode-hexode for frequency changing, followed by an unusual arrangement in which a triode-pentode acts as I.F. amplifier and beat-frequency oscillator. Next comes a double-diode-triode acting as rectifier for A.V.C., second detector and L.F. amplifier, the last-named feeding a pentode output stage through an R.C. network. A mains-energised speaker is employed, and the set is quite free from hum or similar troubles.

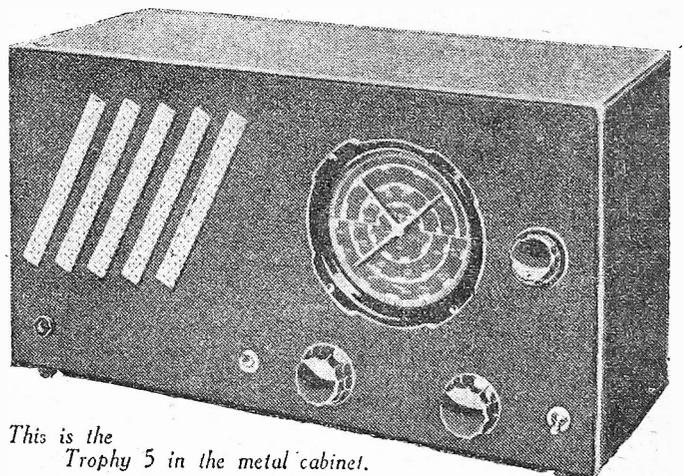
On the panel there is a 'phone jack, beat-frequency on/off switch, combined volume control and on/off switch, wave-change control, and A.V.C. on/off switch. In addition to these are the main tuning

controls, which are part of the well-known B.T.S. mechanical bandspread tuning system. The large full-vision scale is calibrated in wavelengths and is clearly read.

**Test Report**

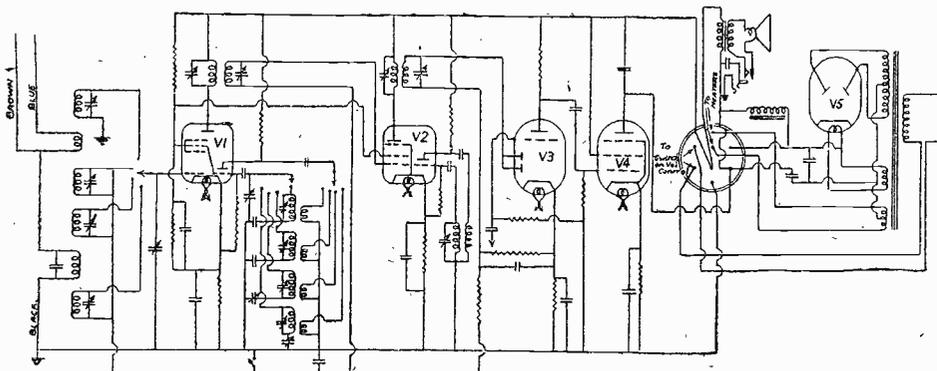
The receiver has been tested in our laboratories over a considerable period and has been found to function in a very satisfactory manner. Tuning is extremely simple with the special dial, and no difficulty is experienced in reproducing special station settings with the two-pointer arrangement which is provided. On the short-wave bands the performance is fully up to the requirements of the experimenter, and American stations have been received regularly in daylight. On the broadcast band all worth-while stations are received at ample volume and the quality

of reproduction on the local stations is particularly pleasing. The bass is far clearer and free from thump or other distortion than one would expect from a small cabinet type of receiver of this nature, and high notes are reproduced with clean-cut brilliance. There is, naturally, some whistle interference at certain parts of the scale, but this is to be expected from a superhet which does not employ an H.F. selector stage. It is not, of course,



This is the Trophy 5 in the metal cabinet.

of an objectionable nature. When used with a full outdoor aerial of the inverted “L” type, results were perfectly satisfactory although, in that case, in the locality where the set was tested, interference assumes rather large proportions. This is, however, considerably reduced when the standard doublet is employed and this is, of course, recommended for short-wave work. The receiver is sold complete at £9, and may be obtained on easy payment terms if desired.



The circuit used in the Trophy 5.

**PRACTICAL WIRELESS SERVICE MANUAL**

By F. J. CAMM.

From all Booksellers 5/- net, or by post 5/6 direct from the Publishers, George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, Strand, London, W.C.2.

# ON YOUR WAVELENGTH



By Thermion

## Television Interference

IN a recent issue I gave my views on the television interference problem, and I gave it as *my* considered view that the greater proportion of television interference was not due to the ignition systems of motor-cars. —My opinion is, of course, based upon my personal experience with television, and it is confirmed by the few friends I have who own television receivers. Now, I do not think that anyone can accuse me of being anti-television, and it is also true to say that this journal has published more information about television than any other technical periodical. It was one of the first to believe in the future of television, and the Editor of this journal backed up his opinion by starting a monthly journal entitled *Television and Short-wave Review* immediately after the Television Committee had issued its favourable report recommending the regular high-definition transmissions. When that journal suspended publication because events showed that it was ahead of its time, and that the Commission had been a little too optimistic as to the state of the science —facts proved by the sudden rise and fall in television shares on the Stock Exchange, and by the failure of the public to be enthused by the report— I said at the time that television had been a victim of the caprice of inventors, and that it would also suffer fierce opposition from those firms who were unable to manufacture television receivers. I also foresaw that it was inevitable for the patent situation to be mitigated by some pool and licence system. One company which formerly had sought to protect its right in the word “television,” which it had registered as a trade mark, generously relinquished its rights. No one will deny that my predictions proved sound in the light of present knowledge, for it was on January 31st, 1935, that the report of the Television Committee was presented to Parliament by the Postmaster-General, and it is not until February, 1939, just over four years later, that the industry decided that the moment is ripe to indulge in a television push.

## Lack of Gratitude

THIS journal has, week by week, published a special television section, and has been one of the keenest television propagandists. Notwithstanding this, the industry has not given evidence of its appreciation, not even to the extent of following normal trade procedure and posting to us reports of its meetings.

I repeat the remarks I made in a previous issue, when I gave it as *my* opinion that the majority of television interference is not due to motor-cars, and I also expressed the opinion that it will probably be solved in the future by a change to a *longer* wavelength. I also said that I considered that the interference problem is one which should have been tackled by the set-makers, who, having achieved the almost impossible by splitting up a scene in the television studio into its electrical counterparts, transmitting it through the ether and reassembling it on the end of a cathode-ray tube, should not find insuperable the smaller, even trifling, problem of the interference created by vacuum cleaners, hair dryers, medical apparatus, and other electrical devices which give rise to television interference. These devices outnumber motor-cars by 300 per cent., and I understand from the statistical department of those whose duty it is to analyse and tabulate these matters that the total number of motor-cars likely to give rise to television interference is about 3,500,000. Apparently the Television sub-Committee appointed by the R.M.A. to investigate this problem are under the impression that only motor-cars in London can give rise to 90 per cent. of the interference, and that the other apparatus to which I have referred to is in use outside London!

## A Simple Check

FALSE reasoning! This committee should well be able to check by figures that there are 16 million pieces of electrical apparatus in this country which can interfere with television, so that in London alone, and the law of average applying, there is at least five times as much television interference from such apparatus as there is from motor-cars! Yet, with a nonchalance, sang-froid and sangunity which would amuse even Charlie Chaplin, they address a letter to the Editor of this paper classifying my opinions as “colossal technical ignorance.” I will leave my readers to judge as to where the ignorance exists.

I also expressed the point of view in the articles to which this committee objects that it would not be possible to make television interference illegal. I base my views not only on a knowledge of the law, but also on a knowledge of what has gone before. Television at the moment is a form of entertainment local to London, and which only a few thousand people indulge in. It is hoped with the present television push to increase that number, and I devoutly hope that the efforts will succeed. They will not succeed, however, by adopting an attitude of compulsion, and by writing to the Editors of papers who have the courage to face up to the situation and facts, offensive letters couched in objectionable language. They must not bury their heads in the sand like the ostrich. In the first place, I say with all the emphasis that type can convey that notwithstanding the fact that a draft Bill is in existence which seeks to make suppression of all likely causes of television interference compulsory, it is doubtful whether it will reach the Statute Book, for the simple reason that such an Act to be effective would have to apply to every motorist in the country, and it would be unreasonable and unconscionable to compel individuals living in the North of Scotland, Wales, the West of England or in any other district outside the service area of Alexandra Palace to go to the expense of fitting suppressing devices merely because some thousands of people in London wish to operate television receivers. Such an act would be the surest way

of fostering national hostility against television among those who do not desire to look in. Pleasanter and voluntary means must be sought. Now, there is such a thing in this country as common law, and it applies to such questions as right of way, ancient lights, lammas rights, and many other things interwoven with the liberty of the subject. Such rights cannot be taken away by Act of Parliament. If, for example, a doctor operating an ultra-violet ray apparatus, or the owner of an electric motor, or a vacuum cleaner, can prove that they have been using such apparatus without complaint for a number of years, it would be impossible legally or otherwise to prove that they are guilty of interference.

#### No Standard Device

THEY must also learn that it is not possible at the present time to manufacture any piece of suppressing apparatus which is successful in every case. Two identical electrical motors, for example, will not yield to the same suppressing arrangements.

The correspondent, who is the chairman of this television interference sub-committee and who wrote objecting to my comments, will, I am certain, be the first to agree with me on that point. He will also, I am sure, agree that at the present moment the question of suppressing devices interfering with the efficiency of the apparatus to which they are fitted has not been satisfactorily solved.

My remarks that I consider a change of wavelength would help to solve the problem are backed by the experiments of a famous Russian scientist. My comments on this point, however, have been warped to indicate that I necessarily meant that high-definition television would be transferred from ultra-short wavelengths to the medium or long-wave bands. I neither said nor implied anything of the sort. Four metres is a longer wavelength than 3 metres, and so is 8 or 10. No one has a greater belief in the future of television than I, and you merely have to peruse the optimism I have breathed in this page for a number of years to verify that. I have on numerous occasions said that television is inevitable, and that within our lifetime the present sound programmes will occupy in the public taste the same position as the silent films. A problem which has been created by television itself, however, must be solved by the industry. I maintain that interference must be solved by the set maker.

## Notes from the Test Bench

#### Short-wave Coils

MANY constructors use short-wave coils of the self-supporting type made from tinned copper wire. These coils are highly efficient, but there is one important point which must not be lost sight of. It is often found desirable to make connection to various points on these coils by means of clips—for instance, for aerial or reaction connections. The arrangement is perfectly satisfactory so long as the wire is clean. Tinned copper wire will oxidise fairly rapidly, especially if it is placed near the fumes from an accumulator. It must, therefore, be well cleaned if the position of a tapping clip has to be changed, and loss of efficiency will arise if this point is not attended to.

#### Unusual Effects

WE have before reported instances of erratic performance arising from some peculiarity which cannot be understood. A recent instance of this which was brought to our attention was loss of efficiency caused by using two earth leads to a screened anode connection. This was 8 ins. in length and at each end of the screened covering the constructor had connected a bare wire joined to the nearest earth point. As results were not up to standard various tests had been applied and when removing a connection made to a common earthing point one of the leads to the screened cable in question was accidentally removed. Results immediately improved and subsequent tests showed that as soon as the two leads were in position the performance fell off. When either of the earth leads was removed, efficiency improved. The connections were soundly made and no short-circuits or similar defects could be traced.

#### Earthed Spindles

WE must again remind constructors that certain types of volume control potentiometer on the market have the spindle "live"—that is, in actual metallic contact with the wiper arm. When the control is used with a metal chassis, or in conjunction with a metal component mounting bracket mounted on an earthed chassis it is essential to use an insulating washer on each side of the mounting bush, or the control will be short-circuited. In some circuits, of course, the arm is intended to be earthed and therefore when using a control dismantled from an old set or when substituting a specified component careful attention should be paid to this point.

#### A Parallel Case

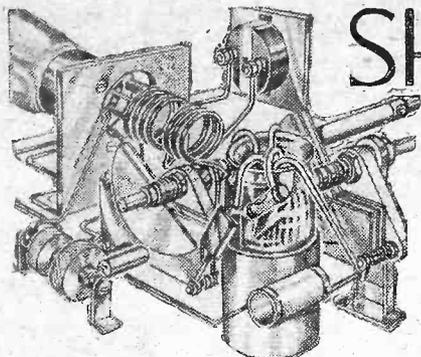
NOW, it is undeniable that almost every home in the country owns a wireless set, and many of the sets are located in districts subject to interference. In fact, there are very few districts not subject to some form of this trouble. The Post Office has been performing yeoman service in tracking down sources of interference, and once it has found it the most it can do is tactfully to recommend to the owner of the offending apparatus that he should fit suppressors. It is logical to assume that, with the combined resources and power of the Post Office and the B.B.C. and the Government, had it been possible to introduce legislation making interference an offence such legislation would have been introduced a long time ago. Television is unlikely to succeed where sound broadcasting has failed.

A form of interference to which insufficient attention has been devoted, because it has not been considered as interference, is the "flat spot." There are many districts in England which for one reason or another are screened. It may be a steel building or some mountain containing metal deposits or some other screen which prevents listeners in those particular districts from receiving programmes. It would be as logical to suggest that it should be illegal for a mountain to be in the way or for factories engaged in Government work to erect steel buildings.

#### "Off My Wavelength"

BEFORE I leave this matter I should like to address some remarks to the writer of a paragraph in a trade paper who suggests that I am "off my wavelength," in discussing the matter in a previous issue. He asks me what evidence I have for my statement that the greater proportion of interference does not come from motor vehicles. The foregoing provides the answer to the naive paragraphist. I said that the problem must be solved by the design of the television apparatus. The paragraphist thinks that "surely is like fitting the population with gas masks (not A.R.P. pattern because they don't work in this case) as a precaution against leaks from gas companies' mains. In any case it is probably impossible."

My detractor here has given his paragraph a special box and you will note that he merely queries my remarks without showing where I am wrong. I hope that the comments I have given rather more thought to it than those individuals acting as critics who fasten on to something without stopping to consider whether the phrases are based on reason.



# SHORT-WAVE SECTION

## U.S.W. AERIAL SYSTEMS

Details of the Construction and Erection of Conventional Types of Aerials are Given in this Article by A. W. MANN.

NO matter what type of short-wave receiver is used, whether it is a regenerative detector and one L.F. combination, or the latest in superhets, its performance is to a considerable degree governed by the efficiency, or otherwise, of the aerial system used in conjunction with it.

Although we can receive world-wide transmissions, using as an aerial a few feet of wire behind the picture rail, or under the rafters, such arrangements do not exploit the potentialities of the receiver to the full, and because of this, the most efficient aerial it is possible to erect is to be advised.

Amateur interest nowadays centres around ultra-short-wave reception. There is no doubt about the potentialities of ultra-short waves outside of visual ranges, and the indications are, in the writer's opinion, that eventually DX will become commonplace.

Development in the design of trans-

manageable proportions, and that simple receivers can be used, is a combination of fortunate circumstances.

Whatever individual ideas there may be concerning ultra-short-wave aerials, it is advisable to try out accepted types first, and to curb the desire to try out original ideas.

### Essentials

The essentials are an efficient aerial system, erected at a good height in order to avoid the possibilities of screening and consequent damping. The higher the better is a rule which applies equally from the reception point of view as that of freedom from electrical interference.

Wooden poles, generally, are for some reason regarded as expensive items. It is, however, possible to erect a neat and efficient aerial at low cost, if square section timber is used. The most simple method is to mount the necessary insulators on one side of the pole. Fig 1 shows an alternative method, which can be adapted to suit the single wire and doublet type systems, and is, in the writer's opinion, a much better arrangement. The length of the arms A and B will depend upon individual requirements, and may be of reasonable length, consistent with the cross-sectional dimensions of the timber used and rigidity of construction.

Flimsy erections, however, will not do, no matter what type of aerial is to be erected.

With the exercise of a little care and attention to detail, it is possible to erect an ultra-short-wave aerial system which will withstand the strongest gales, and yet have the minimum of sway, thus avoiding erratic signal

reception.

Care, however, should be exercised in the choice of timber, which should be straight, entirely free from shakes, and as free from knots as may reasonably be expected. If the length of the pole is comparatively short, 1 1/2 in. section redwood will be sufficiently rigid. If, on the other hand a long pole is necessary in order to erect the system clear of the building, 2 in. or 2 1/2 in. section timber will be necessary, in order to avoid excessive whip in high winds.

### Constructional Details

The two arms should not be nailed in position, but half-lapped and screwed as shown in Fig. 2, which should be studied in conjunction with Fig. 1.

Fig. 3 shows a suggested arrangement for a vertical dipole with twisted flex feeders, and Fig. 2 shows, in dotted lines, how the additional side is half-lapped to the horizontal members.

In Fig. 4 is shown the general arrange-

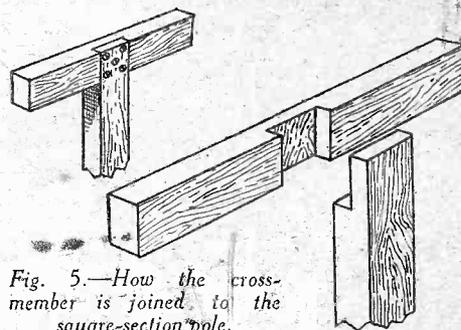


Fig. 5.—How the cross-member is joined to the square-section pole.

ment for a horizontal dipole, the insulators being mounted on the cross-member at the centre, which is also shown in Fig. 5 half-lapped into the square section pole.

The same principle can be applied to erections intended for the mounting of vertical half-wave, and reflector systems, as shown at Fig. 6.

In instances where a pole of comparatively heavy section is required as, for example, greater than 2 in. square, arm and cross members of the same section would be much too heavy, and very unsightly. Fig. 7 shows a 2 1/2 in. section pole with a 1 in. by 2 in. batten lapped into the pole to its full thickness.

### Aerial Dimensions

Aerial dimensions are of vital importance and should be worked out at the start, using one metre as 3.28 ft. as the

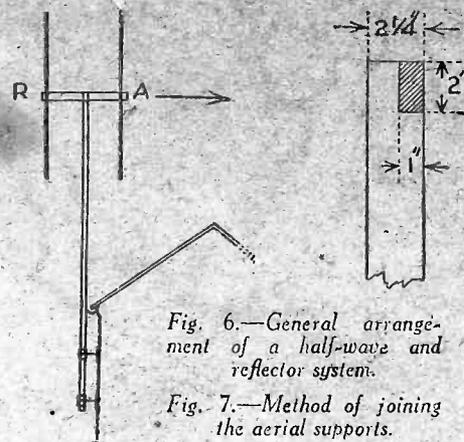


Fig. 6.—General arrangement of a half-wave and reflector system.

Fig. 7.—Method of joining the aerial supports.

basis of calculation. The same applies to feeder arrangements, in that the form these are to take should be decided beforehand.

In order to discuss U.S.W. aerials in detail, and also their dimensions, the various sketches will be referred to in turn. Concerning Fig. 1, we may centre feed or end-feed this type, which should be half-wave in length, according to the band on which it is desired to receive at maximum efficiency. That is, of course, from P to Q. In the case of Fig. 3, L to M and N to O should be respectively one quarter wave-length. As considerable interest is being taken in the five-metres band I give some useful data which can be used as a basis of experiment.

Fig. 1 P to Q, 8ft. centre fed, via twisted (Continued on next page)

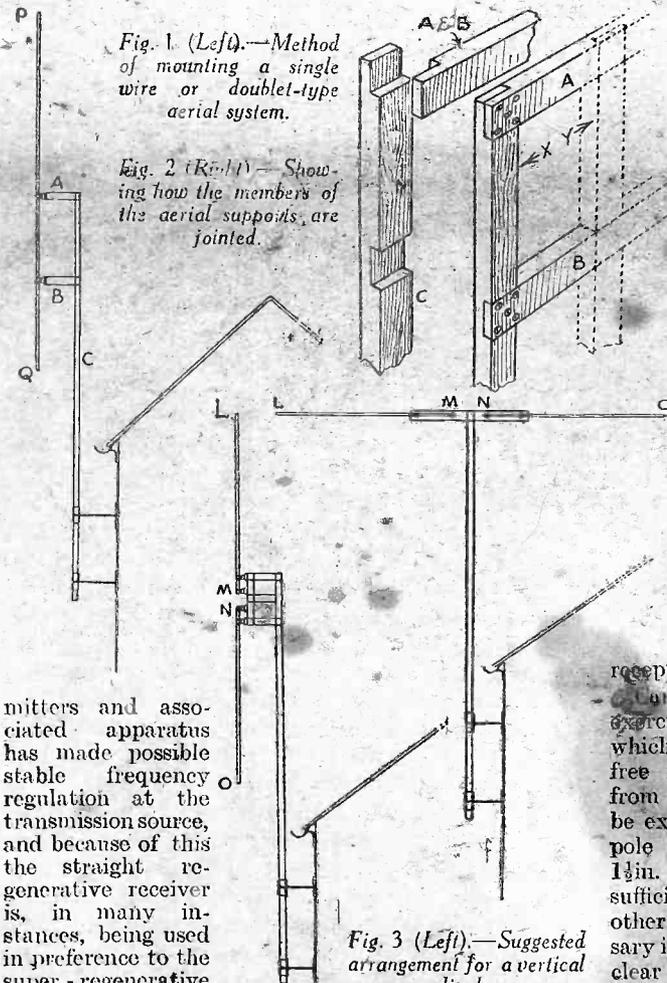


Fig. 1 (Left).—Method of mounting a single wire or doublet-type aerial system.

Fig. 2 (Right).—Showing how the members of the aerial supports are joined.

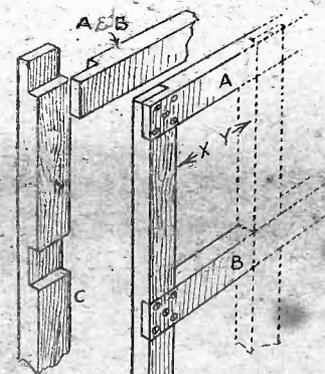


Fig. 3 (Left).—Suggested arrangement for a vertical dipole.

Fig. 4 (Right).—Method of arranging a horizontal dipole.

mitters and associated apparatus has made possible stable frequency regulation at the transmission source, and because of this the straight regenerative receiver is, in many instances, being used in preference to the super-regenerative type.

The fact that ultra-short-wave aerials are of

## SHORT-WAVE SECTION

(Continued from previous page)

flex, each connection to be 4ins. each side of the centre. This also applies to end feeding, but in that case one side of the flex goes at the aerial end, and is left unconnected.

In the case of Fig. 3 we have a vertical dipole with two quarter-wave sections L-M and N-O, the flex transmission line being connected to M and N respectively.

The dimensions are L to M=4ft.; N to O=4ft. The distance between insulators M and N=6in.

The foregoing dimensions also apply to the horizontal dipole shown in Fig. 4.

Passing on to Fig. 6 this shows the most simple aerial and reflector system.

The aerial may be end or centre fed. The dimensions are:

Aerial=8ft. 4in.

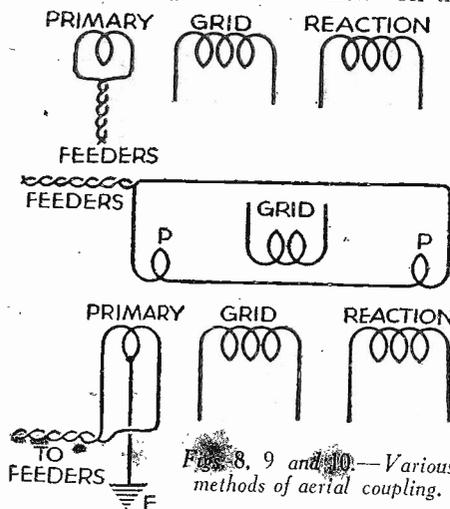
Reflector=8ft. 7in.

Distance between aerial and reflector: 4ft. 4in.

A reflector may be used in conjunction with the dipoles shown at Fig. 3 and Fig. 4,

and placed one quarter wave behind the aerial.

Opinions differ as to the comparative length of transposed feeder lines. On the



Figs. 8, 9 and 10.—Various methods of aerial coupling.

one hand it is considered best in order to achieve optimum results to make them an odd multiple of half the actual aerial length, i.e., one to five times the wavelength to be received, or more, according to circumstances.

On the other hand this is regarded as more or less unimportant. In the writer's opinion where conflicting opinions exist it is best to decide the point by personal experiment, and try precautionary measures first under one's own conditions. So far as beginners are concerned, the twisted flex transmission line or feeder is recommended, as it is easier to arrange the line to leave a vertical aerial system at right angles for one quarter wavelength. When block transposition is used, the problem sometimes presents more difficulty in practice than an illustration leads one to believe.

## Aerial Coupling

Concerning aerial coupling, there are various methods as outlined in the sketches Figs. 8, 9 and 10. Each and all should be tried before the final decision is made.

## LEAVES FROM A SHORT-WAVE LOG

## East Africa and France

THE Djibouti (French Somaliland) stations now in the limelight are FZES on 17.36 m. (17.28 mc/s), 5 kilowatts, and FZE9, 39.65 m. (7.67 mc/s) 5 kilowatts; they constitute the principal radio links between France's East African Colony and Paris. Although mainly used for traffic FZES works in the morning hours and FZE9 until about G.M.T. 21.00—telephony is also heard from them. FZES only broadcasts a radio programme once monthly, namely, on the first Thursday in each month from G.M.T. 13.00-13.30.

## Three More Channels for Finland

THE Suomen Yleisradio A/B of Helsinki (Finland) has been allotted three more channels for the Lahti transmitter, and experimental broadcasts will be shortly carried out on them. They are: OFO, 19.75 m. (15.19 mc/s); OFH, 16.85 m. (17.8 mc/s) and OFI, 13.92 m. (21.55 mc/s). These frequencies are in addition to those already in daily use, i.e., OFE, 25.47 m. (11.78 mc/s), and OFD, 31.58 m. (9.5 mc/s), to which reference was made recently in this log.

## New French West Indian Station

PARIS papers report that the Colonial authorities have opened a 100-watt broadcasting station at Pointe-à-Pitre, in the island of Guadeloupe, French West Indies. The call sign is PG8AA. So far the transmitter has been operating in the amateur band on 42.5 m. (7.058 mc/s), but the power will soon be increased, and a more favourable channel is to be adopted. Broadcasts take place daily between G.M.T. 23.00-24.00.

## Boundbrook's Increased Power

FOR its 25-kilowatt transmitters W3XAL and W3XL, situated at Boundbrook, N.J. (U.S.A.) the National Broadcasting Company of America is erecting two directional aerials beamed towards Latin America, with a view to increasing strength of signal over 24 times. This would mean roughly the equivalent output of a 600-kilowatt plant. The frequencies to be adopted are 9.67 mc/s (31.02 m.) and 21.63 mc/s (13.87 m.).

## Altered Call Signs and Wavelengths

HJ2ABA, Tunja (Colombia), *Ecos de Boyaca*, has changed its channel from 62.37 m. (4.81 mc/s) to 65.44 m. (4.586 mc/s); HJ3ABX, Bogota, *La Voz de Colombia*, formerly on 49 m. (6.122 mc/s) has moved to 61.86 m. (4.85 mc/s); HJ5ABD, Cali, *La Voz del Valle*, hitherto on 31.45 m. (9.54 mc/s) is now on 62.24 m. (4.82 mc/s); HJ7ABD, Bucaramanga, from 62.24 m. (4.82 mc/s) has gone to 63.14 m. (4.751 mc/s), and has changed its call to HJ7BAD. HJ6ABH, Armenia, Caldas, has left the 31-metre band, and is now operating on 61.6 m. (4.87 mc/s).

## Another Tokio 50-Kilowatt

IN order to render more efficient the daily broadcasts destined to European listeners, JLG, on 41.18 m. (7.285 mc/s) has been brought into operation for the news service. It may be heard between G.M.T. 19.30-21.00.

## Albania Tries Out New Channel

ZAA, Tirané (Albania), may now be heard testing almost daily on 40.07 m. (7.487 mc/s). Reports of reception are urgently required by the station, and should be addressed to The General Direction of Posts and Telegraphs, Tirané (Albania).

## Four Popular Ultra-short-wavers

EXCELLENT reception is now being made in Great Britain of the following stations: W9XUP, St. Paul (Minn.), U.S.A., on 11.56 m. (25.95 mc/s), between G.M.T. 16.00-19.00. This studio relays KSTP, St. Paul. Address: National Battery Broadcasting Co., St. Paul Hotel, 363, St. Peter Street, St. Paul (Minn.), U.S.A. W9XJL, Superior, on 11.49 m. (26.1 mc/s), is also heard between G.M.T. 16.00-19.00. Address: W9XJL, Head of the Lakes Broadcasting Company, Superior (Wis.), U.S.A. W3XEY, Baltimore, relaying WFBR, of that city, between G.M.T. 21.00-05.00, on 9.494 m. (31.6 mc/s); is also in the log frequently, as is also W2XQO, Flushing (N.Y.), on 11.3 m. (26.55 mc/s), relaying WMCA, New York. The address of W3XEY is: The Baltimore Radio Show, Inc., 7, St. Paul Street, Baltimore (Md.);

that of W2XQO, Knickerbocker Broadcasting Co., 1697, Broadway, New York City.

## A Regular Chinese Broadcaster

XGOY, Chungking (China), a 20-kilowatt transmitter working on 31.56 m. (9.5 mc/s), is the voice of the Central Executive Committee of Kuomintang, and broadcasts daily at G.M.T. 21.00 a war news bulletin in the English language. It is of peculiar interest inasmuch as the talk which follows frequently describes the living conditions of the people under the present conditions.

## Madagascar on New Channel

FRENCH papers report that FIQA, Tananarive (Madagascar), is now carrying out experimental broadcasts on 31.09 m. (9.65 mc/s). The times of transmission are: G.M.T. 08.00-08.45 (Tuesdays and Saturdays), 15.00-16.30 (Tuesdays, Thursdays and Fridays), 17.30-19.00 (Saturdays), and on Sundays from G.M.T. 07.30-09.00. There is a possibility that the 31.55 m. (9.51 mc/s) channel may be abandoned, as it has not proved itself a favourable one.

## Another Mystery Propaganda Station

THE police authorities of the Union of South Africa are searching for the identity and exact location of a secret short-wave broadcasting station which is transmitting pro-Nazi news and propaganda in the German language to the inhabitants of the former colony in South-west Africa. The channels used for the broadcasts are roughly 28, 33 and 42 metres.

## Panama Heard Nightly

ON the channel formerly used by HVJ, Vatican City, namely 50.26 m. (5.97 mc/s), broadcasts from YV5RC, Caracas (Panama), may be logged nightly from G.M.T. 22.00 onwards. Coupled to the call is the slogan *Caracas, the City of Perpetual Spring*. English and Spanish announcements are made by a man and a woman, the interval signal being the striking of four deep-toned bells. Address: Radio Caracas, YV5RC, Apartado Postal, 2009, Caracas (Venezuela).

A PAGE OF PRACTICAL HINTS

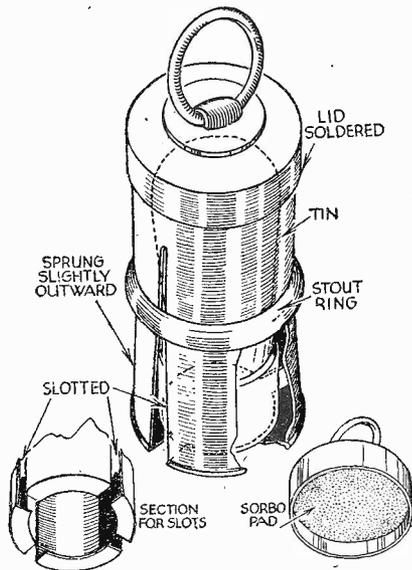
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Removing Tight-fitting Valves

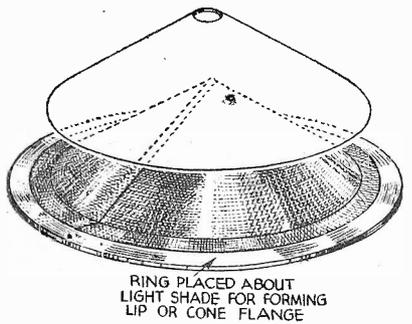
A SMALL tin about 5 or 6 ins. long and 2 in. diameter was cut to make the short claw-like flanges on the bottom leaving a hole large enough to take the



A useful device for removing tight-fitting valves.

average size valve. The lid was fitted with a sorbo pad protecting the valve, should it come away quickly.

A ring was soldered to the top of the lid which was also soldered to the tin. A stout ring was slipped over the whole, and the tin being bent slightly outward, prevented it from sliding right off. By placing the fitment over any troublesome valve, and pushing the ring down forcing the flange under the valve, it can then be pulled straight out, thus avoiding any strain or damage to the valve.—A. T. ROBINSON (Walthamstow).



A simple method of making a speaker cone.

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.

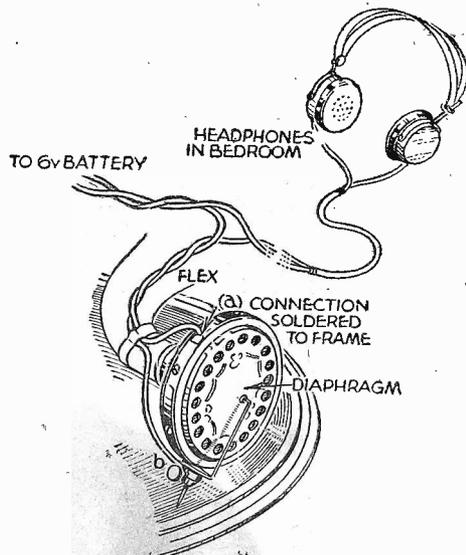
SPECIAL NOTICE

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

Making a Speaker Cone

MY spare cone speaker was in a bad state, the paper cone having split. My problem was to make another. I used damp linen stretched round a flat conical type lamp shade, and by slipping a flat ring over the shade a step near the rim was formed. After a little manipulation the linen stretched to form a flange at the edge of the cone, and the whole was then sprayed with a solution of mucilage and water.

Another shade was placed over this until dry, and a little glue at the joint of the linen kept the edges together. The weight of the shade on top kept the whole thing in shape, and a very satisfactory job resulted.—J. WILLIAMS (Tottenham).



By means of this simple arrangement gramophone music can be listened to on phones.

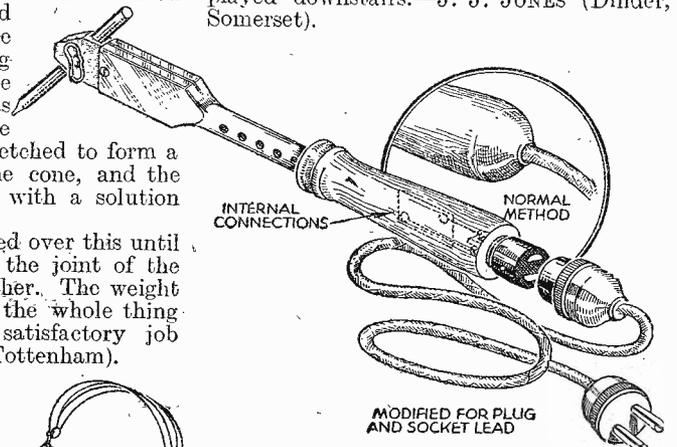
Gramo. Music on Phones

I HAVE an aged relative who is bed-ridden, but who enjoys listening to gramophone records of old-time dance

bands. The gramophone we possess is an ordinary console model, driven by means of a clockwork motor. In order that those of us downstairs can also enjoy the tunes, I devised the following dodge.

One wire of a length of electric light flex is soldered to the metal frame of the gramophone as shown at "a" in the sketch. I then joined one end of a single wire to one side of a 6-volt battery. The other end of the wire is then joined to the metal diaphragm of the sound-box, by screwing it in the needle socket along with the needle (as at "b"). The battery is kept out of harm's way in the cabinet part of the gramophone. I then joined a pair of headphones in series with the sound-box and the battery by means of the length of flex.

By "listening-in" through the headphones, which are at his bedside, my relative can hear and enjoy a perfect reproduction of the records played downstairs.—J. J. JONES (Dinder, Somerset).



An improved method of connecting an electric soldering iron.

An Improved Soldering-iron Connector

THE trailing flex attached to an electric soldering iron is still a troublesome problem. To obviate this, take the electric iron, cut off the flex about two inches from the handle, and attach to the connecting half a standard lamp adapter. This adapter is then fitted into the end of the handle (which should be suitably drilled to allow the adapter to force its own thread in the wooden handle), making itself rigid with the handle. The flex itself, at the point of being cut, is then fitted with a standard lamp-holder which would allow for easy connecting and disconnecting of the soldering iron. A further advantage of the flex and lamp-holder is that it could be utilised for the purpose of an inspection lamp when the soldering iron is not required. The accompanying sketch shows the principle adopted.—E. COOMBS (Widnes).

# THE "REQUEST"

A Two-unit Quality Receiver Designed as an Efficient Two-waveband Circuit Capable of Operating Without Employing the Superheterodyne

MUCH has been written regarding the advantages and disadvantages offered by a superhet circuit. Quite a number of readers argued that "straight" H.F. amplification was a far better proposition if one was concerned with quality reproduction.

The discussion waxed hot and strong in these pages for several weeks; each school of thought put forward such strong cases that the controversy ended in a deadlock.

It is not proposed, therefore, to open up the debate in this article, and it should be noted that the receiver about to be described is not being put forward as a superhet's rival. To make such claims would only start the battle all over again and, quite possibly, give the superhet supporters something to write about. The "Request" Straight Six has been designed to compromise between the two extreme demands; primarily, its object is to give the best quality reproduction consistent with reasonable battery consumption, together with an effective range and a degree of selectivity adequate to satisfy most normal requirements when operated in an area not coming within the shadow of the transmitting masts of a powerful station.

During the last Radio Exhibition

period details were published in this journal of the "Admiral" Four-valver, a receiver employing two stages of H.F. amplification followed by a triode detector and pentode output.

This circuit is most satisfactory, but, and there is always a *but*, as no design can satisfy every reader, a certain number of readers who are particularly keen on high-quality reproduction, and a rather generous portion at that, expressed their desire for a more ambitious low-frequency arrangement.

To satisfy their requirements, therefore, the H.F. and detector circuits of the "Admiral" have been taken and used as the basis for a six-valver, the additional valves being employed to give a greater low-frequency amplification and output without the risk of sacrificing quality through overloading.

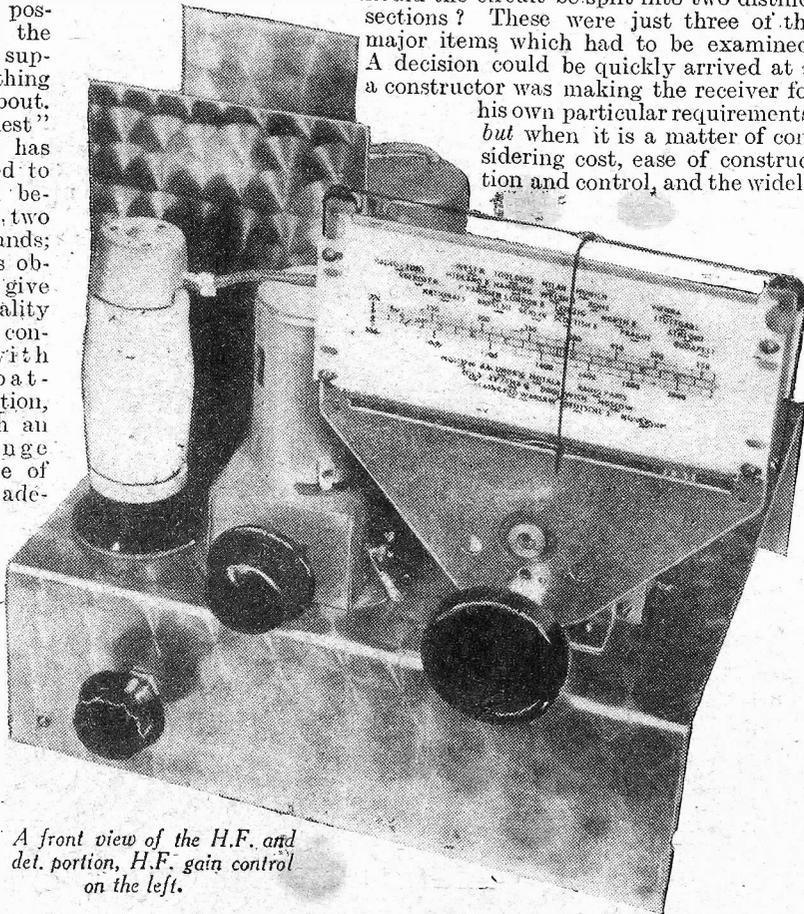
### The Design

When the modifications were being considered, the problem immediately arose as to what refinements should or should not be embodied. Was a bandpass circuit,

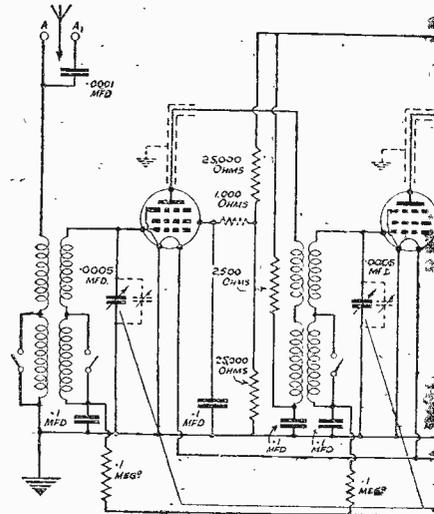
either before or after the first H.F. stage essential? Was sufficient H.F. available for efficient A.V.C. control, and should the existing chassis of the "Admiral" be used or should the circuit be split into two distinct sections? These were just three of the major items which had to be examined. A decision could be quickly arrived at if a constructor was making the receiver for his own particular requirements, but when it is a matter of considering cost, ease of construction and control, and the widely

and, likewise, only require the H.F. and Det. portion, so it was decided to make the "Request" in two distinct sections.

This method of construction has many advantages. It does not necessitate the purchase of all the components at once, it allows faults to be localised and traced

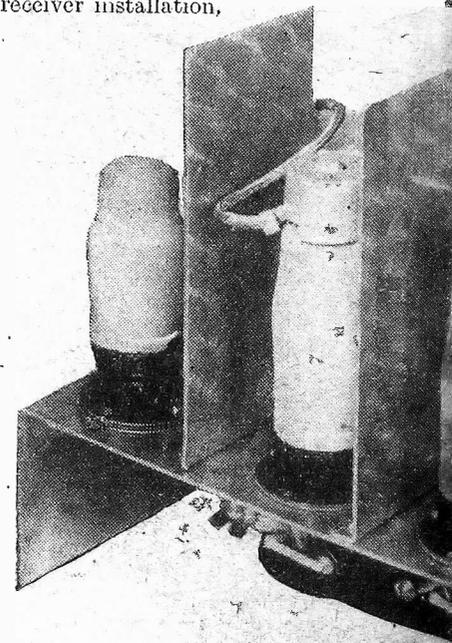


A front view of the H.F. and det. portion, H.F. gain control on the left.



Theoretical circuit diagram

more quickly and, what is also a consideration, it enables the L.F. amplifier to be removed very easily and used for P.U. or microphone work on sites remote from the receiver installation,



Showing the location of the two screens between H.F. and det. stages. Note screened anode leads.

varying conditions under which the ultimate design will be used, it is inevitable that certain apparently desirable features have to be ruled out on one score or another. After very thorough tests, band-pass tuning and A.V.C. were stood down for the time being. This means that they can be employed if one cares to go to a reasonable amount of trouble over final adjustments and, of course, incur the additional cost. However, to those who fancy the items, I would say that they will not be overlooked in the future, and if further tests prove that they offer *practical* advantages, then the necessary modifications will be passed along.

### Chassis

To attempt to mount the additional valves and associated components on the original chassis of the "Admiral" is cutting things a little too fine, and asking for trouble, through the cramping of the H.F. and L.F. circuits.

Apart from those considerations, there are a vast number of constructors who already possess an efficient L.F. amplifier

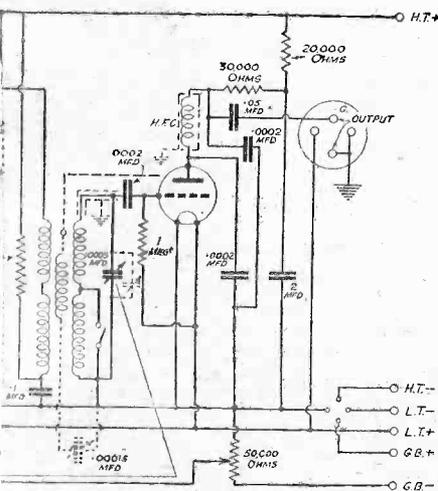
# ' STRAIGHT SIX

## Meet the Request of Readers Requiring Able of Giving Good Range and Selectivity Method - - - - - By L. O. Sparks

Both chassis are made from aluminium, and the first, the one used for the H.F. and det. stages, is 10in. by 9 ins. by 3ins.

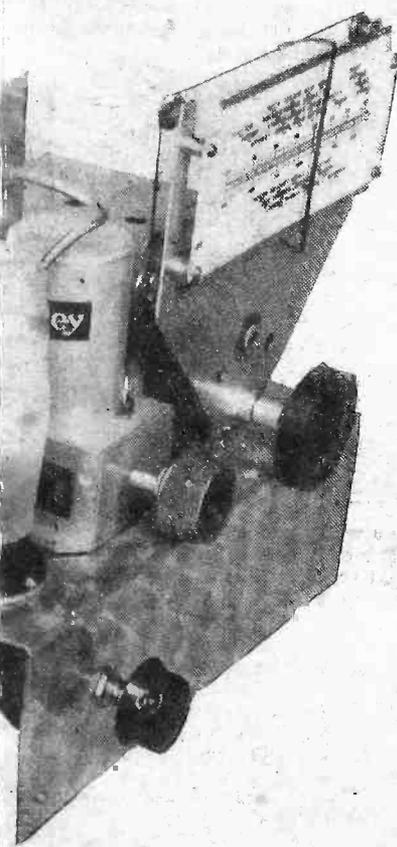
### The Circuit

The theoretical circuit of the first section is shown below. It is perfectly straight-



"The Straight Six."

forward, and almost identical to that of the "Admiral"; in fact, it is its simplicity,



combined with well-designed components and valves, which assures its efficiency and stability.

The governing factor with a circuit of this type is the characteristics of the coils, and for this reason the Varley Coil Unit Type B.P.116 has again been selected.

It will be noted that transformer coupling is employed for the aerial and both H.F. stages. The first of these has a switched primary for medium and long waves, but the last two have their primaries so designed that switching is not essential. This has the advantage of eliminating complicated switching, bearing in mind that H.T. is flowing through the H.F. primaries.

Both H.F. valves are of the variable-mu type, allowing the utmost control to be obtained before the detector stage. The necessary variable bias is provided by a potentiometer connected across a 9-volt G.B. battery, each bias feed being adequately decoupled by a stopper resistance and a by-pass condenser to earth.

The screens of the valves are fed through a fixed potentiometer across the H.T. supply, each screen having its own resistance network and a decoupling resistance wired in series with the screen, with, of course, the necessary by-pass condenser.

To avoid a continual current drain from the G.B. and H.T. batteries by their respective potentiometers, the on-off switch, which is fitted to the coil unit and operated by the wave-change control, breaks the H.T. negative and G.B. positive supplies, apart from the L.T., when the receiver is switched off. It should be noted that while the fixing bracket, and operating cam for the switch form part of the coil unit, the switch is a separate item and is not supplied with the coil unit.

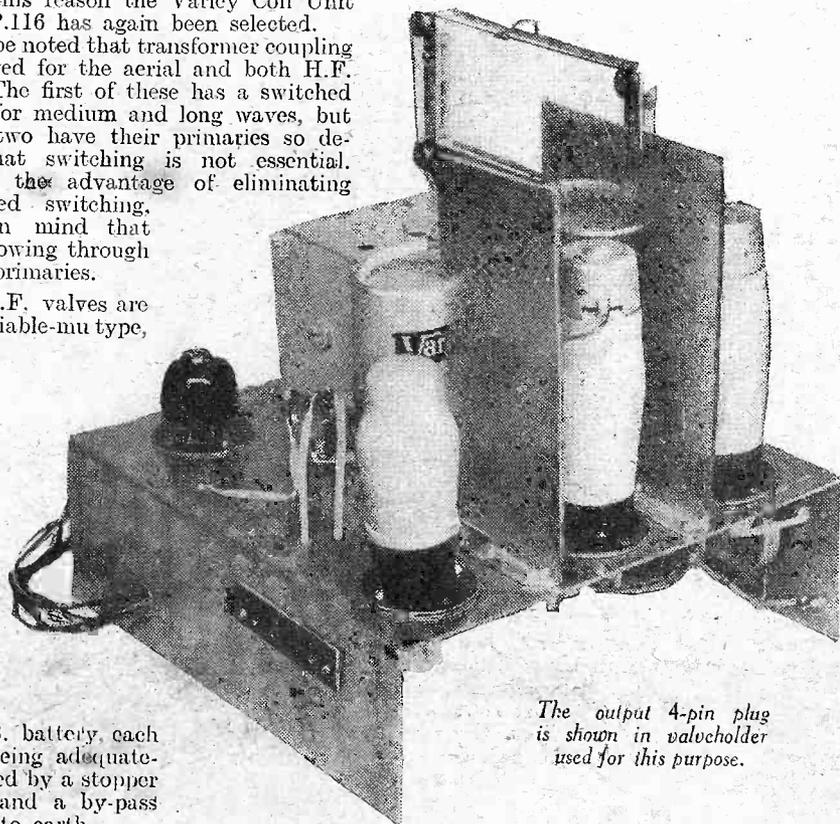
The secondary of the second H.F. transformer, i.e., the third coil, passes the amplified signal on to the grid of the detector via the usual grid condenser and leak combination. A triode is used for this position.

The three secondaries are tuned by a three-gang variable condenser, each section of which has a capacity of .0005 mfd. plus a small trimming condenser which allows the three circuits to be satisfactorily balanced.

In the anode circuit of the detector is inserted an H.F. choke and by-pass condenser to earth, to prevent the passage of unwanted H.F. currents into the L.F. section. This is a very essential consideration with a circuit of this type, therefore the choke should be of reliable make and efficiently screened.

### Output

As it is very desirable for the output leads or sockets to be so connected that they do not carry any direct current in the form of H.T. supply, a simple resistance-capacity coupling is used between the detector anode and output. The anode feed is decoupled sufficiently for all normal requirements, and the only time any



The output 4-pin plug is shown in valvoholder used for this purpose.

modification might be necessary is with some forms of H.T. battery eliminators.

### Construction

Although it is not possible to include the complete constructional details in this article, a few reminders concerning this work will not be amiss.

When two H.F. stages are embodied in a layout, particular care must be given to the placing and wiring of the components and the efficiency of all earth connections.

Where screened connecting wires are shown, see that they are used, and that the metal sleeving is connected to the nearest earth point.

Arrange all resistances so that they are firmly supported, and don't let them straggle all across the chassis by using longer connections than necessary.

For most satisfactory results, solder all connections, taking care to use *tinman's solder* and *proper flux*. If you are not good at soldering, then have some practice until you are able to make a neat and efficient job.

Next week we will publish constructional details of this section of the receiver.

# The "Colt" All-wave Three

Main Constructional Details of the Simple Battery-operated All-wave Three-valve Set which is the Subject of Blueprint PW72

MANY constructors ask for a design of a simple battery-operated all-wave receiver using not more than three valves. For the beginner a baseboard form of construction is often preferred, and when the circuit is of the Detector-2 L.F. type, this may be said to represent a fairly popular type of receiver. The "Colt" was designed on these lines in 1936, and owing to the large demand for blueprints and back numbers describing the main constructional details, the latter are now entirely out of print. Accordingly, we are giving here some of the main details for the use of those who still wish to obtain the blueprint but who are uncertain regarding certain constructional points. The circuit incorporates four separate wavebands—15-35, 30-85, 200-550, and 1,000-2,100 metres. The short-wave coils are arranged in a separate can, and a special five-way switch unit is needed to complete the circuit. As the coils are intended for chassis mounting it is necessary to mount them on their side in this particular receiver, and then the wiring to the switch unit becomes quite a simple task. This also enables the overall height of the receiver to be kept down and a more compact receiver is made possible. The remainder of the circuit is quite standard, R.C.C. components being used to couple the detector and 1st L.F. stages, and a transformer coupling L.F. and output stages.

## Constructional Notes

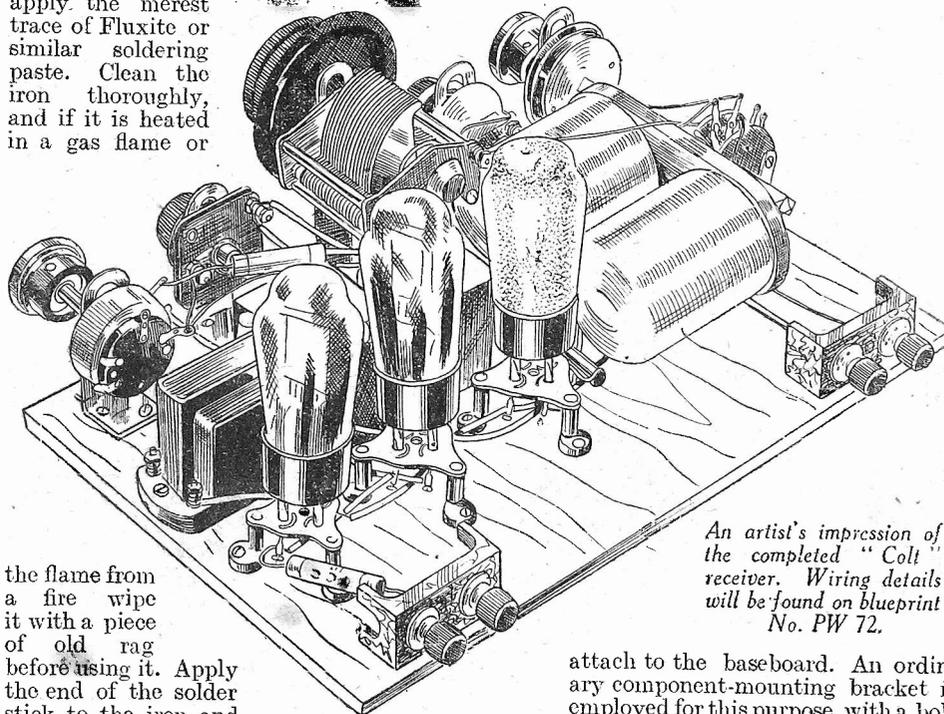
The baseboard should preferably be polished to avoid risk of losses, and if a metallised surface is not adopted, a polished plywood board may be used. The coil and switch assembly should be carried out before these parts are mounted on the baseboard. When purchased, the switch units and the operating rod will, no doubt, be separated (unless a complete kit is obtained) and this facilitates the wiring to the coil unit. If they are assembled, the operating rod and locator plate may easily be withdrawn, as there is no locking device to keep the switch unit in position on the square rod.

The best way of wiring the coil is to attach to each of the contacts on the base, with the exception of No. 4 and that marked E, a good length of tinned copper wire. To avoid the trouble of measuring each length make these wires about 12in. long. Insulated sleeving may be passed over some of these wires, although it is not essential for all of them. It will be noted

as the contacts on the switch unit are wired up, which of these leads run close together and a length of sleeving may then be cut to avoid the risk of short-circuits.

## Making Good Connections

The switch plate and the coil unit utilise soldering tag connections, and, therefore, soldering has to be resorted to in this receiver. Remember, however, that the tags are attached to soft material and make quite certain that a really hot iron is employed and leave it in contact with the tags for the very minimum of time. If this point is not attended to the eyelets may be loosened and the switch will fail to operate satisfactorily. Carefully clean each contact with a piece of well-worn emery cloth and apply the merest trace of Fluxite or similar soldering paste. Clean the iron thoroughly, and if it is heated in a gas flame or



An artist's impression of the completed "Colt" receiver. Wiring details will be found on blueprint No. PW 72.

the flame from a fire wipe it with a piece of old rag before using it. Apply the end of the solder stick to the iron and take off a neat "blob" of solder, put the solder carefully against the soldering tag and it should instantly adhere, removing the iron at once.

Now refer to the switch wiring connections. It will be noted that there are two plates, marked A and B, and on the switch unit, plate B is the one attached direct to the mounting bracket, and when screwed down this is the one farthest from the control panel. The contact points are not

lettered on the actual component, and the letters on the wiring diagram are therefore reference points to the remainder of the wiring. Connect together the three lower contacts on each plate, leaving about one inch of wire projecting from the front plate (plate A), and four inches of wire from plate B. To one of the fixing nuts a soldering tag must now be attached, and the most convenient nut is that on the left, viewing the switch from the front. A two-inch length of wire is then attached to this tag. The switch unit may now be wired to the coil tags, and it will be noted that in four cases there are two wires attached to the coil contacts. Terminal 4 and terminal E nearest to it are now joined together, and the coil unit is ready to

attach to the baseboard. An ordinary component-mounting bracket is employed for this purpose, with a bolt passed through one of the two fixing holes in the foot of the bracket and through the fixing holes in the coil unit. A screw and large washer may then be used to hold down the bracket through the long slot in the arm, and this enables the coil to be accurately positioned when mounting the bracket.

## Finishing the Wiring

The one-hole fixing bush attached to the driver-locator unit should now be attached to a component-mounting bracket, and locked into position with the single nut and indicating plate left off. This may afterwards be attached to the front of the panel by means of the second nut which is provided with the unit. The square driving rod is now pushed through the switch unit, and when the front of the bracket is level with the front edge of the baseboard, the bracket should be screwed down. When the indicating plate is to be attached to the panel the switch should be turned to the extreme left, and then an indicating pointer may be attached to the front so as to give a clear indication of the actual setting of the switch.

(Continued on page 579.)

## LIST OF COMPONENTS FOR THE "COLT" ALL-WAVE THREE

One four-range coil, No. C56 (Bulgin).  
 One driver-locator unit, No. S150 (Bulgin).  
 One five-way contact unit, No. S153 (Bulgin).  
 One .0005 mfd. condenser, No. 2SM (C2) (Polar).  
 One .0003 mfd. diff. reaction condenser (C3) (Polar).  
 One .0001 mfd. Compax condenser (C1) (Polar).  
 Four fixed condensers: .0001 mfd. (type M) (C4), .005 mfd. (C7), .01 mfd. (C6) (type 300 tubular), 2 mfd. (type 65) (C5) (T.C.C.).  
 Three fixed resistors: 2 meg. (R1), 40,000 (R2), 10,000 (R3) (1 watt type) (Erie).  
 One potentiometer, 1 meg. with two-point switch (R4) (Erie).  
 One L.F. transformer, 3/1, No. LT135 (B.T.S.).

One all-wave choke, No. A.W.C1 (B.T.S.).  
 Three four-pin S.W. type baseboard mounting valveholders (Clx).  
 Two terminal blocks with A.E. and L.S. terminals (Belling-Lee).  
 Six plugs: H.T.—, H.T.1, H.T.2, G.B.—, G.B.—1, G.B.—2 (Belling-Lee).  
 Two spades: L.T.—, L.T.— (Belling-Lee).  
 One baseboard, 12in. by 8in. (Peto-Scott).  
 Six component brackets (Peto-Scott).  
 Three valves: D210, L210, P215 (Hivac).  
 One speaker, type 37J (W.B.).  
 H.T. Battery, 120 volts (Drydex).  
 G.B. battery, 9 volts (Drydex).  
 L.T. accumulator (Exide).

# Brief Biographies

## ADELAIDE HALL

**S**TARTING with his broadcasts on February 16th and 23rd, Joe Loss, at the Astoria Ballroom, London, is to use for some of his vocals the celebrated coloured singer of American, British and Continental fame, Adelaide Hall.

Adelaide, whose name first came into the limelight in 1937, when she stepped into the place tragically vacated by the untimely death of the greatly-beloved Florence Mills, is now in this country appearing at the Old Florida, where she is manageress of the artists department for the all-coloured revue, the niterie having now been renamed after her, Chez Adelaide Hall.

Born in Brooklyn, America, it was while on vacation from school—Pratt's University, Brooklyn—that she first sang in public, at a school concert, a common event in the States during Holiday time.

It so happened that Miller, one-half of the stage comics, Miller and Lyles, heard



A recent portrait of Miss Adelaide Hall.

her in these surroundings. At once he dashed back-stage to book her for the show in which he was acting, "Shuffle Along," at the 63rd Street Theatre, despite her youthfulness. She was only sixteen years old but full of confidence and strung along with "Shuffle Along" for a whole year.

This show over, she accompanied Miller and Lyles into another one on Broadway, "Running Wild," and after the run of this expired crossed to Berlin, then travelled on to Hamburg, Vienna, Leipzig, Budapest, Stockholm, Sweden, and Prague, where Adelaide had to leave, as her Mother, angry at her long absence, wired her to come home at once. This was approximately 1925.

A year later, she returned to the stage to play in "Desires of 1927."

Her big opportunity came when Flo Mills died, for immediately Lew Leslie, deprived of his star of "Blackbirds," selected Adelaide as her successor.

Her initial performance for Lew Leslie was in "Blackbirds of 1928." It lasted two years on Broadway and did another four months over in Paris, returning to tour in America for several months more.

For a year she head-lined on R.K.O., and this achievement led to the London Palladium securing her for a brief variety season here in 1931.

Her records have been innumerable, with H.M.V., Decca, Brunswick and Columbia,

and Miss Hall has sung with many noted dance bands, including Fats Waller, Ray Ventura, Willie Lewis, National Scale Orchestra, Fred Elizalde, Jimmy Lunceford, Fletcher Henderson, Rudy Vallee, Major Boles, Duke Ellington and Cab Calloway.

One of her most recent records was with swing pianist Fats Waller playing the organ.

She has been the highest paid coloured artist on the N.B.C. radio network, and was the first singer ever to feature the popular song "Solitude," has appeared in two special feature shorts for Warner Brothers, and is being represented currently by Syd Roy and Felix Mendelssohn, who hope to book her in variety shortly.

Five feet six inches tall, with a most alluring smile, jet black hair and an exquisite taste in clothes—especially sports suits and scarves and sweaters, which she

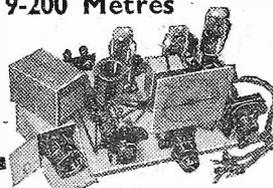
likes in gay colours—she is very much of an athlete, goes horse-riding often and never misses a day swimming during the summer months, but seems to avoid losing or gaining any weight by her devotion to exercise.

Lives in a snug and mellow-lit little house down a West End mews, with many unique gifts her career has brought her situated around her, one typical example being a lamp-shade bearing a few bars of music of many world-famous composers which were inked-in most delicately by one of her fans.

### PATENTS AND TRADE MARKS.

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

**9-200 Metres**



**Short-Wave**

# BARGAINS

Nearly 100,000 short-wave enthusiasts can't be wrong. Secure YOUR N.T.S. kit NOW at an amazing bargain price.

## FREE VALVES!

**New 1-V-2 Band-spread SHORTWAVER**

**Complete Kit—COILS—4 valves FREE!**

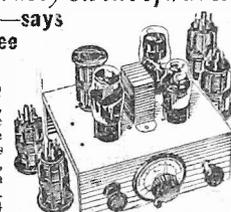
List value £4-19-6

## BARGAIN 49/6

A powerful S.G., Det. I.P., Pentode short-wave receiver employing a special bandspread tuning arrangement and providing amazing efficiency over the effective wave range of 9-200 metres. This is the set for the short-wave Ham and beginner alike. This N.T.S. kit is, of course, supplied complete down to the last screw, coils for 12-94 metres and 4 FREE valves. Yours for 2/6 down and 12 monthly payments of 4/3.

**1-Valve SHORT-WAVER.** A marvellous single valve receiver providing wide-world short-wave results on 12/94 metres. As a special introductory offer to beginners this kit is available with all coils, pair of lightweight 'phones, and free matched valve. List value 55/- BARGAIN. £1/7/6 or 2/6 down and 11 monthly payments of 2/6.

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



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

**YOURS FOR 2/6 DOWN**

**LIGHTWEIGHT 'PHONES**

LIST VALUE 15/-

## 3/6

Ideal for short-wave work and testing. Post 6d. extra.

**ALL-WAVE KITS—VALVES FREE**

"World" Kits are supplied less coils to accommodate those who already possess famous R.T.S. self-locating inductors. Matched and tested valves given FREE.

**ALL-WAVE WORLD S.G.3.** Wave-range 9-2,000 metres, slow-motion tuning. Station-name scale. Kit includes all parts with drilled metal chassis, transformer, etc., and FREE S.G. Det. and Pentode valves. List value of £4/15/0. BARGAIN 29/6 or 2/6 down and 12 monthly payments of 2/10.

**ALL-WAVE WORLD S.G.4.** Employs one more S.G. audio stage than the 3-valve model and all extra components. Station-name scale. 4 valves given FREE. Astounding BARGAIN at 42/- cash or C.O.D., or 2/6 down and 12 monthly payments of 3/9.

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

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

**FREE** Send now for your copy of the N.T.S. Short-Wave Bargain booklet; also Bargain A.C. and Battery Chassis List and valve replacement chart.

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Send now for N.T.S. Bargain List "V" of replacement valves. Amazing offers covering all types. Also your FREE copy of the N.T.S. Short-wave Book.

**BARGAIN**

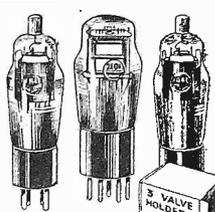
POST FREE **5/6**

LIST VALUE 35/-

**VALVE BEST SELLER.**

Two S.G.'s and a Pentode output, brand new, matched, plus 3 valveholders data and circuit diagrams, for set building, repairs and replacements.

**HURRY!!**



DATA and DIAGRAMS

**1939 All-wave Battery S.G.3**

**AMAZING FAMOUS-NAME OFFER**

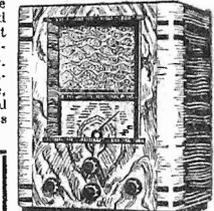
LIST VALUE £8:15:6

## BARGAIN £4:19:9

**5/- secures, balance in 18 monthly payments of 6/4.**

This superb Super All-Wave Battery S.G.3 receiver, as illustrated, will give you programmes from all over the world. Circuit comprises V.M.H.F. Pentode High Efficiency Detector and Harries distortionless output Pentode, 4 Wave-ranges, 14-2,100 metres. Station-name dial. Exquisite walnut cabinet measuring 19 1/2 ins. high, 16 ins. wide, 11 ins. deep. Tone-compensated moving-coil speaker fitted. Less batteries.

**HURRY! SECURE THIS GREAT SET WHILE STOCKS LAST.**



**POWERFUL CLASS "B4" ALL-WAVE CHASSIS Complete with Valves**

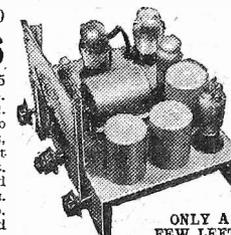
LIST VALUE £7:0:0

**Bargain 79/6**

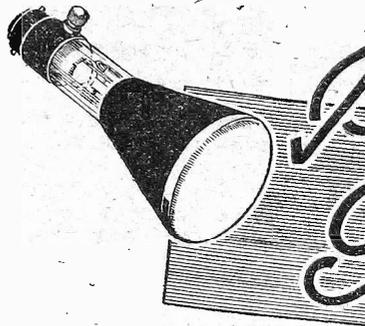
or 5/- down, balance in 15 monthly payments of 6/-.

A snip not to be missed. Volume and range equal to a mains set. 3 wavebands, 15-2,100 metres. Efficient S.G. Bandpass circuit. Station-name dial. Screened coils. Chassis size 11 1/2 ins. wide, 9 1/2 ins. high, 8 1/2 ins. deep. Complete with 4 matched valves. Guaranteed fully tested. Available with matched moving-coil speaker, cash or C.O.D., 24/19/6, or 5/- down and 18 monthly payments of 6/3.

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# Practical Television

February 18th, 1939. Vol. 3. No. 139.

## A Television Survey

IT is apparent that Birmingham is determined not to lose any of its claim to be considered as the next city in which a television transmitter will start operating in this country. Their efforts are to be admired, and should be noted by other provincial cities who feel that they should be considered in any Government scheme which aims at providing a network of stations to cover the television service needs of the bulk of the country's population. In the case of the first-named city, however, an aerial survey has been made of the point to point route between the Alexandra Palace and Birmingham. This was undertaken on the assumption that a radio, and not a cable link, would be employed for relaying the television picture signals from London to the site chosen. If high points are required for erecting the relay stations which receive and then re-transmit the signals, then places mentioned are Ivinghoe, Byfield, or a place near Daventry. In proximity to Birmingham itself there is Walton Hill, near Stourbridge, but the conclusions arrived at from this preliminary aerial flight are that there should be no difficulty in providing a satisfactory signal with only two repeater stations. Incidentally, it is worth remembering that although the main aim is to serve the provinces with programmes relayed from London, because of the high cost involved in providing local programmes, it should be possible to reverse the process and give to London programmes of real interest which may occur within easy reach of the provincial stations. Whether this is contemplated is not yet known, but it is a suggestion which merits close investigation, for it would broaden enormously the national outlook of the television service.

## Television Sound Quality

ALTHOUGH it is generally recognised that the quality of the sound which accompanies a television transmission is superior to that given by ordinary medium and long-wave broadcasting, this should not be allowed to lull the engineers responsible for this side of the work into a sense of false security. Improvements are still needed, especially when outside broadcasts are being undertaken. Here it is essential for the viewer to capture the whole atmosphere of the scene where the event is taking place. The associated noises should therefore predominate, and not the voice of a commentator describing what is happening frequently a phase or two behind as is evidenced by what one sees on the receiver screen. The excitement of the occasion is so frequently lost by the verbal description, and the speaker is apt to forget that the average viewer with good signals is seeing just as much (and often more) as those privileged to be eye-witnesses on the spot. In the case of studio transmissions the sound is much better acoustically, but often the microphone or its shadow has been too much in evidence. It is appreciated that the handling of the boom is a difficult

matter, but special attention should be given to this at rehearsals, for it tends to destroy the degree of illusion which is so essential when watching television pictures in the comfort of the home.

## An Assurance

IT was a happy thought on the part of the authorities to inaugurate the campaign for making the public more television minded by a special morning transmission from Alexandra Palace. Both Mr. Ogilvie and Mr. Stanley made short speeches pointing out how the organising was being undertaken, and stressing that this was the first real co-operative effort of a young and growing industry which bids fair to outstrip many of its rivals. From the

show but little change for a long time. Too often have rumours been spread that prices would tumble down, but if one examines the contents of a modern television set it will be realised that serious price reductions are an economic impossibility unless quality is sacrificed very materially, and picture size reduced. The American boast that even although their own public television service would not start until May, they would sell more television sets by the end of 1939 than Britain would in the whole year, was taken up by the R.M.A. television development committee. There may therefore be a friendly transatlantic contest, and this spirit will be welcomed by all who have the interests of television's rapid development at heart.

## Ultra-short-wave Power

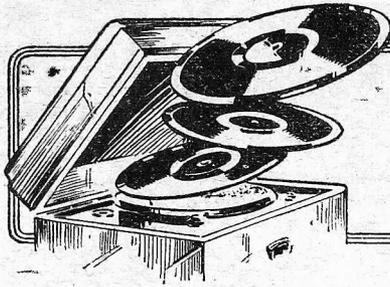
ONE of the main difficulties which has been experienced so far in connection with the use of ultra-short waves for the propagation of television signals is associated with the fact that the rated output power of the transmitter is relatively low when compared with that employed on medium- and long-wave broadcasting stations. There are many technical reasons involved in this problem, but perhaps the most important is the peculiar effects which occur in the high-power valves themselves



Hundreds of motorists who escape to the country each Sunday recently had the eyes of thirty thousand people watching for their slightest driving faults. A television camera with a squad of courtesy cops took shots of bad driving whilst a police superintendent gave a running commentary on the fault. Jasmine Bligh, the television hostess, was present at the demonstration which was held at Bignall's Corner, where St. Albans Road crosses the Barnet By Pass. Our illustration shows Miss Bligh let off with a caution. She is being interviewed by a mobile police officer for careless driving.

public point of view there were two assurances which were welcomed. First of all, in mentioning that continued research would be applied to improve the service technically, Mr. Ogilvie added that all the improvements effected at the transmitting end would in no way upset the performance of sets for some years to come. In other words, there is no fear of early obsolescence in receivers, and a set bought now will be capable of showing pictures of good quality in three or four years time, ignoring, of course, any breakdown in the component parts themselves. In the case of Mr. Stanley, he restored public confidence by stressing that the present price of receivers would

as a result of the high carrier frequencies they are called upon to handle. The use of demountable water-cooled tetrodes, as carried out by the Baird Company with their transmitter is one solution, but it is now learned that a new device is being perfected in America which may serve to overcome some of the present difficulties. Technical details are at the moment rather scanty, but it is learned that the apparatus is capable of generating very high frequencies within itself, and even at high powers the control of the electronic oscillations is not difficult. If equipment of this nature can be perfected, its features will merit investigation by television engineers.



# Impressions on the Wax

## A REVIEW OF THE LATEST GRAMOPHONE RECORDS

### Light Orchestral

**T**HE London Palladium Orchestra, conducted by Clifford Greenwood, has made a new recording of the Suite from Rosse's Incidental Music to the "Merchant of Venice." This consists of two Preludes, an Intermezzo, an Oriental March and the Doge's March. This last is well known from having been used so often as Pageant Music—*H.M.V. C 3072-3*.

Louis Levy's excellent selection from the "Mikado" on *H.M.V. BD 653* will be welcomed by those who have seen the remarkable colour film of the Gilbert and Sullivan opera.

A record that will have a wide appeal is Toscanini's conducting of the B.B.C. Orchestra in the Overture to Mozart's "Magic Flute" on *H.M.V. DB 3550*. It is a great recording of one of the finest Overtures, and ranks with his earlier and quite sensational record of the "Barber of Seville" Overture.

The Coldstream Guards pay a pretty compliment to the youngest band in the Services by playing the "Royal Air Force March Past" coupled with their own march, "Milanollo," on *H.M.V. B 8856*.

The Royal Air Force Band gives excellent account of two fine marches, "National Emblem" and "Imperial Echoes," on *H.M.V. B 8846*, whilst one of the best records by brass bands for some time is provided by the Black Dyke Mills Band, who play a selection from "Il Trovatore" which includes the Anvil Chorus—*H.M.V. BD 643*. This band has been playing for many years in competitions, and has obtained more consistent high awards than any other of the regular competitors.

### From the Shows

**T**HE two big hits from "Under Your Hat," the Courtneidge-Hulbert success now running at the Palace Theatre, London, appear on *H.M.V. B 8865*. The Palace Theatre Orchestra, the two stars of the piece, and the Rhythm Brothers all help the record to go with a swing. On one side is Cicely Courtneidge singing "The Empire Depends on You" and Cicely, Jack and the Rhythm Brothers are all together on the reverse side singing "Keep It Under Your Hat."

There's a story behind a new record by "Fats" Waller in the *H.M.V. February* list, as this great "swing" pianist deserts the piano for the organ. "Fats" received his first training as an organist, and versatility at the piano is only of recent origin. His father was a negro minister who destined his son for the church also, but when the elders heard him swinging the church organ, they thought it "unfittin'" for a church so he became a cinema organist. Now after all these years he can be heard at the organ again, and although his record of "Water Boy" and "Lonesome Road"—*H.M.V. B 8845*, is not issued as a swing record, he contrives to make it swing along very nicely, thank you.

Mildred Bailey and hubby "Red" Norvo are known to all America as Mr. and Mrs. Swing. Before that they were called the King and Queen of Swish. That was because they started a fashion for softer and less noisy swing music. The charm of her voice seems to lie in the vein of hard tone that runs through the apparent softness of her singing. To get a grip of this paradox you should listen to her record of "Dear Old Mother Dixie" and "Too Late"—*H.M.V. B 8847*.

Tommy Dorsey's latest record "Tin Roof Blues" and "Boogie-Woogie" on *H.M.V. B 8854*, should appeal to others besides the swing fans as the rhythm of the first side is very insidious in the way the rhythm is held over changes of tempo.

### Parlophone

**F**OR his latest recording on *Parlophone RO 20431* Richard Tauber sings "One Day When We Were Young" and "I'm in Love with Vienna," both of which are in English.

In the 12in. Classic Series appear two fine orchestral recordings. The first is "Martha" Overture (two parts), played by the Vienna State Opera Orchestra, conducted by Prof. Leopold Reichwein, on *Parlophone E 11392*, the other being "The Flight of the Bumble Bee" and "Khovantchina," Interlude, Act 4, played by the E.I.A.R. Symphony Orchestra, Turin, on *Parlophone E 11393*.

Millicent Phillips, the young girl soprano, (the story of her discovery by Parlophone has appeared previously in these notes) has chosen two songs from the film "That Certain Age" for her latest recording "My Own," and "You're as Pretty as a Picture"—*Parlophone R 2615*.

Ronald Frankau, the popular radio and stage comedian, is extremely funny in "Bare Facts" (monologue) and "The Best Kind of Bad Girls" on *Parlophone R 2620*.

A "Second Waltz Medley" (two parts) is recorded on *Parlophone R 2617* by the Orchestra Mascotte, whilst Herbert E. Groh, the German tenor, sings "Undine" (father, mother, sisters, brothers), and "The Trumpeter of Sackingen" on *Parlophone R 2613*.

Harry Roy and his Orchestra have coupled two popular tunes of the moment on *Parlophone F 1330*. They are "The Umbrella Man" from the film "These Foolish Things" and "Ferdinand the Bull," from the film of that name. His other numbers are "Joseph! Joseph!" and "Day After Day" on *Parlophone F 1340*, and "Goodnight Little Skipper," coupled with "I'm Singing a Song for the Old Folk," on *Parlophone F 1329*.

Leslie A. Hutchinson ("Hutch") has made two new records this month. The first—"If Ever a Heart was in the Right Place," and "This is the Kiss of Romance"—*Parlophone F 1338*, the other, "They Say" and "There's Something About an Old Love"—*Parlophone F 1339*.

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This Way

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**TELEVISIONS**

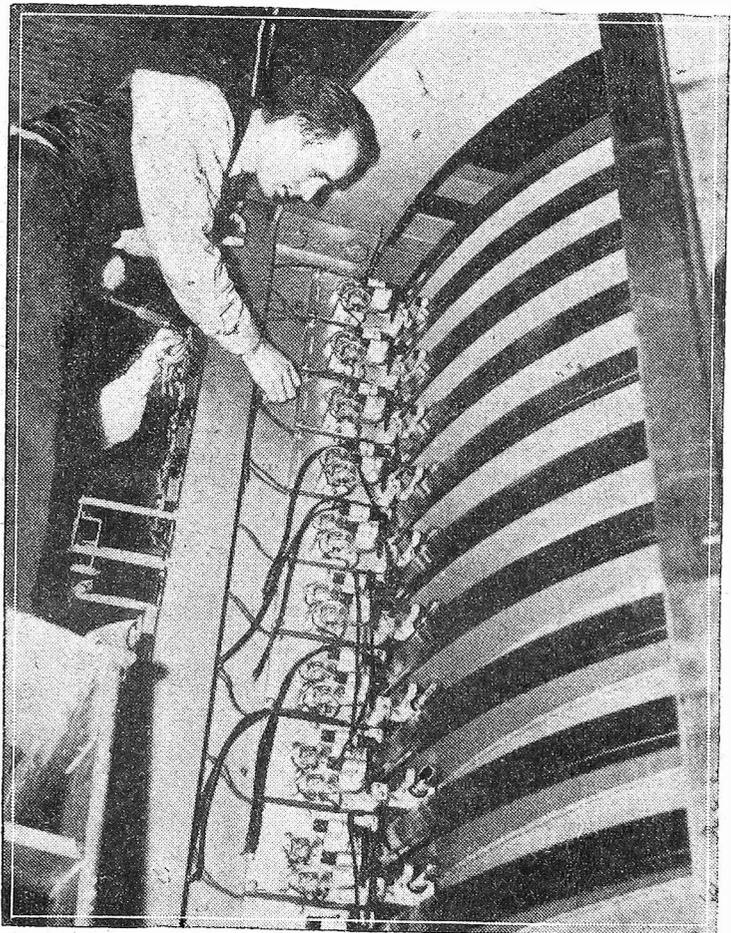
Using Electronic Principles

FROM time to time attention has been drawn to the importance of applying electronic principles to microscopic work. There is no doubt that this is a direct outcome of the research which has been undertaken for television in the field of electron optics. It is as well to remember, however, that the electron microscope as developed to-day can take one of two general forms, according to the particular purpose it is called upon to serve. In the first type the beam of electrons furnished by radiation from a cathode surface is made to irradiate the object undergoing investigation, so that its form can be quite clearly defined on a fluorescent screen or photographic plate mounted in the path of the beam. The apparatus resembles very much the familiar simple microscope, but the optical glass lenses are, of course, replaced by their electron equivalents and the electron beam is used in lieu of the light rays. It is with this form of the instrument that the extremely high magnifications mentioned before in these columns have been achieved. Magnifications up to a figure of 100,000 have been actually measured, and the outstanding benefits of this have already been recognised by the medical and biological sciences when called upon to give chapter and verse for the activities of bacteria that up to the present could only be detected by cruder methods. Very often the earlier work depended on colouring matter or the use of intense light, and this in many cases killed the bacteria and so rendered the work void.

an image of the cathode surface will then be projected on to the normal front screen and may be enlarged where necessary. If a single anode magnetically-operated type of tube is to be used in this manner, then the modulation electrode is used as an anode. This has a positive potential applied to it so that it gives an electrostatic focusing system in conjunction with the original anode. Magnification is then undertaken by altering the direct current flowing through the external solenoidal focusing coil.

A Colour Advantage

WHEN watching television transmissions from Alexandra Palace,



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Another Case

THE actual industrial form of this type of apparatus is complicated and expensive, but when smaller degrees of magnification are necessary then the subject to be examined is focused optically on to a uniform cathode surface. This is electron emitting, and the resulting electron image brought into being is either electrostatically or electro-magnetically focused on to a fluorescent screen for observation, either visually or photographically. This simple principle is often made use of when it is desired to examine the actual nature of the surface of the cathode in a standard form of C.R. tube. To bring this about a correct interrelated adjustment of the first and second anode-potentials has to be made, and

especially when there is a description of the scene involving the mention of the colours of dresses or articles, the viewer quite naturally is set thinking of the time which must elapse before monochrome gives way to colour in his received picture. Wherever television's development is being undertaken on any large scale some attention is being directed towards the achievement of good colour television pictures. The cinema industry has long realised that talking pictures in colour, and of a high quality, are what the public really want, and in the case of television the ultimate aim is the provision of natural colour with stereoscopic relief. It is not known generally that subjects with relatively inferior picture detail can be watched in comfort if colours are present, whereas with a black-and-white reproduction this would not be tolerated.

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# NEWS and H.M.S. KING GEORGE V.

## B.B.C. Overseas News Reorganisation

WE understand that the B.B.C. have reorganised the news services in its Overseas Department. As a measure of co-ordination, the Empire News Service and the Foreign Language News Service, previously under separate editors, have been brought together in an enlarged Overseas News Section, under an Overseas News Editor. To this post, Mr. A. E. Barker, hitherto Foreign Language Service News Editor, has been appointed.

Within the reorganised Overseas News Section, the following new appointments have been made:

As Empire News Editor, Mr. Michael Barkway; as Assistant Empire News Editor, Mr. Clifford Hulme; and as Euro-

pean News Editor (for the services in French, German, and Italian), Mr. W. M. Newton.

The Arabic and the Spanish-Portuguese services, also included in the Overseas News Section, remain under the same editors as hitherto. Since the end of last month, the foreign news bulletins on medium wavelengths have been lengthened from half an hour to forty-five minutes each evening.

## The King to Launch H.M.S. King George V

HIS Majesty the King will journey to Tyneside, on February 21st, to launch the new battleship *King George V*. The entire ceremony will be broad-

cast from the National transmitter, beginning at approximately 3.40 p.m. A running commentary of the proceedings will be given by Lieut-Commander Woodrooffe.

Shortly before the arrival of the Royal party, Lieut-Commander Woodrooffe, to the accompaniment of lively airs by the dockyard band, will describe the picture of the crowds lining the building slip, and the arrangements made for launching the vessel into the Tyne.

As the King arrives the band will strike up the National Anthem. Presentations over, the launching service as laid down by regulations will be held. Immediately following, His Majesty will launch the ship. No speech will be broadcast but listeners may hear the King's voice naming the vessel: Microphones alongside the slipway will convey to listeners the roar of the mighty hull as she slides into the Tyne.

## THE "COLT" ALL-WAVE THREE

(Continued from page 574)

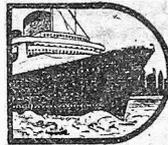
To avoid cutting the spindle of the volume control, and to enable the control knobs all to remain at an equal distance from the panel, the bracket for this component should be mounted slightly back from the front edge of the baseboard. Mount the valveholders first and carry out the wiring to the legs, as these may prove inaccessible when the transformer and remaining components have been fitted. A single length of wire is employed for each filament run, and lengths of sleeving are cut off to slip over between the valveholders, passing the wire through the centre holder and finishing off at the other end. Attach the grid leak to the first valveholder, and lengths of wire to the remaining legs, after which the remaining components may be attached in the positions shown in the wiring diagram.

## Testing Out

Complete the wiring and attach the battery leads, making quite certain that the correct indicating plugs are attached to these. When the receiver is checked and ready for test, the L.T. leads should be attached to the accumulator and the H.T.— and G.B.— should be inserted into the appropriate sockets on these batteries. G.B.—1 should be inserted temporarily in the 3-volt socket of the grid-bias battery and G.B.—2 in the 7.5-volt socket, whilst for preliminary tests H.T.—1 should be inserted into any socket between 80 and 110 volts and H.T.—2 into the 120-volt socket. Rotate the right-hand control in a clockwise direction and the switch will be heard to snap over after a short movement, in which condition the set is on but the L.F. volume control is in the position of minimum volume. As this control is turned farther the volume will be gradually increased. The reaction control should be set to minimum for preliminary tests, and the wave-change switch set to the medium-wave position. The local should be heard and there are no trimming adjustments to be carried out. The voltage at H.T.—1 should be adjusted until smooth reaction effects are obtainable over all wavebands, and in this connection it should be noted that the aerial lead may be attached to point 5 on the coil as an alternative. This will in some cases be found to provide better results on the short waves, but no doubt each listener will try the arrangement with his own aerial system in order to find the most useful adjustment. The series aerial condenser (on the left of the panel) will assist in obtaining maximum selectivity on the medium waves, and the operation of the receiver is extremely simple.

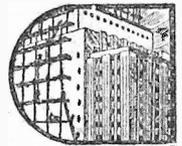
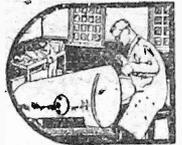


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- Motor Engineering
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- Municipal and County Engineers
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- Novel Writing
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- Pumps and Pumping Machinery
- Radio Communication
- Radio Service Engineering
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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).

## Wind-driven Charging Plant

SIR,—I should like to thank you for the very helpful book "Coils, Chokes and Transformers," received in connection with Problem No. 330, and also for "Sixty Tested Wireless Circuits," awarded me for solving Problem No. 297.

Also congratulations on providing in PRACTICAL AND AMATEUR WIRELESS such interesting and useful information on all branches of radio. I think the component construction articles are particularly helpful.

As I am in a country district some distance from a charging station and not on the mains, batteries are still rather a problem. Could you publish some information about wind-generators, about proprietary models (including American), and those for amateur construction, with details of types of dynamo, speed, shape of propellers, best angle of vanes, etc.

I realise that in normal times this subject might not appeal to many readers, but in the present rather unsettled conditions, with the possibility of mains supply being cut off, I think readers would be glad to have information on the subject.

I remember some time ago you published a photo of equipment presented by Messrs. E. K. Cole, to Tristan da Cunha, which included a wind-generator.

Apparatus of this sort has, I believe, been available for some time in the U.S.A., where, of course, things are in general more scattered, but I think that people in this country would be interested in a suitable model offered at a reasonable price.—J. P. COOK (Chepstow).

## A Simple U.S.W. Adapter!

SIR,—I think it is agreed that the A.F. side of a modern commercial superhet gives a much better frequency response than that of its pre-detector circuits. To take advantage of the quality of the television sound programmes, it would be better to use an adapter which would be plugged into the pick-up terminals on the broadcast set, than to use a converter.

I, and I daresay other readers, would like to see a brief description of a simple adapter, say, R.F. and detector, which would pick up the television station with the minimum of distortion. Would it be possible for you to give space to the description of such a unit to be either mains or battery operated?—W. W. LLEWELLYN (London, S.W.).

[Are any other readers interested in apparatus of the type referred to in the above two letters?—ED.]

## Voltage Tests with Mains Transformers

SIR,—Re your interesting articles "Making Your Own Components," I should like to pass this small piece of information re mains transformers. When the constructor has assembled his transformer,

he will include it in a "power pack" for his receiver and will want to prove that it is functioning properly; voltage and current tests will be carried out.

The methods of taking these readings have been stressed in PRACTICAL AND AMATEUR WIRELESS, but a small slip a beginner makes is this:—250-0-250 volt secondary; a reading across the anodes of the rectifying valve (full wave), will be 500 volts A.C. and not 250 volts A.C., as it might be thought by a beginner to radio, resulting in probable damage to their meter through setting it at the wrong range.—JOHN W. LEECH (Llandudno).

## Station XGOY—Nanking

SIR,—In regard to a paragraph published in your short-wave notes of January 28th, I wish to inform you that I tuned in the Chinese station—XGOY—quite clearly on Sunday evening last, at 9 p.m. The news was in English regarding the Sino-Japanese hostilities. On signing off they gave XGOY, 31.5 metres, Nanking.—EDWARD BRADLEY (Wolverhampton).

## A Good Log from North London

SIR,—As there seems to be considerable interest nowadays in seeing "what the other fellow gets," I thought that other readers would be interested to see my log. I use a seven-valve commercial superhet with various antennas. The following are some of the stations I have received: W1AXA, BLO, FMP, GED, IXO, JFG, KKG, TW, WE; W2DX, ECR, EOA, GIZ, GUX, HFS, HS, IXT, IXY, PP; W3AIR, AXT, CRG, CZJ, DHM, DNZ, EMM, OEZ, FGN, FJU, FSD, GWL, LN, MD, PX; W4AH, CDG, CYU, DCR, EQA, EZL; W5DEW; W6PER; W8GLC; LNW, OAL, OAR, QGW; W9BCV, BCW, BDE, RUK, VXC; FA3HC; ON4CC, DA, DB; PY1FR; PY3BX; VE1CM, DQ, EI; VE2BG, CC, EE, JV; VE3FA; SU1AM; ES5C; F3AP, HL, KQ, PR, SH; F8KK; E17M; 111Y, FB; ZB1L; CT1QG, QN, QV, PM; YR5AA; SM2VP; SM5YU; HB9BB, BR; and YV5ABY.

I have written to two of your correspondents, namely, F. D. Drew, and Derrick Walker, but I should be pleased to hear from any other short-wave experimenters, and so make a "four-way" or more of it. I should especially like to get in touch with any B.L.D.L.C. members in this district.—P. L. EVERRETT (4, Clifton Road, Alexandra Park, London, N.22).

## Amateur Transmitting—the Friendly Spirit!

To "A Genuine Guy Still."

DEAR O. M.—I was pleased to see that my "sour grapes" letter had been accepted by you in such a friendly spirit. Believe me, I had no intention of implying that you had made a mistake in your facts,

There is a world of difference between amateurs and "hams." You were unlucky in only meeting amateurs. I cannot say what the ratio is for the south, but here in the north, amateurs who are not also "hams" are few and far between. As regards my "pet corn," I hold no brief for the transmitting world in general, but my experience has been that the "ham spirit" is a very real thing, and I could not allow what I took to be a wholesale condemnation pass without some attempt to state the other side of the question; and as for the "harsh words" with which I did it, I think that anyone who read both our letters will agree that it is a case of the kettle calling the pan black!! Frankly, I cannot explain why the G.P.O. grant licences to some people and refuse them to others. I can only say that as the G.P.O. is an organisation and not an individual, they cannot be accused of unfairness, especially as each licence is judged on its merits.

As regards junior A.A. licence holders and qualified knowledge, A.A. licences are issued to enable prospective full calls to gain the necessary experience. This is self-evident, as calls are only issued to those with experience, and to gain experience, legally, you must have a call. I cannot remember any technical knowledge being required for an A.A. call. A knowledge of morse, even, is not necessary.

To conclude, I should like to thank the Editor of PRACTICAL AND AMATEUR WIRELESS for his courtesy in allowing us both to express our views, and now, as far as I am concerned, this discussion is closed, at least in these pages. I, too, regret that it is impossible for us to meet in person, as I certainly meant my invitation.

So, with vy 73's es sure hpe cush, in the very best "ham spirit."—NORMAN A. L. TIMBERS (G5TR) (Rossendale, Lancs).

CUT THIS OUT EACH WEEK.

# Do you know

—THAT an H.F. choke may sometimes be dispensed with in the anode circuit of a detector valve.

—THAT in the above case the transformer primary winding or anode resistance will provide sufficient choking effect.

—THAT an earth lead should preferably be screened or at least prevented from touching earthed objects until it enters the ground.

—THAT capacity between an aerial terminal and a metal chassis can introduce signal losses.

—THAT not more than two L.F. transformers should be employed in a straightforward receiver.

—THAT accumulator terminals may be kept smeared with petroleum jelly to avoid corrosion.

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

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

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# RADIO CLUBS & SOCIETIES

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

## THE CROYDON RADIO SOCIETY.

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

Meetings: Tuesdays at 8 p.m.

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

WHEN Mr. P. G. A. H. Voigt visited the Croydon Radio Society on Tuesday, January 31st, standing room only resulted for late comers in St. Peter's Hall, Ledbury Road, S. Croydon. Mr. P. G. Clarke presided, and welcomed the large number of visitors, including many readers of PRACTICAL AND AMATEUR WIRELESS. Mr. Voigt said we had to thank the B.B.C. and its transmission from Alexandra Palace for a source of better quality. On the ultra-short waves used, of course, the frequencies were considerably extended up the spectrum. Of no little interest to the society as a quality seeker was Mr. Voigt's corrector circuit, situated in the loudspeaker's speech circuit. He did think that his method, which was fully discussed on the blackboard, was a better solution for top-note cutting than the "knob marked mellow" beloved by some set manufacturers.

Nor were members disappointed with results, as on the television sound transmission, the reproduction was extraordinarily lifelike and brilliant. Quality on medium waves was well up to Mr. Voigt's own standard, and the meeting noticed the improved top response due to his new twin diaphragm. Many records were played, particularly interesting being a recording by Mr. Stuart Davies of Sir Thomas Beecham conducting the London Symphony Orchestra in the Davis Cinema, Croydon. Next Tuesday, February 21st, the Mullard Wireless Service Co., Ltd., will lecture on the latest valve and television developments.

## RADIO, PHYSICAL AND TELEVISION SOCIETY.

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

Meetings: Friday evenings at 8.15 p.m.

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

ON Friday, February 3rd, Mr. Wilkins, of The Automatic Coil Winder and Electrical Equipment Co., Ltd., lectured on "Electrical Measuring Instruments." In the course of Mr. Wilkins' lecture particulars were given of many instruments, particular attention being paid to methods of protecting instruments against accidental overloads either by means of fuses or by mechanical devices, such as are employed with the well-known Type 7 Avometer. Details were given of methods of valve-testing, and of the difficulties encountered in the design of an instrument capable of testing all makes of modern valves. A new type of ohmmeter which had been on show at the recent Physical Society's Exhibition, but which was not yet on the market, was also described. This small and relatively cheap little instrument works on an entirely new principle, and is designed for measuring contact resistances, and other resistances of extremely low value.

Orthcoming events include lectures by representatives of The Marconiphone Company, Ltd., Mullard Wireless Service Co., Ltd., and Messrs. Negretti and Zambra.

Further particulars may be obtained from the hon. secretary.

## THE EAST SURREY SHORT-WAVE CLUB.

Headquarters: 111, Station Road, Redhill, Surrey.

Meetings: Alternate Thursdays, 8 p.m.

Hon. Sec.: Mr. Leslie Knight (G5LK).

ON January 19th, G6JF gave a talk and demonstration of his home-recording apparatus. After making one or two individual records, all members present were invited to attempt to make a general record, which when replayed caused great amusement.

The General Discussion night of February 2nd, although attended by only a dozen or so members, was not lacking in enthusiasm: various problems were raised, many of which contained extremely interesting points.

The club, which is nearing its first birthday, now boasts of sixteen fully-licensed transmitters, and seven A.A.'s.

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# IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, February 15th.—Symphony Concert from Queen's Hall, London.

Thursday, February 16th.—Military Band programme.

Friday, February 17th.—Manon, an opera by J. Massenet.

Saturday, February 18th.—Music Hall.

## REGIONAL (342.1 m.)

Wednesday, February 15th.—Drama at Daventry by Neil Tuson, from Midland (Broadcast in November, 1938).

Thursday, February 16th.—The Haslewood Diamond, a play for the radio by Arthur Watkyn, from Welsh.

Friday, February 17th.—Theatre Royal, Cheltenham, a page of theatrical history, 1783-1839, specially written for broadcasting by Wilfrid Rooke Ley, from Midland (First broadcast on January 5th, 1938).

Saturday, February 18th.—The Siege, an incident of the Spanish Civil War, by Geoffrey Moss.

## MIDLAND (297.2 m.)

Wednesday, February 15th.—Drama at Daventry by Neil Tuson (Broadcast in November, 1938).

Thursday, February 16th.—Midland Magazine, February Number.

Friday, February 17th.—Theatre Royal, Cheltenham, a page of theatrical history, 1783-1839, specially written for broadcasting by Wilfrid Rooke Ley (First broadcast on January 5th, 1938).

Saturday, February 18th.—Sport in the Midlands.

## WEST OF ENGLAND (285.7 m.)

Wednesday, February 15th.—Made in the West—3, Cornish Pilchards.

Thursday, February 16th.—Orchestral programme, from the Royal Exeter Hotel, Bournemouth.

Friday, February 17th.—Western Magazine.

Saturday, February 18th.—Table Tennis: West of England Championship—a commentary on part of the finals by Ralph Rossiter, from the Palace Hotel, Torquay.

## WELSH (373.1 m.)

Wednesday, February 15th.—Motets and Anthems: Cardiff Musical Society from Llandaff Cathedral.

Thursday, February 16th.—The Haslewood Diamond, a play for the radio by Arthur Watkyn.

Friday, February 17th.—Amenity Maketh Man, or Background is as Background does, an address at a meeting of the Cardiff Business Club.

Saturday, February 18th.—Orchestra concert.

## NORTHERN (449.1 m.)

Wednesday, February 15th.—Slices of Life, by Mary Luly.

Thursday, February 16th.—Northern Music Hall: Variety from the Savoy Theatre, Scunthorpe.

Friday, February 17th.—Programme of music by William Shield.

Saturday, February 18th.—Northern Choral Singing, Maia Ladies' Choir, Stockport.

## SCOTTISH (391.1 m.)

Wednesday, February 15th.—An Evening's Concert (in Gaelic).

Thursday, February 16th.—Orchestral programme.

Friday, February 17th.—Pipe Band.

Saturday, February 18th.—Scottish Dance Music.

# LATEST PATENT NEWS

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

**TELEVISION.**—Baird Television, Ltd., and Jones, V. A. No. 495331.

Line synchronizing pulses are derived by frequency multiplication at 2, 4, from a source 1 while frame impulses are derived from source 1 without frequency multiplication; due to the circuits 3, 5, (e.g. band-pass filters), the time of inception of the first line pulse will be different from that of the first frame pulse and this difference will vary with variation of frequency of the source 1. Such variation is prevented by

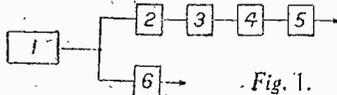


Fig. 1.

the introduction of a circuit 6 whose time delay varies with frequency in the same degree as that of circuits 3 and 4 combined. The circuit 6 is preferably a band-pass filter identical in configuration with the filters 3, 5, and the reciprocal of its percentage band-width is equal to the sum of the

reciprocals of the percentage band-widths of the filters 3, 5 (Fig. 1). Specification 479935 is referred to.

## VARIABLE CONDENSERS; SOLDERING.

—Naamlooze Vennootschap Philips' Gloeilampenfabrieken. No. 494491.

An electrode, for a variable condenser, adapted for longitudinal movement, is made by causing a resilient metal strip to engage along one edge in a matrix or jig suitably recessed, the other edge being secured to, for example, a disc by soldering. In the example, a jig is formed by winding about a core 3,

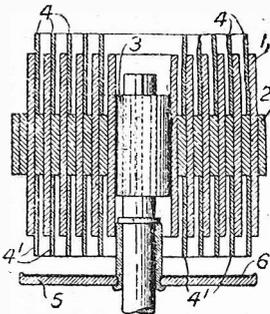


Fig. 2.

strips 1, 2 of differing width. Into the recesses thus formed on both sides, strips 4, 4' are engaged to form spirals which can be secured by applying a disc 5 with a solder face 6 and heating. (Fig. 2.)

**PROJECTION SCREENS.**—Weinreb, H. (Kudar, H.). No. 493337.

A projected picture such as a television image is viewed in a room lit by sources 1, 5 (Fig. 3) emitting light of selected wavelengths, and filters absorbing such wavelengths are incorporated in the projection

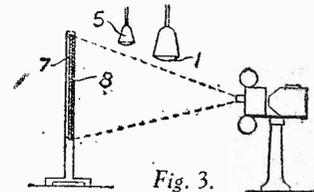


Fig. 3.

screen or are interposed between the observer and the screen. The lamps 1, 5 emit yellow and blue light and the screen 7 comprises a frosted mirror of glass containing neodymium or didymium behind a yellow filter 8. If the sources emit red or blue light, filters containing rare earths of the yttrium group are used, e.g. holmium, erbium, thallium. Specification 450513 is referred to.

## NEW PATENTS

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

### Latest Patent Applications.

- 1998.—Baird Television, Ltd., and Tingley, G. R.—Magnetic deflecting means for electron-discharge devices. January 20.
- 1997.—Baird Television, Ltd., and Nuttall, T. C.—Circuit arrangements for television, etc., systems. January 20.
- 2546.—Cole, Ltd., E. K., and Martin, A. W.—Tuning arrangements for radio-receivers. January 25.
- 2513.—Edwards, J. W. H., and Coleman, H. G. M.—Regenerative radio-receivers. January 25.
- 2528.—Ehrenberg, W.—Cathodes for electron-discharge devices. January 25.
- 2649.—Jones, W., and Pye, Ltd.—Television, etc., systems. January 25.
- 2175.—Philco Radio and Television Corporation.—Push-button volume control device for radio-receiving sets. January 21.
- 1940.—Pye, Ltd., and Dalglish, J. W.—System of range-finding, etc. January 19.

2374.—Taylor, H. C.—Radio-receivers. January 24.

### Specifications Published.

- 499132.—Radioakt.-Ges. D. S. Loewe. Band-filter coupling circuit for television amplifiers.
- 499028.—Wallace and Tiernan Products Inc.—Radio signalling systems.
- 498927.—Marconi's Wireless Telegraph Co., Ltd., Rust, N. M., and Hills, E. F.—Tuning-control systems for radio receivers and the like.
- 498945.—General Electric Co., Ltd., and Espley, D. C.—Apparatus for the transmission of television and the like.
- 499080.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Wireless receiving-sets.
- 499108.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Apparatus, such as radio receivers, for converting acoustically-modulated oscillations into sound oscillations.
- 499359.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Radio receiving apparatus comprising means for facilitating tuning. (Addition to 418858).

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

## TELEVISION IN THE PROVINCES

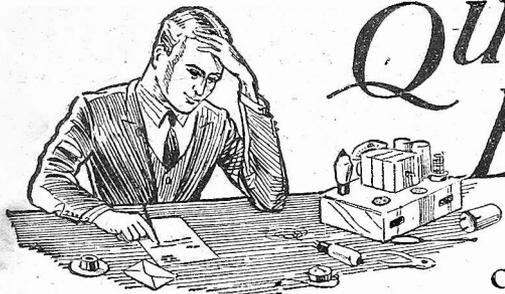
THE large provincial cities are certainly taking this television question seriously and anticipating the day when they will have their own service of signals within range of their own boundaries. For example, it has just been learned that in Manchester a new hotel costing over half a million pounds is being planned for erection soon. Not content with providing all the usual conveniences and comforts at reasonable prices, the architects state that every room will have a telephone and cloakroom, and be wired for radio and television. Guests will therefore be able to look in and listen in to any transmissions which come within range of the receiving equipment installed in a convenient position, generally on the roof of the building. So far as is known no hotel in this country has taken steps to install a television distribution system, although many blocks of modern flats in London include television plug points as one of the amenities for prospective tenants. A main aerial and receiving set connected to a distribution amplifier ensures that at each plug termination signal strength is adequate to operate a normal form of television receiver. In Germany they have gone one stage farther for flat working. One company has developed a scheme whereby in each suite of rooms points are provided which serve a similar purpose to loudspeaker extensions. Just as it is possible to plug in a loudspeaker in any room, leaving the main receiving set in one fixed position, so a television picture unit is provided which is shorn of almost all equipment except for a cathode-ray tube and loudspeaker. For this to be done satisfactorily the signal distributing cable is of a very complex and expensive character, for it must furnish line and frame scanning potentials, power feeds to the cathode-ray tube, an E.H.T. supply, as well as vision and sound signals, at a sufficiently high level to modulate both the cathode-ray tube and loudspeaker effectively. This is by no means an easy matter, but it was devised with the object of providing tenants of the rooms with television pictures at a low cost.

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# QUERIES and ENQUIRIES

aluminium as being the most suitable for all ordinary purposes.

## One-valve Transmitter

"I wonder if I could use a 'Home Broadcaster' mike in place of your recommended component in the one-valve battery transmitter. If so, would the connections from the mike be to the crystal and valve as in the circuit? Also, what would be the best type of L.F. choke in this set?"—F. H. (Dublin).

YOU could use the microphone in question, and if this has a built-in transformer, then the output should be taken to the two points normally connected

## 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.

to the secondary of the transformer in the circuit, as shown. The choke required is the Varley D.P. 11.

## Accumulator Charging

"The mains here are D.C. and I wish to charge my accumulator. Is it true that by putting a lamp in series with the accumulator it will charge, and if so, which does the lamp go between—negative or positive. Also, which is it that bubbles when placed in water?"—A. W. (Norwich).

IT is quite in order to utilise your D.C. mains for charging, providing a lamp of the same mains voltage is in series with the leads to the accumulator. For most satisfactory results an ammeter should be included in series to ascertain the current which is flowing. When testing mains polarity with the leads in water a lamp should be included in the live lead to avoid the risk of a short-circuit, and the negative lead will give rise to the bubbles.

## Battery Short-circuit

"Please can you tell me the cause of my H.T. battery and accumulator running away so quickly? The battery is 120 volts purchased only two weeks ago and is now finished, and the accumulator only lasts about three days. The set is three or two valves (detector and two L.F.). The grid battery is quite in order."—F. C. (Glasgow, S.E.1.).

IT would appear that there is a short-circuit in some part of the receiver and this may be confirmed by connecting a milliammeter in the H.T. negative lead. This will give the total current flowing and you can then compare this with the total of the valves and thus ascertain whether there is an additional drain on the battery. A stage-by-stage test will be necessary to locate the source of the trouble but we suspect a faulty by-pass condenser or crossed leads. If all the valves are removed there should be no current reading on the meter and no current should be taken from the accumulator.

## Volume Control and Superhet

"I have a superhet with double-diode-triode secondary detector and L.F. circuit and, unfortunately, there is no provision for pick-up connections. I have tried my pick-up joined to the grid circuit of the output pentode, but this gives insufficient amplification. What is the simplest way of adding it to the set to get more amplification without altering the wiring too much?"—H. E. (Perth).

NO doubt the receiver is provided with a volume control which is connected so that the arm of the control is joined to the grid of the triode section of the D.I.F. valve. In that case the simplest way of adding the pick-up is to join it across the volume control. If there is no such control the pick-up may be joined to the grid circuit of the triode section.



## 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.

**H. B. (Beckenham).** We recommend the Record All-Wave Three, and parts may be obtained from Messrs. Peto-Scott.

**J. R. (Glasgow).** We have not taken over any details, and as the paper is no longer published we regret that we are unable to assist you.

**E. M. L. (Repton).** The gauge is 36 S.W.G., but it appears to be a special resistance wire, probably nickel-chrome. Write to Messrs. Bulgin who may be able to supply a replacement.

**M. S. (Liverpool, 21).** There is no blueprint, but the coil connections are quite standard, and you should experience no difficulty. Any good choke may be used.

**P. N. (Richmond).** The valve is a standard S.G. component, with anode at the top and the side terminal is the cathode connection.

**W. W. S. (E.7).** We suggest you follow the articles which we published each week in these pages, and perhaps also obtain the "Wireless Constructor's Encyclopedia."

**A. R. W. (Ashford).** Three valves in an S.G. detector L.F. combination should be perfectly satisfactory. Mains apparatus may prove, ultimately, to be cheaper to maintain, but this depends upon how much you have to pay for electricity.

**A. H. (S.E.9).** The meter could be used with any receiver, even a one-valver.

**R. B. (Grantham).** The device in question was for restoring cabinets and not for use with a pick-up. You will find a circuit for your purpose in the article in this issue on Home Recording.

**S. W. C. (Chelmsford).** We cannot recommend one of our sets to build from the parts in question. One of the receivers now being described for the use of old parts may, however, meet your requirements.

**W. S. (Crayford).** You can use any good commercial coil in the set. We suggest a Bulgin C.69.

**E. B. D. (S.W.11).** We are unable to send the prints, but the Pyramid one-valver should meet your requirements. A dry battery could be used but would need frequent replacement. Forty volts is a little on the low side, but may prove suitable in your particular case.

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

## Push-pull Grid Bias

"I have constructed a set in which I propose to use a pair of Hivac PX.230 valves in Class A push-pull, supplying them with 150 volts from an H.T. unit. I should be glad if you would advise me regarding what amount of G.B.-voltage should be used with these valves. According to the valve data sheet they require 15 volts negative at 150 volts for a single valve. Now I have been informed that for push-pull working this should be halved to 7½ volts only. Will you tell me if this is correct? If not, what is the right bias to give?"—T. W. B. (Plymouth).

WHEN battery valves are employed in a Class A push-pull circuit, with battery bias, the same voltage is required as that needed for the single valves. Thus, in your case you should apply 15 volts. If, however, you use a split secondary push-pull input transformer, you can modify the bias slightly for each valve so as to balance the anode current, but it is incorrect to state that only half the bias is needed for push-pull working. Your informant has probably become confused with automatic biasing arrangements, where a single bias resistor is employed and thus the anode current of both valves will be flowing through the resistance thus calling for a modification in the resistance value.

## Increasing Voltage

"I would be very much obliged if you could tell me what type of rectifier to use when you step up from 6 volts to 120 volts."—C. G. (Falkirk).

YOUR query is not very explicit, but in its simplest form all that is necessary to increase 6 volts to 120 volts is to use a step-up transformer. This can, however, only be done where the 6-volt supply is A.C. and you cannot transform D.C. If, therefore, you wish to obtain H.T. at 120 volts from a 6-volt D.C. source it will be necessary first to convert the D.C. into A.C. (or pulsating D.C.) and then transform it, afterwards rectifying it again to obtain a smoothed D.C. for H.T. purposes. It is possibly this idea which you have in mind and a special vibratory rectifier for the purpose is then used. Messrs. Bulgin can supply this upon receipt of details concerning the current requirements.

## Chassis Materials

"Would you please advise me on the comparative merits of aluminium, brass and copper (sheet) respectively as covering for the wood baseboard and front panel of (a) a short-wave receiver, and (b) a two-valve transmitter?"—H. G. C. (Nottingham).

OF the materials mentioned copper is the most efficient, but is more expensive and not so easy to "work" as aluminium. Brass would not be as satisfactory as either the aluminium or copper and therefore we suggest the

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 The "Pyramid" One-valver (HF Pen) .. 27.8.33 PW93

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

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Sixty Shilling Three (D, 2 LF (RC & Trans)) .. — PW34A

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Summit Three (HF Pen, D, Pen) .. — PW37

All Pentode Three (HF Pen, D (Pen), Pen) .. 29.5.37 PW39

Hall-mark Three (SG, D, Pow) .. 12.6.37 PW41

Hall-mark Cadet (D, LF, Pen (R)) .. 16.3.35 PW48

F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three) .. 13.4.35 PW49

Genet Midget (D, 2 LF (Trans)) .. June '35 PM1

Cameo Midget Three (D, 2 LF (Trans)) .. 8.6.35 PW51

1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) .. — PW53

Battery All-Wave Three (D, 2 LF (RC)) .. — PW55

The Monitor (HF Pen, D, Pen) .. — PW61

The Tutor Three (HF Pen, D, Pen) .. 21.3.36 PW62

The Centaur Three (SG, D, P) .. 14.8.37 PW64

F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) .. 31.10.36 PW69

The "Colt" All-Wave Three (D, 2 LF (RC & Trans)) .. 18.2.39 PW72

The "Rapide" Straight 3 (D, 2 LF (RC & Trans)) .. 4.12.37 PW82

F. J. Camm's Oracle All-Wave Three (HF, Det, Pen) .. 23.8.37 PW78

1938 "Triband" All-Wave Three (HF Pen, D, Pen) .. 22.1.33 PW84

F. J. Camm's "Sprite" Three (HF Pen, D, Det) .. 26.3.33 PW87

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

Pury Four Super (SG, SG, D, Pen) .. — PW34C

Battery Hall-Mark 4 (HF Pen, D, Push-Pull) .. — PW46

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

All-Wave "Corona" 4 (HF Pen, D, LF, Pow) .. 9.10.37 PW79

"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B) .. 12.2.33 PW83

The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) .. 3.9.33 PW90

Mains Operated.  
 Two-valve : Blueprints, 1s. each.  
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 A.C.-D.C. Two (SG, Pow) .. — PW31  
 Selectone A.C. Radiogram Two (D, Pow) .. — PW19

Three-valve : Blueprints, 1s. each.  
 Double-Diode-Triode Three (HF Pen, DDT, Pen) .. — PW23  
 D.C. Ace (SG, D, Pen) .. — PW25  
 A.C. Three (SG, D, Pen) .. — PW29  
 A.C. Leader (HF Pen, D, Pow) .. — PW35C  
 D.C. Premier (HF Pen, D, Pen) .. 31.3.34 PW35B  
 Ubique (HF Pen, D (Pen), Pen) .. 23.7.34 PW36A

Armad Mains Three (HF Pen, D, Pen) .. — PW33

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

## SUPERHETS.

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 F. J. Camm's A.C. £4 Superhet 4 .. 31.7.37 PW59  
 F. J. Camm's Universal £4 Superhet 4 .. — PW60

"Qualitone" Universal Four .. 16.1.37 PW73

Four-valve : Double-sided Blueprint, 1s. 6d.  
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 Midget Short-wave Two (D, Pen) .. — PW38A  
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Three-valve : Blueprints, 1s. each.  
 Experimenter's Short-wave Three (SG, D, Pow) .. 30.7.38 PW30A

The Perfect 3 (D, 2 LF (RC and Trans)) .. 7.8.37 PW63

The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) .. 1.10.33 PW68

## PORTABLES.

Three-valve : Blueprints, 1s. each.  
 F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) .. — PW65

Parvo Flyweight Midget Portable (SG, D, Pen) .. 19.6.37 PW77

Four-valve : Blueprint, 1s.  
 "Imp" Portable 4 (D, LF, LF, Pen) .. 19.3.33 PW86

## MISCELLANEOUS.

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 Class B Three (D, Trans, Class B) .. — AW386  
 New Britain's Favourite Three (D, Trans, Class B) .. 15.7.33 AW394

Fan and Family Three (D, Trans, Class B) .. 25.11.33 AW410

£5 5s. S.G.3 (SG, D, Trans) .. 2.12.33 AW412

Lucerne Ranger (SG, D, Trans) .. — AW422

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

Lucerne Straight Three (D, RC, Trans) .. — AW437

Transportable Three (SG, D, Pen) .. — WM271

Simple-Tune Three (SG, D, Pen) .. June '33 WM327

Economy-Pentode Three (SG, D, Pen) .. Oct. '33 WM337

## Mains Operated.

Two-valve : Blueprints, 1s. each.  
 Consocietric Two (D, Pen) A.C. .. — AW403  
 Economy A.C. Two (D, Trans) A.C. .. — WM286  
 Unicorn A.C.-D.C. Two (D, Pen) .. — WM394

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

£15 15s. 1936 A.C. Radiogram (HF, D, Pen) .. Jan. '36 WM401

Four-valve : Blueprints, 1s. 6d. each.  
 All Metal Four (2 SG, D, Pen) .. July '33 WM326  
 Harris' Jubilee Radiogram (HF Pen, D, LF, P) .. May '35 WM386

## SUPERHETS.

Battery Sets : Blueprints, 1s. 6d. each.  
 Modern Super Senior .. — WM375  
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 The Request All-Waver .. June '36 WM407  
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Two HF. Portable (2 SG, D, QP21) .. — WM363

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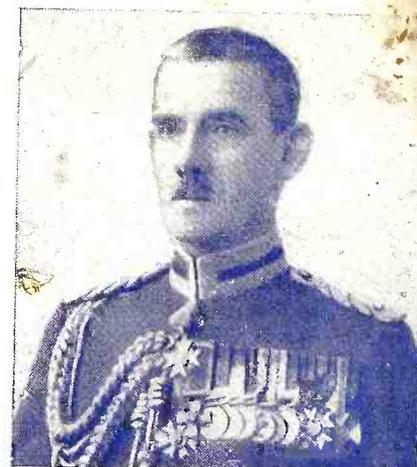
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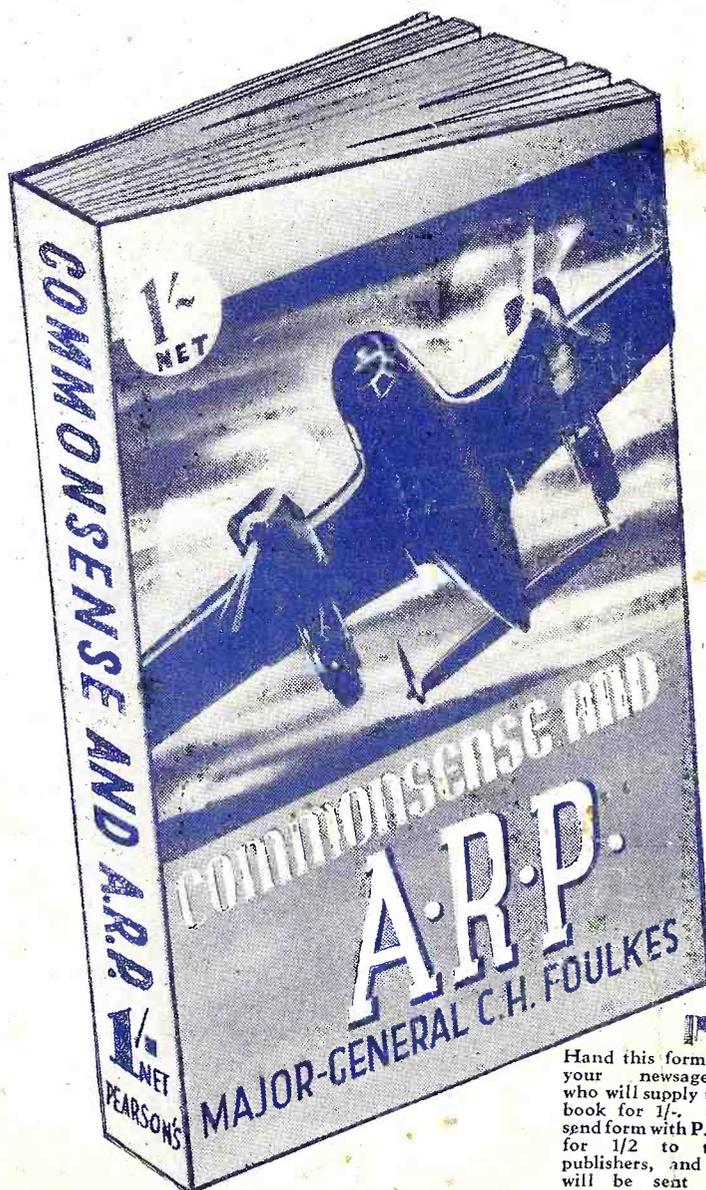
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