

A SIMPLE TWO-VALVE SHORT-WAVER—See Page 63.

Practical and Amateur Wireless

3^d
EVERY
WEDNESDAY

Edited by F.J. CAMM

A GEORGE
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April 3rd, 1937.

AND PRACTICAL TELEVISION



VALVES

Types & Purposes

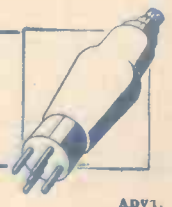
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THE HEART OF THE SUPERHET —SEE PAGE 54



Practical

and Amateur

Wireless

Edited by F. J. C.A.M.M.

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B.Sc., A.M.I.E.E., Frank Preston.



VOL. X. No. 237. April 3rd, 1937.

ROUND *the* WORLD of WIRELESS

The Simplest S.W. Two-valver

THE constructor will find much to interest him in the following pages, and of particular interest is the neat two-valve short-wave receiver, which is a development of the Simplest One-valver which has proved such a great success in the past. The numerous logs which have been published from readers show just what can be accomplished with a single valve when used in a suitable circuit, and the two-valver described on page 63 is a similar arrangement with the addition of a single L.F. amplifying stage, and consequently, will give louder signals. No blueprint is available for this receiver, but it is so simple to make up that all of the details given in the article will be found suitable for even the beginner. An interesting article is also included describing the construction of some simple and novel types of tuning dial. The present enthusiasm for simpler dials, especially of the "alphabetical" type, lends interest to this article, and every reader should find one type of dial included which will meet his requirements.

More Coronation News

FURTHER fixtures have been arranged by the B.B.C. for Coronation week, and it is now announced that on Coronation Night (May 12th) a special Coronation party will be held. So far, three well-known "acts" have been booked. These are Elsie and Doris Waters, Clapham and Dwyer, and the Two Leslies. It is hoped soon to announce the names of others who will be present, and the Party will follow closely the lines of the famous Christmas Parties, and will run for seventy-five minutes.

Copyright Waived

A FURTHER item of Coronation interest is that the B.B.C. will waive the copyright clause on its transmissions. This, it is hoped, will lead to very large public-address gatherings and meetings in all parts of the country, where the B.B.C. programmes will be relayed. The Marconi-Phone Company announce that the task of relaying the broadcast to the crowds thronging the route of the procession will involve over 25 miles of twin wire, connecting up over 50 tons of apparatus, with a thousand valves working continually

throughout 24 hours! In addition to this, there will be a complete "stand-by" apparatus in the unlikely event of a breakdown. Fifty trained engineers will be in charge of the apparatus for the entire 24 hours.

Television and Astronomy

DURING a speech at Strasbourg, Prof. Lallemand said that astronomers were keenly interested in the present television developments. It is expected that television will play a great part in future astronomical studies, as the fact that light is changed into electrical energy and changed back again by the television

wave Broadcasting Stations." It is estimated that 250 cylinders of hydrogen, each containing 100 cubic feet of gas, will be used before the last balloon is sent off.

France to Nationalise Radio?

IT is stated that the French Government has under consideration the question of nationalising the whole of the radio manufacturing industry. This is stated to be in pursuance of the Government's plans to nationalise all industries having any connection with war activities.

Sir James Barrie

ON May 10th, the Monday of Coronation week, a play by Sir James Barrie will be broadcast in the National programme. The play selected for this first opportunity listeners have had of hearing over the microphone any of the great dramatist's works is "Dear Brutus." First produced at Wyndham's Theatre in 1917, with the late Sir Gerald du Maurier in the leading rôle, it met with instantaneous favour and has since been frequently revived.

Variety in Miniature

ON April 2nd Cora Goffin, the musical-comedy star and principal boy in pantomime, is the chief attraction in this Midland programme of "Variety in Miniature," compiled by Martyn Webster. Billy Gordon, with his piano-accordion, has his first broadcast; Jack Woodroffe, who won a Birmingham newspaper talent competition, will appear in impressions; Jim Collier, the Singing Lumberjack, will sing some Hill Billie numbers accompanied by Martini and his Music; and Mr. Webster is to introduce a new character, Professor Whup, who gives "a Helpful Talk on Life's Little Problems" under the title of "This and It."

Coronation Television Arrangements

IT is announced that close-up pictures of the King and Queen as they pass in the Coronation procession will probably be seen on the television screen. The B.B.C. has been experimenting with a telescopic lens, which, it is hoped, will make this possible. Three special vans are to be used for televising the procession, and both land lines and a wireless transmitter will be available, as a link between them and the Alexandra Palace.

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equipment will lead to amplification far greater than is obtainable by ordinary telescopic means.

Philco Balloons

LOOK out for one of the vari-coloured balloons released by Philco between March 22nd and April 3rd. These are filled with hydrogen gas which may keep them aloft for a considerable time. Approximately 2,000 of these have been sent up each day, and on them is printed a coronet with a message to the effect that if the finder writes to the Philco works, giving details of where the balloon is found, he will receive free a new and informative booklet, "A Guide to Reception of Short-

ROUND the WORLD of WIRELESS (Continued)

To Stop Radio Noises

WE are informed that another step has been taken towards legislation to make electrical interference with broadcasting illegal. Following a report of a special committee of the Institution of Electrical Engineers, it is understood that the Government ultimately intended to introduce such a measure. The chief causes of unwanted noise are lifts, trolley-buses, and trams, household appliances, such as vacuum cleaners, small electric motors, "Neon" signs and electro-medical apparatus.

Microphones at Coronation Ceremony

IT is stated that for the Coronation there will be microphones at 100 points in the Abbey. Many will be for the use of foreign commentators, whose descriptions will be relayed to the capitals of Europe.

There will also be 36 microphones on the route for the use of home and foreign broadcasters, and the four radio channels to America will all be working.

Sir Adrian Boult to Visit Dublin

IT is announced that Sir Adrian Boult, at the invitation of the Director of the Irish Free State Broadcasting Service, will go to Dublin on April 11th to conduct a public concert which will be broadcast from the Gaiety Theatre.

This will be the first time that the B.B.C.

Jack Hylton, who recently returned from a very successful European tour, and who may be heard on the air during Coronation Week.



Director of Music has conducted a concert in Dublin, and it will also be the first appearance in public of the Irish Free State Broadcasting Orchestra. The soloists will be Thelma Reiss, who will play Elgar's Violoncello Concerto; and Renée Flynn, who will sing a group of arias with the orchestra. The main item in the programme will be Brahms's Symphony No. 2 in D.

True Stories

ANGUS BAXTER, manager of the Bristol Ice Rink, will tell "The Wayfarer's Story" in the series of True Stories in the Western programme on

INTERESTING and TOPICAL NEWS and NOTES

April 2nd. After sitting on an office stool for five years, he decided he wanted something more out of life than a further 36 years on the same stool, so he shook the dust of the city from his feet and set forth



The illustration shows one of the many uses to which Exide batteries are put—Pathe Pictures Ltd. use power from an Exide to operate the talkie apparatus in their portable camera unit. No doubt scenes of this type will soon be included regularly in the television programmes.

on the adventures about which listeners will hear.

Variety from Bath

A VARIETY programme will be broadcast from the stage of the Theatre Royal, Bath, on April 9th. The artists will include Jack Mayor and Alan Kitson in songs at the piano, and Sid Dooley, comedian. Charles Gordon will play handbells.

Violin Recital

PAUL BEARD, who is the leader of the B.B.C. Symphony Orchestra, will revisit his home town of Birmingham on April 3rd, and give a violin recital. The programme will include Brahms's Sonata in D minor. Paul Beard, who was formerly leader of the City of Birmingham Orchestra, is the son of a Birmingham violinist and the grandson of a Birmingham singer.

"Cine-Variety" from Gloucester

THIS is the first broadcast from the Theatre de Luxe, Gloucester, which in its thirty years has had the distinction of being the first to introduce a continuous programme of pictures in the West Country, the first to introduce talkies, and the first to introduce a policy of cine-variety. The manager, since early in 1929, has been Major Ernest Clifford. Wyndham Lewis, the organist, who will play in this Midland programme on April 8th, was formerly associate organist to Reginald Foort, at the Regal, Marble Arch. The instrument is a three-manual, nine-unit American theatre organ.

Regional Listeners to Share in Television Programmes

BROADCAST listeners will be interested to know that twice within the next month owners of ordinary broadcast receiving sets will be able to hear the sound portion of television transmissions from Alexandra Palace. The first occasion will be at 9 p.m. on Tuesday, April 6th, when the artists will be Frances Day, Irene

Prador and Lydia Sokolova. Sound will be transmitted as usual on 7.23 metres, as well as on the Regional wavelength.

On April 15th evening television transmissions will begin at 9 o'clock, with a thirty-minute programme by Henry Hall and the B.B.C. Dance Orchestra, and the sound part will be heard also by Regional listeners.

SOLVE THIS!

PROBLEM No. 237

Black built a battery superhet having a tone-control potentiometer and condenser connected in series between anode of the output valve and earth in the usual manner. When the set was switched on reception was satisfactory, but as the tone control was rotated towards minimum setting the fuse bulb glowed and eventually burnt out. What was the trouble? Three books will be awarded for the first three correct solutions opened. Address your solutions 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. 237 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, April 5th, 1937.

Solution to Problem No. 236

The primary winding in the aerial coil of Edmund's receiver was broken.

The following three readers successfully solved Problem No. 235, and books are accordingly being forwarded to them: F. H. Mercer, Ward 3, Sick Quarters, R.N. Barracks, Chatham; W. C. Young, 32, Emmadale Rd., Weymouth, Dorset; H. C. Cooke, 88, Dunstable Rd., Luton, Beds.

VALVES—TYPES AND PURPOSES

Details of Pin Connections and Circuit Requirements of Some of the More Unusual Types of Valve which are Now Available

IN the early days the only type of valve in general use was a triode, or three-electrode valve, but as the art of radio progressed the number and disposition of the electrodes was modified until to-day there is a vast collection of valves of different types. This leads to confusion in the minds of many amateurs, as it appears that special circuits require special valves, and it is often desired to use some particular valve in substitution of an existing one. In such a case difficulty is encountered in knowing just what circuit alterations are essential in order to avoid damage to the valve and to retain the characteristics of the circuit. It may, therefore, be stated broadly that a triode valve is employed generally as a detector or L.F. valve; an S.G. valve as H.F. amplifier or detector; and a pentode in either the H.F. or L.F. stage, the characteristics of the valve varying slightly and the valve being denoted as an L.F. or H.F. pentode. This covers the ordinary, or "straight," circuit, but there are in addition many special types of valve and these will be now briefly enumerated.

Frequency Changers

For use in the frequency-changing stage of a superhet there are now in general use four valves of the multi-electrode or dual types. These are the Pentagrid, Octode, Triode-Hexode, and Triode-Pentode. As the function of the frequency-changer is such an important feature of the superhet these valves and the associated circuits are fully described in another article in this issue, and the reader is referred to that section for these particular types. Also employed in the superhet receiver are combined valves in which two diodes are associated with a triode or pentode L.F. valve. This type of valve is

fitted with a 7-pin base and a top cap, and performs the function of second detector, with or without A.V.C., and low-frequency amplification. The double-diode-pentode is employed as an output valve, without any intermediate L.F. amplification. It is also possible to obtain the double-diode valve without any further combination,

and these are known as Class B and Q.P.P. (Quiescent Push-Pull) valves. This is a modification of the standard push-pull circuit in which the two valves of the combination are biased to different points on the working characteristic.

L.F. Stages

For the output stage of battery receivers there are available multi-electrode valves which are designed to act in combination,



One of the Acorn Midg-st valves shown in comparison with an acorn.

and naturally the function of the two diodes is as in the previous cases. For special circuits a single diode is also manufac-

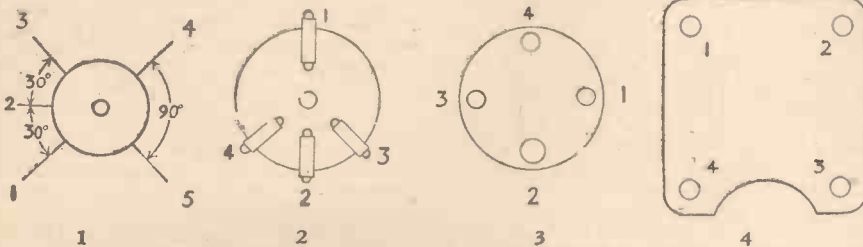
and these are known as Class B and Q.P.P. (Quiescent Push-Pull) valves. This is a modification of the standard push-pull circuit in which the two valves of the combination are biased to different points on the working characteristic.

Rectifiers

For A.C. receivers, half-wave and full-wave rectifiers are used in the mains section to change the A.C. delivered by the mains transformer into D.C. These valves, as with A.C. valves used in the remaining stages of an A.C. receiver, may be of the directly-heated or indirectly-heated type. That is to say, in a directly-heated valve the filament is the electrode which emits electrons when it is brought to an incandescent condition by the voltage supply source. Consequently, battery valves are also of the directly-heated type. The indirectly-heated valve, however, utilises a heater (or filament), which is surrounded by a cathode, and the latter is heated by the glowing filament (hence the name heater). The cathode is the electron emitting electrode.

In addition to the valves bearing standard pins, a series of valves is manufactured by Messrs. Mullard in which side contacts are employed. These valves have 5 or 8 contacts, and the connections are given in the table overleaf.

(Continued overleaf)



Valve Bases as seen from below. Connections are given in the table underneath.

Type.	Base.	PIN CONNECTIONS.							
		1	2	3	4	5	Top	B'tm	
ACORN.									
Triode	1	H	C	H	G	A	—	—	
H.F. Pentode	1	H	C	H	S	SG	A	G	
DEAF AID.									
Triode (D.H.)	2	A	G	F	F	—	—	—	
Triode (I.D.H.)	2	A	C	H	H	—	G	—	
Triode (Mullard)	3	A	G	F	F	—	—	—	
PUBLIC ADDRESS.									
Triode	4	A	F	G	F	—	—	—	

VALVES—TYPES AND PURPOSES

(Continued from previous page)

Midgets

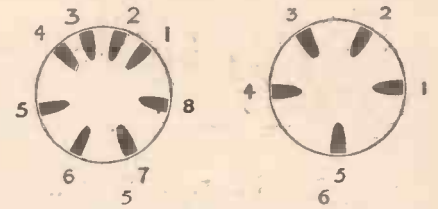
Amongst the Midget class may be mentioned the Hivac valves, of which there are only three types, triode, tetrode and output pentode, and the Acorn valves. Our illustration shows one of these valves in comparison with an acorn on a man's hand, and the connections for existing types are given in the table. Also included in the midget class are the valves manufactured especially for use in deaf aids, and the attached table also gives the connections and types. For public address purposes a special type is also made with four pins and is included in this table.

In these tables, M denotes the metalised surface, H the heaters, C the cathode, and A the anode. In the multi-grid class G1 is the control grid, G2 the screening grid, and G3 the suppressor grid. In the Octode G5 is the oscillator grid and G6 the oscillator anode. In other words,

the electrodes are numbered outwards from the cathode.

Next week we will give Midget and Continental connections.

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Side-contact valve-pin arrangement: viewed from below.

Mullard Side-contact Valves

Type.	Base	PIN CONNECTIONS.								Top Cap
		1	2	3	4	5	6	7	8	
Triode	5	M	H	H	C	—	—	—	A	G
H.F. Pentode	5	M	H	H	C	G3	—	G2	A	G1
Output Pentode	5	—	H	H	C, G3	—	—	G2	A	G1
Octode	5	M	H	H	C, G6	G2	G1	G3, G5	A	G4
Double-diode	6	D2	H	H	C, M	D1	—	—	—	D2
Double-diode	6	M	H	H	C	D1	—	—	—	—
Rectifier, half-wave	5	—	H	H	C	—	—	—	A	—
Rectifier, voltage-doubler	5	C1	H	H	C2	A1	—	—	A2	—
Visual Tuning Indicator	5	—	H	H	C	—	G	Target	A	—

Get Those High Notes

THIS article has been inspired by a chance remark overheard in a tube train, when a man was heard to say: "I think my set cuts off at about 6,000, but I hate violins and screechy instruments, anyway!" Should this gentleman read these lines, the writer craves his forgiveness, and pleads justification for using his words to introduce these notes.

Do not let us dwell on whether or not the violin is a screechy instrument; this is obviously a matter of opinion. The gentleman in the train has expressed his opinion, the writer has another and different opinion, and various readers will, in turn, also have, and are entitled to, their own views; but let us attack the implied suggestion that if a receiver cuts off at 6,000 cycles, it will adequately handle those instruments whose fundamental notes are limited to the middle or lower end of the musical scale, or, better still, let us investigate this whole tangle of fundamentals and harmonics, of top cuts and base cuts; also, the portions of the musical scale required by various instruments for their faithful reproduction in the home of the listener. In passing, it may not be thought out of place to mention that any consideration of the audible frequency scale as applying to an individual is to some extent limited by physical factors within the ear of the person concerned, as, quite apart from the fact that there are many characteristics in hearing between one person and another, there are some, particularly people getting on in life, whose ears have a natural top cut, and for their especial needs it is obvious that there is no point in arranging for an amplifier and loudspeaker to handle those frequencies which bring about no response in their hearing.

Low Frequencies

Anybody who has heard the deep boom of the tympani would know that the fundamental note from these instruments is very low in the musical scale. Actually, it is in the second octave from the bass end of the piano, but the incidental har-

monics on which it depends for its characteristic tone extend well up towards 3,000 cycles. It should be thoroughly understood that these remarks do not refer to the actual range of notes obtainable from various instruments, but the harmonics which accompany the note, and which give it its characteristic individuality. The frequency range required by the bass drum is similar to that of the tympani, but the familiar small drum played with wooden sticks, usually known as the "snare" drum, requires, rather surprisingly, the almost entire frequency band, starting way down at 100 cycles up to round about 10,000 cycles, i.e., over an octave above the top note on the piano. The double bass, cello, viola and violin take up between them a frequency band from 35 cycles to the upper limits of the human ear, say in the region of 14,000 cycles, which is nearly two octaves above the top note of the piano.

Above 5,000 Cycles

It is not intended to deal with each instrument individually, but it may be said that such instruments as the bass tuba, trombone, French horn, bass saxophone, bassoon, flute and the like can be faithfully accommodated where the loudspeaker and amplifier are incapable of reproducing above, say, 5,000 cycles, although such amplifier needs necessarily reach down to 25 cycles, its characteristic response curve being flat to at least 50 cycles. Incidentally, it is common practice in America to make an amplifier dip violently at the 100-cycle mark to avoid excessive amplification of any mains hum that may be present. Where the curve rises again immediately below 100 cycles, it is doubtful whether anybody would notice it. At the other end of the scale such instruments as the snare drum, referred to above, the soprano saxophone, clarinet, and particularly the oboe, require a reproducer capable of going up at least 10,000 cycles, as all these instruments are capable of producing harmonics at a strength comparable to the fundamental note up in the regions of the upper limit of audibility. It

is suggested, however, that as already intimated, 10,000 cycles is adequate for all practical considerations.

Acoustic Peculiarities

Listeners to plays will have noticed the very unconvincing noise which footsteps make on the radio. In fact, it will be noticed that it is common practice to-day to say: "Here comes So-and-so" before the footsteps are heard; otherwise it is doubtful if they would be recognised as such. The reason for this is astounding, the harmonics of such sounds extend up to the region of 10,000 cycles, and all the harmonics which characterise this particular sound are high. As the majority of sets (whether their owners care to admit it or not) start cutting off in the interest of selectivity at about 5,000 or 6,000 cycles, the reason is apparent why footsteps should sound so unreal. The same remarks apply to hand-clapping, as a distinct drop in the realism of this applause is noticeable in an amplifier that cuts off at 9,000 cycles. Here again this is undoubtedly the reason why so many people have remarked from time to time that hand-clapping on the radio sounds mechanical. It would be possible to go on almost indefinitely enumerating the peculiar requirements of various sections of sounds and noises, but the foregoing remarks are representative, and indicate not only various acoustic peculiarities which are in themselves interesting, but also the requirements of a radio reproducer, if faithful reproduction is aimed at. Many people, no doubt, prefer what is colloquially termed "soft tone," and unquestionably people are entitled to listen to such incomplete music if they so desire, but this is not true reproduction. Then, again, investigation shows that the key clatter of wind instruments, and the sucking noises of the brass instruments, and so on, are reproduced only by the very high frequencies, and it is again a matter of personal taste whether such noises should or should not be reproduced.

THE PRACTICAL MOTORIST

EVERY 3rd FRIDAY

Packed with Practical Articles of Interest to the Owner-driver.

Terminals, Plugs and Sockets - - - - - - - - - There's No Connection!

The Trouble Does Not "End" at the Terminal. It Usually Commences There!

THE writer, a service engineer belonging to a company whose name is a household word, has recently been amusing himself by reading a number of books on service work published both here and in America, also sundry articles appearing in these countries, and gives below a number of faults which, although not uncommon, have been rarely, if ever, mentioned.

Stupid Mains Plugs

A common cause of spluttering in commercially-built receivers is such a stupid one that the engineer never bothers to mention it, and the amateur usually thinks of it last. This is the actual connection between the mains cord and the mains plug. The average mains plug is peculiarly unsuitable for this purpose, having the usual ridiculous hole in which the end of the flex is inserted, which in turn is intended to be gripped by a screw of absurd dimensions, which may, with luck, grip as many as half of the metal strands. This connection very often becomes loose due to one or more strands working out from under the screw, leaving the rest of the bunch a poor fit. In the absence of an intelligently designed plug, the best remedy is to bind the strands together so that the screw can be made to grip them without them spreading unduly. Where the cover permits of it, it is a good idea to bare about $\frac{1}{2}$ in., take the strands through the hole, round the outside, and back through the hole again. Obviously the screw should not be tightened to the point where the flex is cut, but it should be tight enough to prevent any possibility of arcing, which sets up most disagreeable interference.

Plugs and Sockets

There is an increasing tendency for manufacturers to terminate the aerial and earth connections of the set with sockets, and to generously provide two particularly nasty little plugs intended for the earth and aerial leads. At least one manufacturer recommends 7-22 copper wire for the earth "which should continue unbroken to the actual receiver," but thoughtfully provides a plug in which only three strands will pass through the hole provided for that purpose. These plugs are in themselves satisfactory, but many of them have a common failing. The wire is intended to be held in place by the metal plug portion which is screwed up against it. Often when screwed right home it will not properly grip a piece of wire of reasonable gauge, and while the wire is clean, all is well, but when the wire oxidises, nasty scraping noises are heard in the speaker if the lead sways. Trouble of this nature is peculiarly awkward to find, as if the lead is taken and shaken from side to side at an angle that is at all acute, it may bring the wire into perfectly good contact. It should not be necessary to add that such manufacturers go to great trouble to lower H.F. resistance of their tuned circuit, and it is intolerable that resistance should be set up in the aerial plug, which necessarily happens unless the plug grips the wire tight enough to prevent oxidization.

The Elusive Gas Pipe

Many listeners are obliged to use a water-pipe "earth" which, at best, must have a fairly high resistance. Along this resistance there is a potential drop, consequently if any metal comes in contact with the pipe throughout its length, which is in turn connected to earth, it will cause some sort of noise to be set up in the loud speaker. Many years ago a case was investigated where a set made the most alarming noises when a motor-bus went by. This was due to a water-pipe "earth" touching a gas-pipe momentarily when the motor-bus caused it to vibrate. Such a trouble as this is not difficult to find provided the water-pipe is visible throughout its length, but unfortunately this is rarely the case. To a lesser extent the same trouble can apply where the water pipe touches some other earthed object at a point above (possibly several stories above) where the earth lead from the set is connected.

Ancient Wall Sockets

Wall sockets that have been left undisturbed for a term of years often make very bad connection with the supply wires, due to damp, verdigris, and any of the other troubles which can attack a wall plug not protected by a box at the back. Such a state of affairs often gives rise to a minute arc between the wire and terminal, which, in turn, can produce a most appalling racket in a sensitive wireless set of the superhet class. The remedy is obvious, and it is sufficient, therefore, to draw attention to it. It will be appreciated that an ordinary A.C. volt-meter is not likely to reveal the trouble, the obvious pointer being whether

the set works satisfactorily when plugged into some other socket. The same trouble would, of course, appear with a broken wire, but this usually solves itself, as the broken ends of electric light cable very soon move apart so that a complete break occurs.

A Screw Loose!

The reprehensible habit of neglecting to "earth" a mains set is getting more and more common. Admittedly in nine cases out of ten reception is not improved, but it is unquestionably desirable from the safety aspect. An unearthed chassis brings quite a few lesser troubles in its wake; an example will serve to indicate them. Some chassis are fixed in their cabinets by four nuts and bolts. In due course the base of the cabinet warps, and a nut and bolt which were previously under tension become loose and rattle on the chassis. If the chassis is earthed, this does not matter in the slightest. If it is not earthed, it will still not matter in 99 cases out of 100, but in the odd case it will faithfully record its movements on the loudspeaker by a peculiar scraping noise, which can be imitated by scraping the aerial lead gently with a piece of metal. The trouble, of course, occurs in those receivers which are inclined to be on the verge of instability when the earth is removed, and it is more likely to occur with sets one or two years old, rather than with those of this season, which, taking them all round, are extraordinarily stable. Where the practice is indulged in of earthing the speaker chassis to the set chassis, the same trouble arises when one of the bolts becomes loose which fixes the speaker to the baffle.



Peter Yorke, a newcomer to the "H.M.V." lists, and a favourite broadcasting band leader, is here seen making his first records at the "His Master's Voice" Studios. They are entitled: "A Nice Cup of Tea," and "Love Me To-day" (H.M.V. BD5179) and "Smoke Dreams," and "There's That Look in Your Eyes Again" (H.M.V. BD5180).

The HEART of the SUPERHET

Indicating the Importance of the Frequency-changer Stage, with Useful Advice Concerning the Choice of Frequency-changer Valve. By Idris Evans

CONTRARY to a general belief, the superheterodyne is by no means a product of the past five years. Superhets were in use before broadcasting commenced in 1922, but they fell into disuse about ten years ago and then suddenly reappeared in 1932. Their disappearance in 1927 was partly due to the advent of the S.G. valve and the consequent improvement in straight receiver performance, but the main reason was the difficulty which was then experienced in obtaining stability and good quality reproduction from the superhet. These disadvantages were due to the imperfections of the frequency-changer stage—the most vital section of the superhet.

During the five years between 1927 and 1932 S.G. valves were gradually improved, and by the latter year the straight receiver using two H.F. stages had reached the

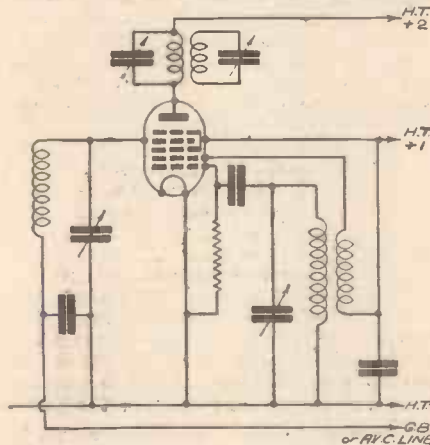


Fig. 1.—Showing the tuned circuits associated with the pentagrid frequency-changer.

height of its popularity. Its sensitivity and selectivity were of a high order. As the transmitting stations were increased in number and their power was doubled and trebled, however, it was realised that the selectivity of most straight sets fell short of requirements. It was then that the superhet reappeared—a greatly improved superhet from the 1925 type owing to the improvements which had, in the meantime, been made in the design of the frequency-changer stage and its associated components. Coils, tuning condensers, and I.F. transformers had been improved and by correct use of screening cans it was found possible to maintain stability even with both windings of the I.F. transformers accurately tuned by means of trimmers. This balancing improved the selectivity and sensitivity, and screening of the H.F. coils and wiring prevented the pick-up of unwanted signals, thereby providing a further improvement in selectivity and a reduction of whistles.

The Pentagrid Valve

Simultaneously with the improvement in coil design and screening technique came the modern frequency-changer valve. In the early superhet two valves were used to produce the intermediate frequency

beat note, but it was found that one valve could perform this function equally well, thereby simplifying the wiring of the external circuits and reducing the current consumption. Several multiple valves are now in common use as frequency-changers—namely, the pentagrid or heptode, the octode, the triode-hexode, and the triode-pentode. The first to appear was the pentagrid. This comprises an S.G. valve and a triode in one bulb, the S.G. section acting as the modulator and the triode as the oscillator, the two sections being coupled by means of the electron stream inside the valve. The pentagrid is very suitable for use in receivers tuning to the normal medium and long wavebands. It can also be satisfactorily used for the normal short wavebands of 15 to 100 metres provided that the tuning circuits are carefully designed.

The Octode

The octode works on the same principle as the pentagrid, but has an extra grid—the suppressor grid. In practice there seems to be little difference between the performance of these two types, and as far as the constructor is concerned they may be freely interchanged.

The Triode-hexode

The difficulty experienced in making the pentagrid oscillate satisfactorily below 20 metres accounted for the appearance of the triode-hexode. As interest in short waves increased, the necessity for a frequency-changer that would function equally well on the normal broadcast bands and on the short wavebands became evident. As its name indicates, the triode-hexode is a

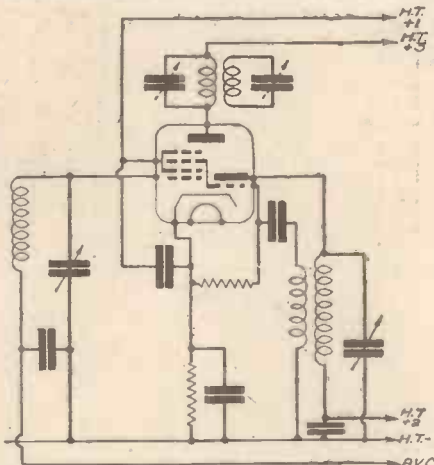


Fig. 2.—A frequency-changer stage using a triode-hexode. It will be noted that the oscillator anode circuit is tuned.

combination of hexode and triode, the difference between its internal construction and that of the pentagrid being the addition of a mixer grid which is connected internally to the oscillator grid. Its superiority over the pentagrid on the lower wavebands is accounted for by the almost complete absence of interaction between the oscillator and modulator sections. As shown

in the diagram, Fig. 1, it is customary to tune the oscillator grid when a pentagrid is used, but better results are generally obtained with the triode-hexode when the oscillator anode circuit is tuned—the circuit is shown in Fig. 2. The pentagrid and triode-hexode are interchangeable, however, without the necessity for any circuit alterations, and in most cases it will be found that good results will be obtained with the pentagrid and the triode-hexode with either the oscillator grid or oscillator anode circuit tuned.

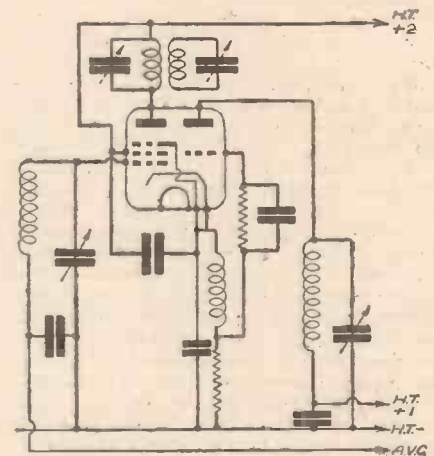


Fig. 3.—Showing the most commonly used circuit arrangement for a triode-pentode.

The Triode-pentode

The last type is totally different from the other three. It comprises a pentode frequency-changer and a triode oscillator screened from each other, and except for the common cathode the two sections are independent of each other. It is claimed that the screening of the two sections eliminates interaction between the aerial and oscillator circuits, thereby preventing frequency drift. This type of frequency-changer is suitable for long, medium, and short-wave reception, but owing to the fact that it is not interchangeable with the other three types it is not very commonly used by constructors.

THE WIRELESS CONSTRUCTOR'S ENCYCLOPAEDIA

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Practical Television

April 3rd, 1937. Vol. 3. No. 44.

Camera Progress

THE success of the transmitting side of television is indisputably linked up with the sensitiveness of the camera equipment used for scanning and generating the initial television signal. Lack of sensitivity reveals itself in the final picture as an overall covering of fine black and white spots, which for want of a better term is generally referred to by the technician as "mush." To give a better signal to mush ratio, therefore, it is quite common practice in the studios to submit the artists to the effects of glaring and high light intrinsic value lamps. Naturally, modern equipment is of much better quality than the early apparatus, although it was only a few months ago in France that the studios had to be supplied with special exhaust fans and tubes to dissipate the rather unbearable studio heat brought about by these lights. It is very trying for artists to act under these conditions, and continual research is being applied in an effort to effect the greatest possible improvement in camera sensitivity. The importance of the latest news concerning the Farnsworth electron camera cannot therefore be over-estimated. For head and shoulder close-ups it is claimed that in the American laboratories of this inventor only about half a kilowatt of lighting is necessary, a reduction which will be welcomed by all, for it suggests that outdoor scenes under non-favourable weather conditions should now be possible. Speaking of outdoor television shots, it is interesting to note that the B.B.C. have already made some moves in that direction. With the occasional brighter days, golf and horse-riding lessons have been featured, and the engineers on the cameras themselves have now been provided with leather helmets which incorporate the headphones used to give instructions from the control room without being influenced by extraneous noises. In addition, these men wear rather tight-fitting flying suits and leather gauntlets as a protection against the inclemency of the weather.

Censorship

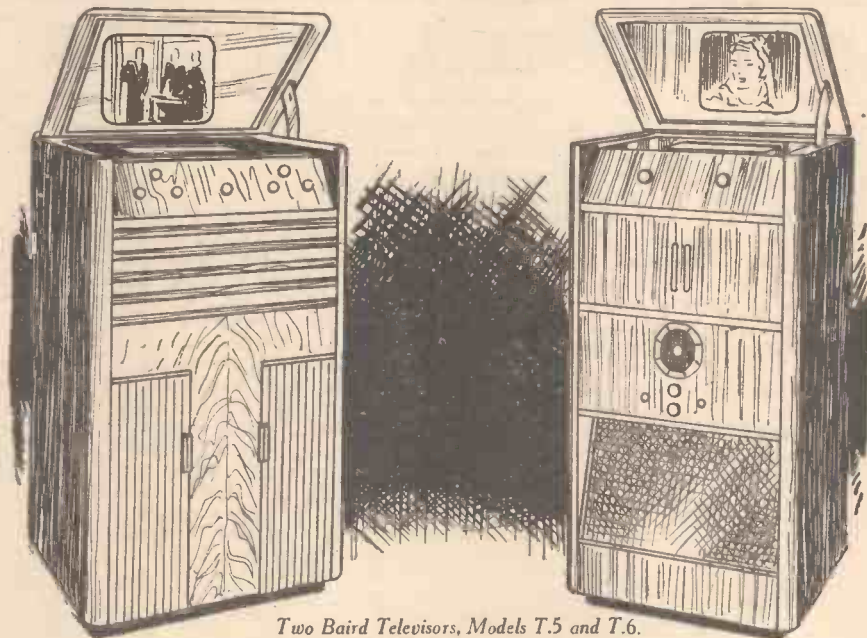
IT is being stated quite freely in many quarters that the main reason for the ban imposed on televising the Coronation ceremony scenes inside Westminster Abbey (some still hope the decision is not irrevocable) is one of censorship. When films are taken it is an easy matter for the small committee (already officially appointed) to censor the developed result, and delete anything which seemed to suggest a lacking of the dignity which must, of course, be associated with such a ceremony. On the other hand, the B.B.C. officials pointed out quite rightly that a half turn on one control knob would be sufficient to black out the television picture completely if those in authority felt that during any period the results observed did not fall within the prescribed conditions. Apparently this has failed to impress the Abbey authorities so far, and may be due to the fact that they have never seen a

picture or familiarised themselves with the Alexandra Palace apparatus.

Derby Prospects

ALTHOUGH some three months away, plans are already being discussed to see whether this year's Derby can be televised. The race itself always excites world-wide interest, and to link it up with television would be an excellent thing for the service. On two previous occasions this has been done. The first was on June 3rd, 1931, when the first portable daylight television van of the Baird Company was positioned against the course rails, the generated signals being sent by land line to Long Acre, thence to Savoy Hill, and finally, Brookmans Park, where they were radiated by the London National station as a thirty-line low-definition picture. A year later, however, a more ambitious experiment was undertaken, for a Baird daylight television van, with improved scanning equipment, sent signals showing the Derby scenes to the Metropole Cinema,

realise what increased picture size involves. The maximum picture area on any cathode-ray tube commercial receiver at present available is 110 sq. ins.; this being obtained with tubes having a fluorescent screen face of 15in. diameter. For home purposes, this is ample for most occasions, but where large audiences are to be entertained and cost is not a very prime factor, then this can be multiplied very considerably. The best method so far is to use a projection type cathode-ray tube. This is of the same standard type, but has an almost flat circular face with very thick glass. In this way, optical distortion is avoided altogether, and the actual picture size on the screen seldom exceeds 8in. in width and is often less. The picture is so bright and sharp, however, that it can be projected right through the end of the tube on to a screen remote from the receiving apparatus. In this way, pictures from 2ft. wide up to at least 6ft. wide can be shown. In the exhibit shown by Telefunken in Berlin recently, the actual screen itself was covered with small glass beads in order to concentrate the lighting, and so enable the brightness of the picture to be enhanced. It must be noted, however, that the anode voltage required to operate a tube of this nature is particularly high, anything up to 20,000 volts having been employed so far, while the deflecting voltages in the case of electrostatically operated tubes are also considerably higher than normal. It is these factors which govern the initial cost, but no doubt concentrated research will help very materially in making this a commercial proposition.



Two Baird Televisors, Models T.5 and T.6. These are now the lowest priced complete television receivers on the market.

London, where pictures were shown as a three-zone arrangement with ninety-line definition on a screen 10ft. by 8ft. Undoubtedly, this was a great achievement, and in addition to the land line pictures the race was again broadcast as thirty-line pictures by the London National station. With the hope of a high-definition Derby transmission, however, with its increased picture detail, the results should be outstandingly good.

Large Television Pictures

A GOOD deal is still being talked about large television pictures for the home, but in the majority of cases the persons participating in the discussions fail to

New Zoo Television Series

ALREADY a large number of children look forward eagerly to television's "Zoo Day," which occurs once a fortnight, when Mr. Seth Smith brings a new party of his little friends from Regent's Park. In the new series which opens on April 9th, it is hoped that some of the larger animals will be persuaded to face the television camera, for, with the approach of warmer weather, it may soon be possible to stage outdoor parties with animals which are too big to be comfortably accommodated in the studio.

It is hoped also to bring children into the picture with the animals.

Sir Noel Ashbridge's
Lecture

SIR NOEL ASHBRIDGE, in a recent lecture to the Institution of Civil Engineers, dealt with many of television's immediate problems as well as plans for the future. After explaining how signal distribution will be linked up with the work of the Post Office in laying the coaxial cable, he stated that there is to be a single main cable with side spurs leading to the principal theatres, the Cenotaph and Whitehall, and vantage points on procession routes. The Alexandra Palace is already connected with Broadcasting House via the P.O.'s trunk telephone exchange near St. Paul's, and when the television van units are completed it will be possible to plug in the camera equipment at any of these points and so enable the programme director to cover a large proportion of London events. Improvements were also in hand to extend the size of the studio stage, give greater mobility to the artists taking part in any performance, while the use of the telephoto lens would enable distant outdoor scenes to be covered.

The problems associated with reception interference by the ignition systems of motor-cars were also mentioned. Until a year ago, he said, electrical interference caused by spurious radiation from the ignition systems of motor-cars and from electro-medical apparatus was known to

Television Notes

exist, but the extent of the inconvenience likely to be caused was difficult to estimate. The effect of interference from the ignition systems of motor-cars had been found somewhat serious at distances of more than four or five miles from the transmitting station. The effect of a single motor-car was confined to a small area, so that even at distances of twenty or twenty-five miles from the transmitter the trouble was obtrusive only when a car was opposite a house where reception was being carried out. Conditions on a main road might be bad at any considerable distance from the transmitting station. Reasonably simple means existed for the prevention of those parasitic radiations, and it was to be hoped that means would be found for ensuring that all motor-cars were fitted with suppressors. The difficulty did not occur on ordinary broadcast wavelengths, so far as motor-cars were concerned, since the spurious emissions were not on wavelengths as high as 200 metres. Similar interference from electro-medical apparatus was more serious, but much less widespread. Its cure was far more difficult.

The use of directional aerials with reflectors was a material benefit as it brought the received television signal to a

level considerably in excess of the interference, and by reducing the degree of "gain" necessary in the set the quality of the observed picture was very noticeably improved.

Television at the Ideal Home Exhibition

SINCE the present television service is one which is designed to give home amusement it is quite natural to expect that the forthcoming Ideal Home Exhibition at Olympia will include this feature. This has been done on more than one previous occasion, the last being in conjunction with the fashion parade. A television studio complete with mobile scanning unit, amplifiers and microphone was set up on one of the gallery floors and linked by land line to a large back projection television screen about 7ft. high by 3ft. wide. Artists and mannequins situated in the studio were seen by the assembled audience watching the Pageant of Fashion in a hall some distance away, and the possibilities of television thereby demonstrated. With the present exhibition it is proposed to have studio equipment resembling that used at the Alexandra Palace, and visitors will see the resultant pictures on standard home receivers, thus being able to compare and contrast the real with its miniature electrically reproduced replica.

DIFFERENTIAL TRIMMING

THE problem of matching two adjacent tuning circuits of a multi-stage receiver is still unsolved in spite of many years of development and research. Considering the fact that the inductance values of two "accurately" matched coils may vary by as much as ± 0.3 per cent, and that no two sections of a two-gang tuning condenser can be adjusted so as to be completely equal throughout the whole of their angular rotation, we are still faced with the balancing out of the remaining small variations between adjacent circuits. The introduction of the well-known variable trimmer condenser provided upon the majority of receivers is a definitely useful, though not 100 per cent. efficient, adjunct. The latter is actuated by a control knob concentric with, and rotating freely upon, the same spindle as the main tuning control, enabling a small additional variable capacity to be placed in parallel with the front condenser section.

This variable trimmer, together with the small semi-fixed trimmers (at the side of each section of the condenser) assists in neutralising the capacitance variations caused by: (a) stray capacities, (b) transferred capacities, and (c) inherent capacities of the components themselves.

Upon analysing the causes of these variations one can see the futility of seeking a definite cure and must, therefore, provide methods of keeping their effect down to a minimum. Stray capacities (a) are developed by general receiver wiring, switches and screened leads; under group (b) are capacities transferred across H.F. transformer windings due to the aerial circuit, anode circuit capacity of the preceding valve, and reaction capacities which vary at different settings of the tuner; inherent component capacities (c) consist chiefly of the grid-cathode valve circuits, self-capacity

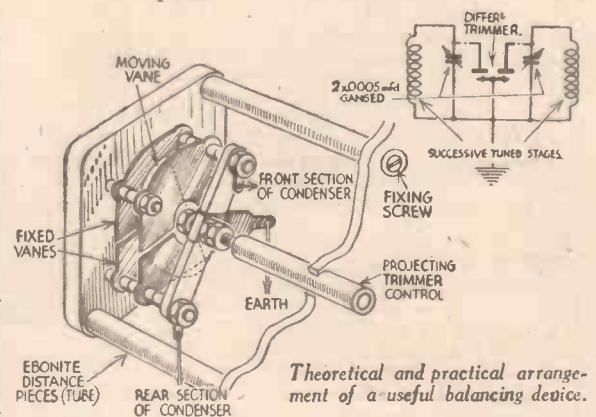
of tuning coils, and paralleled capacities caused by resonant points of high-frequency chokes.

Whenever a grid biasing potential is applied to one or both valves (e.g., variable-mu valves in A.V.C. stages) its decoupling components will further deviate the associated tuned circuit from its theoretical value.

These many enumerated capacities have a marked effect at the lower end of the tuning scale where they represent a large percentage of the total circuit capacity and, considering their total effect, it is clear that the excess may occur in either the first or second tuned stage, and may even transfer itself to the other stage upon different wavebands. The inclusion, therefore, of the small semi-fixed trimmer is detrimental at the lower parts of the waveband, and the additional variable trimmer (in parallel with the front condenser) is useless when the predominant capacity already exists in its own stage—although some degree of adjustment can be obtained by adding more capacity by means of the side trimmer associated with the rear condenser section.

Having no definite solution, one may resort to the use of a differential trimmer to enable tuning to be carried out to a greater degree of accuracy. Application of a "differential trimmer" has a decided advantage in that it is able to correct a two-way inter-stage error by an external (panel) control, and when used the semi-fixed side trimmers may be set at minimum, thus improving the selectivity upon the lower

wavelengths. Such a condenser can be easily improvised by modifying an old air-spaced variable micro-differential condenser of, say, .00004 mfd. maximum capacity. By removing one-half to two-thirds of both the fixed and moving vanes to obtain twice the dielectric spacing, a "zero" capacity (when the moving vanes are equally interleaved between the fixed vanes) in the region of .00001 mfd. will be obtained. External rotation may be effected by adopting a horizontal mounting so that a long ebonite knob may project a convenient distance through the face of the control panel.



The diagram illustrates the method of connection, although the valve circuits between the first and second stages, and after the second stage, are omitted for clarity. Again, it may be mentioned that the author has also applied the principle to facilitate trimming bandpass coupled circuits with definite advantage.—W. A. Harrison (Aintree).

The CYCLIST - - 2d.
Every Wednesday.

On Your Wavelength

By THERMION



Television Programme Delays

JUST as a mild warning to the B.B.C. I should like them to know that I am looking in regularly every day, and I tell them that having spent £70 on a television receiver to look in for two periods of one hour each per day, I am dissatisfied with the amount of each hour which is wasted in delays between the items. It is too bad to have to spend a large sum of money as I have done in the interests of science, to have to waste about 15 minutes of every hour; also I complain of the fact that the clock hands which appear before the programme starts are not correctly set. May I also say that the programmes do not start to time, and that some of the items are not suitable for television. Bands and that sort of thing should be heard and not seen. The other afternoon during an interval, a gramophone record was played, which lasted for six minutes. There

B.B.C.'s edict. We all know that the listening public doesn't want one, and I hope that we may now be left to listen in peace. Let those who want dance bands buy a gramophone or go to the music-halls.

If you find an immediate improvement in the television programmes I do hope you will show your approval in the usual way. I smoke anything and have no particular preference in the cigarette or cigar line. I drink whisky and champagne, and my car is in such a state of decrepitude that some of you out of sheer gratitude may like to club together and buy me a new one. Having spent my last available cash in the interests of the science of television I simply have not the money left to buy a new one, nor even to have my old one repaired, so do take pity on me. If you have any old clothes, such as shirts, or a pair of breeks which are not too badly patched, they would be very welcome. I shall be able to build a house very shortly with the bricks which readers are continually hurling at my head, so I merely ask them for a few old clothes and a few of the amenities of life which make it bearable. The way of the pioneer is indeed hard. For me the thorny paths of penury, and the hard knocks of adversity. It was always thus. Had I turned my undoubted ability into the channels of filthy lucre and hard commercialism I should have made a fortune. As it is I prefer to reside in the limbo of the unknown and have allowed Marconi and others to make the money which should have rightly come to me!

have added that some of them are supercilious, snobbish, silly, circumlocutory, circumnavigatory, and inane. Broadcasting appeals to their vanity because they like to know that it annoys their lady friends, who sit at home at afternoon tea parties, tearing the lady broadcaster's character to shreds. The same speaker said that the microphone was not kind to women's voices, and there was a sameness about the female voice that became irritating. I do not quite agree with this. There are some ladies with music in their speaking voice; there are others who speak in a manner which betrays a bad temper. Most quickly spoken women are bad tempered, and lack voice modulation. Many of them rattle through their script as if they are anxious to get it over. Few of them succeed in putting it over.

The Prisoners Complain

I HEAR that the prisoners at an American prison recently held a demonstration (in this country we should hail it as a riot) against the type of programme that is being

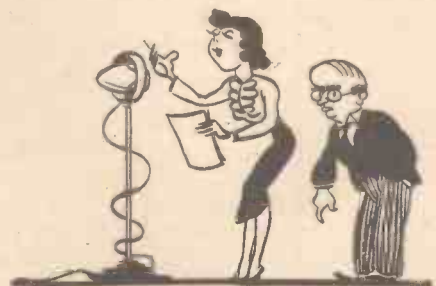


Prison Radio

was no vision programme during this period. Now that the B.B.C. knows that no less a person than myself is looking in, I have no doubt that they will change their ways. I do not like to think that as a result of my continued onslaught about crooners and dance bands they have decided to let dance bands go, but the fact is, they are going, and you must draw your own conclusions.

"Superior, Swanky, or Condescending?"

AT a conference in Leeds arranged by the B.B.C. to discuss talks, a certain learned doctor said that women who broadcast are superior, swanky, or condescending. He might



The Female Broadcaster

supplied to them *via* the sets in their cells. They said that they were fed up (in this country we should say sated, cloyed, or nauseated) with too much highbrow uplift, and wanted more variety and light entertainment. The solution seems to be to withdraw the wireless sets altogether, for the American criminal is the worst in the world, and from some of the cases I read ought to have the cat-o'-nine-

tails twice daily for seven years. But in that comic country known as America anything can happen, and I have no doubt that in order to prevent a strike of prisoners they will placate them with champagne and feather-beds, or else release them altogether.

Radio Superstition

I AM surprised to hear that there is still a lot of silly superstition regarding the way in which radio functions and in the way it is obtained in the home of the listener. I recently heard of a man who was perturbed because he had been told that as his aerial sloped down from his window the wireless waves would run away from his set and he would get weak reception. Another listener was using a metal skewer stuck in a box of earth on the window-sill of a flat as his garden was so far away, and was watering it each day in order to maintain its efficiency. I really thought that all of these silly ideas had died long ago, but, no doubt, there is often some slight substratum of truth underlying the idea. For instance, the sloping aerial idea may have originated in the case of a listener who had erected the aerial badly, perhaps had not used any insulators, or had used bad ones, and had afterwards altered the aerial, including insulators or improving insulation, and changing the angle. The increased volume or sensitivity may thus have led him to believe that previous troubles were due to the angle. Similarly, the use of a long earth lead to a flat may have picked up interference or given poor results, and the effect of the capacity earth may have led him to think that the box of earth was better. I wonder what other fallacies are still in existence? Drop me a line if you know of any.

The Octals are Coming

THE high price and diversity of types of British valves has in the past accounted for the predominance of American receivers in the Colonies and Dominions. There is no doubt that the best British valve types are more efficient than the American types fulfilling a similar function, but this very fact has been a disadvantage rather than an advantage. Their efficiency makes the receiver more prone to instability, and great difficulty is generally experienced in procuring a suitable substitute when the original type is not easily obtainable. The greatest diversity of types exists in the A.C./D.C. range of the various manufacturers. They have



Choosing Gang Condensers

THERE are some components, such as volume controls and switches, which still give a good deal of trouble and their design does not seem to have been materially improved during the past three years. This cannot be said of the gang condenser, however. Great improvements have been made on this component recently. It is not surprising, therefore, that old models are being sold so cheaply. Old types can be used fairly successfully in simple two and three-valve straight sets for reception of the normal broadcast-band stations. If the receiver is of the all-wave type, however, and especially if it is a superhet, it is certainly advisable to use a modern condenser.

Bar-construction Type

WHEN the stations to be received have a wavelength below 40 metres it is very necessary for the tuning condenser to have a low minimum capacity, and very good contact must be effected between the moving vanes and the external terminal or lead to which these vanes are connected—a bad contact will produce background noises which can be intolerable on the short wavelengths. The bar-construction type, as incorporated in the Vitesse all-waver, is the most commonly used at present. This type has the advantage of having a very low minimum capacity and if of reliable make the movement is noise-free. Constructors of the Vitesse should therefore adhere to specification if good results are to be obtained on the short-wave band.

Record Three Trimming

THE disadvantages of a high-minimum capacity on the short-wave bands have been dealt with before in these notes, and it has been pointed out that the value of the minimum capacity in the tuning circuit has an increasing effect as the frequency of the received signal is increased. A minimum of .00005 mfd. is not very noticeable at 2,000 metres, but at 20 metres its effect on tuning will be tremendously greater. In the Record Three the gang condenser has three sections, but only the back section is in use on the short-wave bands, and a trimmer is not therefore required on this section. The necessary trimming on the medium and long-wave bands can be effected by means of the trimmers attached to the first and second sections, and in order to keep the minimum capacity on the short-wave bands as low as possible the trimmer screw of the back section may be removed.

not been satisfied with choosing different heater current ratings—there are .18 amp., .2 amp., .25 amp., and .3 amp. types—but they must also differ with regard to the position of the external grid connection. American valves, on the other hand, are more standardised and consequently more readily interchangeable. It is true that in the majority of cases four British valves will do the work of six American valves, but when the price of the British types is much higher than that of the American types, little is gained by this high efficiency. The decision of Marconi and Osrams to manufacture 6.3-volt valves with octal bases is therefore likely to provide a great fillip to the overseas sales of British sets, and it is also certain to help in stabilising the home market. By standardising valve types valve prices will drop and so will the price of sets. This should have a snow-ball effect on sales; people will not worry so much about the valve replacement problem when they contemplate buying new sets, and as more valves will be required per set, this will also tend to increase valve sales.

Car-radio Development

I BELIEVE I have told my readers before that I am in favour of car-radio, and that I have made a point of testing several of the outfits on the market. Normally, I am perfectly content to listen to three or four stations at most, and prefer not to have to indulge in "knob-twiddling," whilst driving. Despite the fact that many of the remote tuning controls fitted to present-day sets can be mounted on the steering column where the scale is easily visible, this is not good enough. When driving there are too many road signs to watch to be able to look down at a tuning dial.

It is for this reason that I have for some time been trying to persuade manufacturers to fit an automatic press-button tuning control, so that a few alternative programmes could be obtained as easily as operating the horn. I am afraid that I have been crying in a wilderness as far as British manufacturers are concerned, but I am now glad to see that at least one American firm has introduced an outfit with five push-buttons for pre-set tuning. These are mounted on a strip panel attached to the steering column. When stations are wanted which are not pre-tuned, the driver can operate a tuning dial in the normal manner.

Now, you British manufacturers, what about it?

A PAGE OF PRACTICAL HINTS

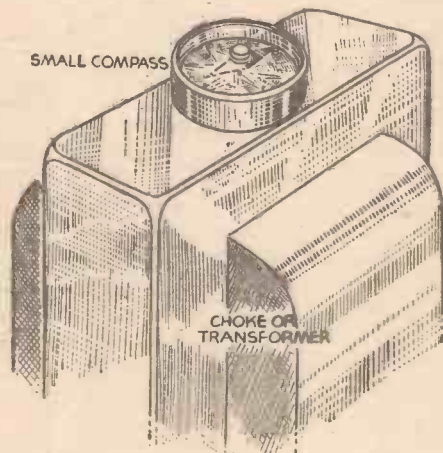
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Novel Fault-finding Dodge

BY placing a small vest-pocket compass on the top of the output filter choke deflection of the pointer will indicate that

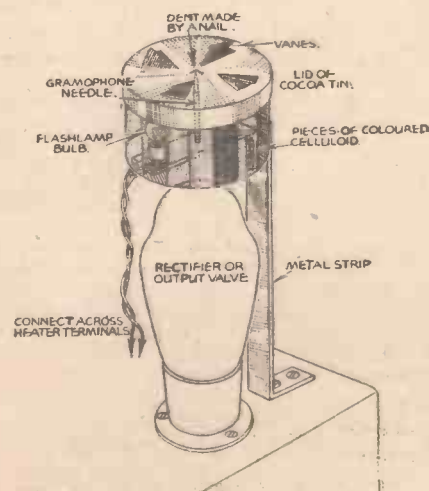


Using a small pocket-compass for simple fault-finding.

the valve is getting its current. When testing, this dodge is equally applicable to other anode leads if they are choke or transformer fed. Even H.F. chokes will show some deflection. This dodge greatly facilitates fault finding.—R. SHAW (Darlington).

Automatic Colour Changing for a Tuning Dial

HERE is a simple device which might be of some interest to wireless owners who like to amuse the children. I fitted one to my own set last Christmas, and it proved so popular that I have left it connected up permanently. It is very easy to make, and



A novel colour-changing device for a tuning dial.

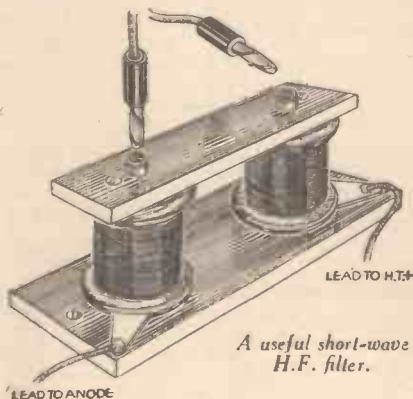
THAT DODGE OF YOURS!

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.

can be fitted to practically any mains set with the popular semi-transparent dial. Details of construction are clearly shown in the drawing. The hot air from a valve (rec. or output) causes the tin lid to rotate, and so causes the tuning dial to change colour continuously all the time the set is on.—J. EDGINGTON (Birmingham).

A Short-wave H.F. Filter

THE H.F. filter illustrated will be found extremely useful for overcoming head-capacity effects in short-wave receivers. It consists of an ebonite base measuring 1½ in. by 3 in. Two silk reels about ¾ in. in diameter, each wound in the same direction with one layer of fairly fine wire, form the two coils. These coils are mounted on to the

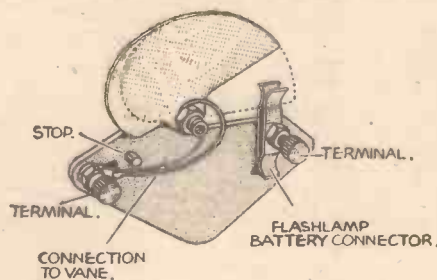


A useful short-wave H.F. filter.

ebonite base with their centres 1½ in. apart, soldering tags being provided, as shown, to which a wire from each coil is attached. Another piece of ebonite measuring ¾ in. by 2½ in. is screwed to the top of the coils, two holes being drilled to coincide with those in the coil centres, and plug sockets fitted to the ebonite with their bases inside the coils. It only remains to fit corresponding plugs to the 'phone leads which are plugged into the sockets, the filter being connected by the soldering tabs to the existing 'phone terminals of the receiver. Alternatively, soldering tags may be fitted to both ends of each coil and the unit connected in the 'phone leads of the set itself.—H. E. LELAND (Cambridge).

An Improved "On-off" Switch

THE advantage of this simple switch, is the absence of crackle. Dismantle an old reaction condenser, retaining one moving plate, and securely lock it to the spindle, with the spring washer next to the bush. An old connection for joining flash lamp batteries together is fixed in place, as shown in the sketch. The completed switch gives a clean knife action, and is a



An improved "on-off" switch made from an old reaction condenser.

one-hole fixing component. Another advantage of this simple switch is that all knobs on the set can be made to match. The rest of the moving plates can be kept for future replacements.—A. JARMAN (Ware, Herts).

Sharp Tuning with Iron-Cored Coils

RECEIVERS using good iron-cored coils are often so sharp in tuning that the sacrifice of the top register is too great, and some listeners would doubtless be willing to sacrifice a little selectivity in favour of better top note resistance. This is particularly noticeable when a detector is used, as this form of rectification has negligible damping. The response curve can be easily levelled out by connecting a suitable resistance across one or more coils. Where two tuned circuits are involved, the value between .1 and .25 megohms is suggested, or should there be a third tuned circuit, the value may have to be somewhat lower. The correct value can, of course, only be found by trial, as it is controlled by the degree of top note loss, and the degree of top note loss that can be tolerated.—R. H. WILSON (Pinner).

Milliammeter Switch Contacts

WHEN making up a multi-range milliammeter, it is very important to arrange the circuit so that there are no switch contacts in series with any of the low-value shunts. A shunt of 1 ohm, or even less, is quite common, and when it is realised that a resistance of a quarter of an ohm is not uncommon in quite a well-designed switch, it will be obvious how a serious error can be introduced.—A. WATERS (Croydon).

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MODERN DIALS Y

ONE of the most noticeable improvements in modern commercial receivers is the design of the tuning dial, and some of the latest dials are of particular interest in that they simplify the necessary operation of tuning the various stations. Unfortunately, the majority of these dials are not available to the home-constructor, and he is thus debarred from taking advantage of the ideas incorporated; but there are several simple devices which may easily be constructed with the minimum of tools to enable similar ideas to be incorporated in existing receivers, and the following details will no doubt be found of assistance. It should be emphasised that no attempt is being made to describe the construction of any existing dial, but it is inevitable that certain principles will be described which

carries a plain sheet of ivorine or white celluloid bearing a number of rectangular cut-outs. Behind this a second ivorine sheet moves with the condenser spindle, and upon it station names are marked. The simplest way of making a neat job of this is to cut out the names from a newspaper list of broadcast stations, and the main hints for making this type of dial are as follow. The openings must be staggered to avoid two names becoming visible at one moment. The names are fixed in position as the receiver is tuned, and to avoid getting two names together, pencil notes should first be made, as it will not be possible to affix the names in regular order from left to right. The method of moving the rear strip will be as shown later.

Alphabetical Dials

The most logical type of dial, and one which is now in use on one well-known commercial receiver, is the alphabetical dial. This has been in use for some time on certain Continental sets and has the advantage that a complete list of stations is printed in alphabetical order, and an indicator is moved to be brought in line with the desired station. There are many different ways of carrying out this idea, and the following three are

the simplest and most direct for the constructor. They are shown in Figs 2, 3 and 4. In Fig. 2 a large dial is used and the small section on the left carries an alphabetical list of the main stations (preferably compiled after the receiver has been carefully tuned for a few nights in order to locate just what stations are received at worth-

Details of a Few Novelties in Tuning
Constructed with the Minimum of Tools
Incorporated in Practically Any Set

while strength). A short line runs to the edge of this panel, which may be thin ivorine or white Bristol board. Travelling along behind this is another panel with a row of fine pencil lines marked to correspond with the lines by each station name. The receiver is then tuned slowly to each

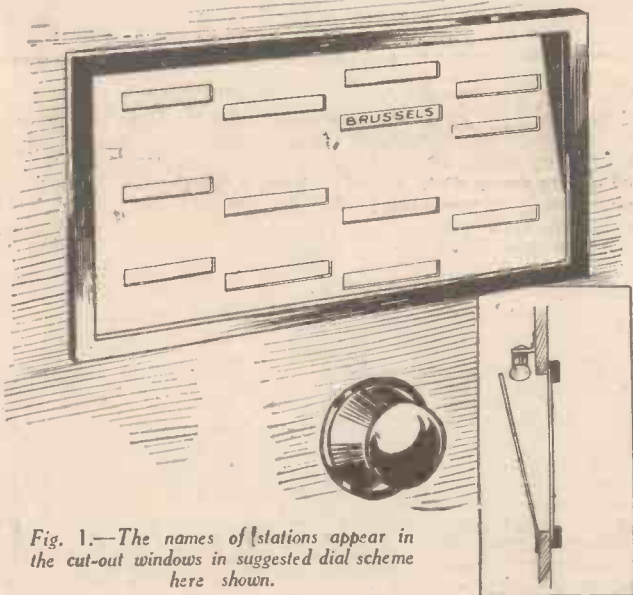


Fig. 1.—The names of stations appear in the cut-out windows in suggested dial scheme here shown.

may bear a similarity to commercial products, and perhaps, therefore, manufacturers will accept the usual disclaimer.

Station Names

The majority of dials fitted to earlier commercial receivers were of the large full-vision type, and carried the names of dozens of stations. The user is confused, until he is familiar with the dial, and takes some little time to locate a desired station before the pointer can be turned to the required setting. Such a difficulty may be overcome by using a dial in which the names of the stations appear in a window, although a criticism of this idea may be that all names but one are hidden, and the user does not know which way to turn. There is sufficient novelty in the idea, however, to warrant the construction of a dial of the type illustrated in Fig. 1, where a large rectangular escutcheon

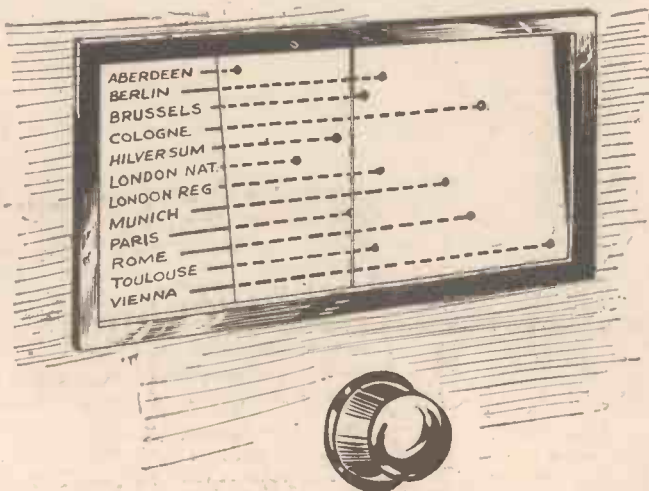


Fig. 2.—Another interesting suggestion for a dial in which a list of stations is arranged alphabetically.

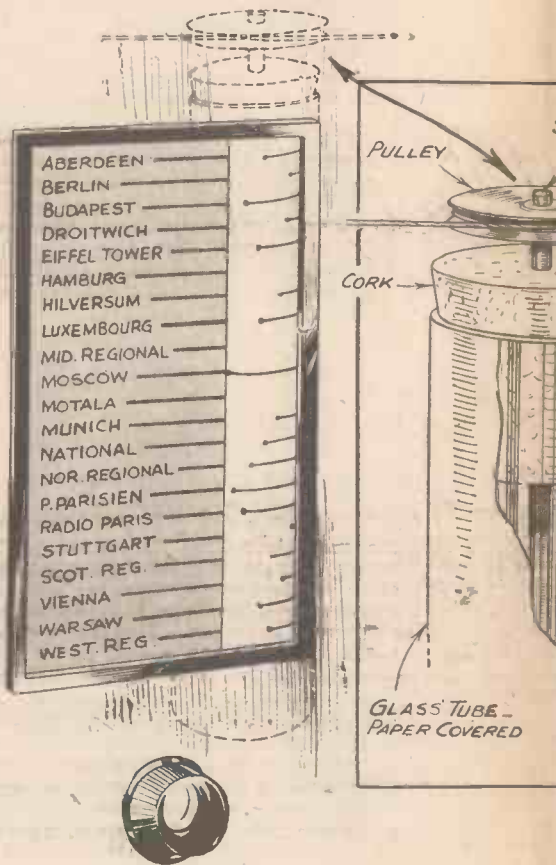


Fig. 3.—A rotating cylinder carries the indications in the alphabetical dial.

station, and when the exact point is reached a dot is made for indication. This may be done by attaching a thin wire behind the panel which will cast a shadow down the centre of the panel; by fixing a wire in front for easier visibility; or by marking close to the edge of the name panel. For this arrangement, as the indicating panel travels behind the name panel, the latter will have to be flood-lit from the front to avoid confusion due to the lines and dots travelling behind. When the final positions are decided the pencil lines should be inked in in a series of thin broken lines and a large dot, preferably in another coloured ink, to denote the final position as above mentioned.

Rotating Cylinder

In Fig. 3 the indicating chart takes the form of a cylinder, which is rotated and carries the indicating lines. A few tests

YOU CAN MAKE

ng Dial Design which may be
 Trouble and which May Be
 et - - - By W. J. DELANEY

will have to be made in pencil. Again, various methods of indicating the final setting may be used, one of the schemes just mentioned being found most desirable. The indicating section may be constructed from a length of large diameter test tube. This may be cut off at the sealed end to the required length, and two corks pushed into the ends will enable a short length of rod to be inserted for pivots. A dial lamp of the ordinary type may be suspended inside the tube by passing the connecting wires through the corks, and on one pivot a pulley should be

from becoming dirty and to add to the general appearance.

Another idea is depicted in Fig. 4, where the names are spread over the entire panel or dial, and a round or square hole punched by the side of each. This dial should also be flood-lit, as for Fig. 2, the easiest way of doing this being to slope the dial away from the escutcheon and to fit a dial light above it. A piece of glass in front will keep out dust and add to the appearance. Travelling behind this dial is a second sheet of material, preferably opaque. As a station is tuned in, a mark is made through the opening corresponding to the station. This mark is afterwards punched out, and a coloured dial light is fitted behind. Thus, when a station is located a coloured light will glow at the side of the name, but again these will have to be staggered in order to avoid two openings being illuminated at one time.

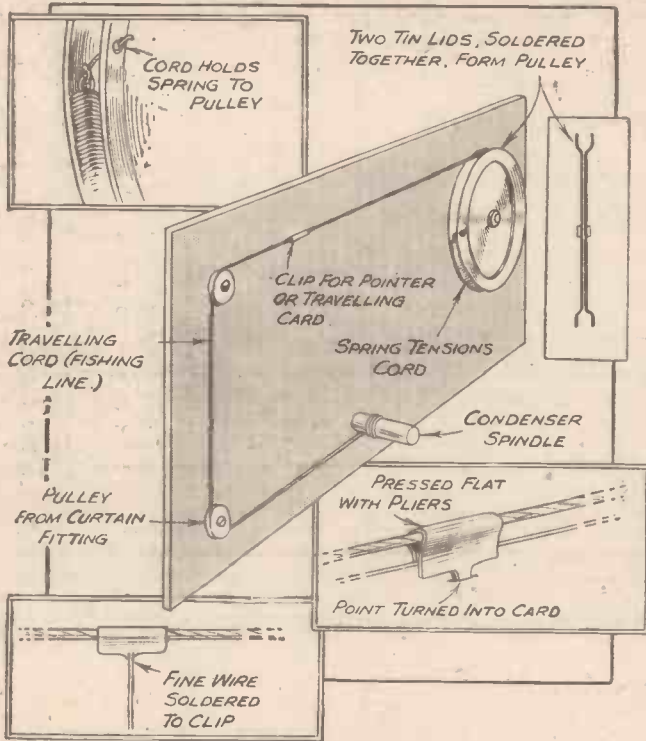


Fig. 5.—Details of a suitable driving mechanism for the dials described in this article.

soldered so that it may be rotated. The driving cord should be twisted once or twice round the pulley and the end should then be taken round a further pulley and a small weight attached. This will have to be adjusted so that it does not turn the indicating dial of its own accord but is sufficiently heavy to keep the cord taut when the dial is turned so that the cord is "unwound." A further suggestion to avoid using the weight is to employ an endless cord, attached at both ends to the large driving pulley. The paper carrying the dial settings may be stuck over the tube, or, if some indicating mark is first made so that it may be inserted in a previously decided position, it may be placed in the tube to prevent it

Driving Mechanisms

All of the devices described are quite simple in action, but some little difficulty may be experienced in putting them into practical effect. The method of moving a large panel or dial bodily such as is called for in Figs. 1, 2, and 4 may be carried out by means of cords and pulleys. The pulleys will have to be fitted to a metal framework or screwed to the back

of the cabinet or panel. For this purpose the small pulleys sold at the local stores as runners for use with the spring curtain rods will be found ideal. The dial may be attached to the cord by small pieces of tin or thin brass, bent round the cord and pressed with pliers so that it grips. Any adhesive may be used to hold the card to the clip, or points may be cut on it and driven in by pressing with the pliers. The cord should be twisted two or three times round the condenser spindle, and to obtain the necessary high gear a large

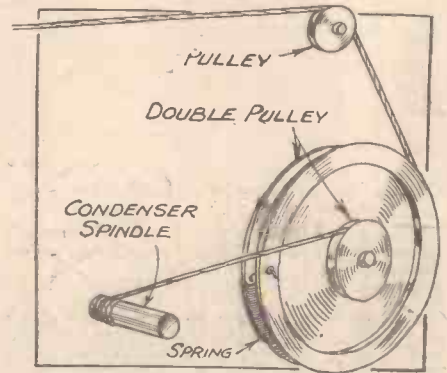


Fig. 6.—A suitable geared drive may be constructed as shown in this illustration.

pulley made by dismantling an old slow-motion drive or by sandwiching two "press-in" tin lids may be used. One end of the operating cord should be fixed permanently to one end of a short spring, the other end of which is attached to the drive. This will take up slack and give a positive drive. A similar idea may be used to cause a pointer to traverse a dial, a thin wire being soldered to metal clips clamped on the cord as above described.

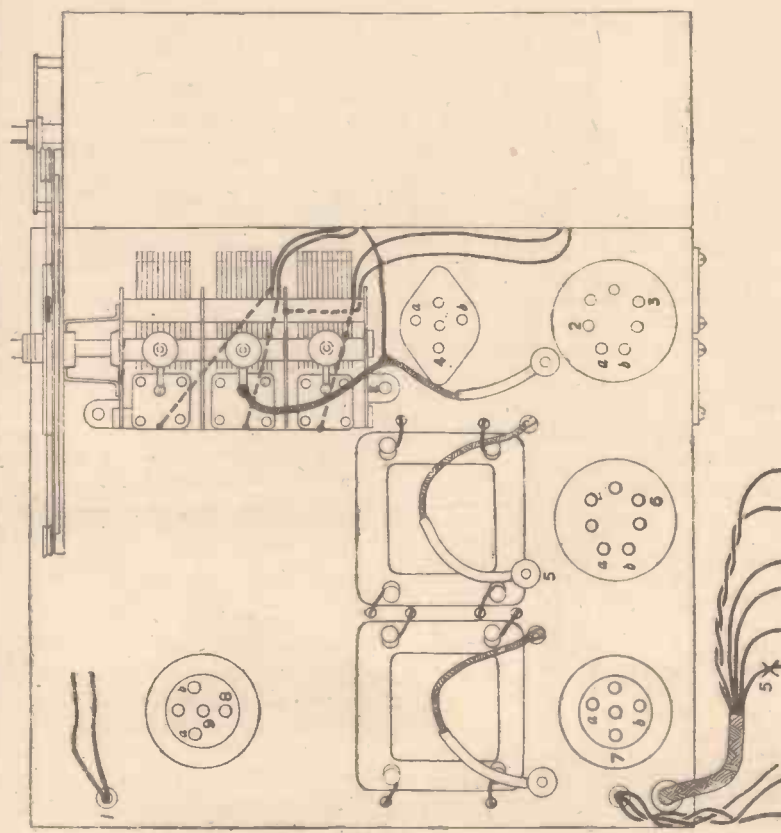
Driving Cords

The most suitable material for the cord is good fishing line, a hank of which may be obtained from a shop dealing in fishing tackle, dressed silk line proving to have the longest wear. Salmon or jack line may be obtained of suitable thickness. Details such as differential lighting, which have already been discussed in previous articles may, of course, also be included in the dials mentioned and will add to the novelty, although they will also add to the difficulty of construction due to the complications of switching or changing the medium through which the lights show. The latter arrangement saves one bulb and simplifies wiring, but introduces the need for some very careful measurements and constructional work.



Fig. 4.—Small windows are punched by each name in this dial, and are illuminated by a coloured lamp at the back.

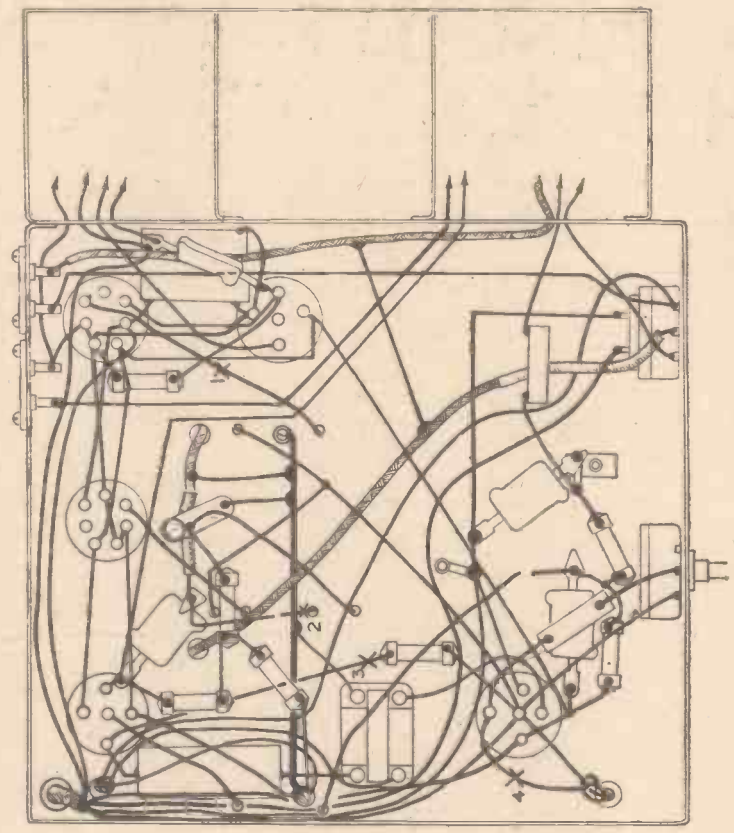
Practical and Amateur Wireless SERVICE DATA SHEET No. 30 F. J. GAMM'S VITESSE ALL-WAVER



Top of Chassis View

Approximate Voltage Readings

Voltmeter	-to E.
"	+ to 2 = 48 to 60 volts.
"	+ to 3 = 120 volts.
"	+ to 4 = 72 to 84 volts.
"	+ to 5 = 120 volts.
"	+ to 6 = 60 volts.



Underside of Chassis

Approximate Current Readings

Voltmeter	+ to 7 = 75 volts.
"	+ to 8 = 118 volts.
"	+ to 9 = 120 volts.

Approximate Resistance Readings

I.F. Transformers	Ohmmeter Connected across 1 and 2 = 3½ ohms.
"	" " " " 5 and 8 = 3½ ohms.

Underside of Chassis

Milliammeter	Connected at x4 = 4½ mA.
"	" " " " x5 = 15 mA.



SHORT WAVE SECTION

THE SIMPLEST SHORT-WAVE TWO

The Receiver Described is a Modification of the "Simplest Short-Waver," a Single-valve Set Previously Described in these pages, and which has Proved Extremely Popular and Efficient in the Hands of Readers. — — By FRANK PRESTON

reaction condenser has a capacity of .0003-mfd., and should be of the air-dielectric type and can, to advantage, be fitted with a reduction drive or slow-motion scale.

The object in using two condensers in series for tuning is that the capacity of the tuning condenser on short-waves should be about one-third of that used in a broadcast receiver; this is to render tuning reasonably easy, and to ensure maximum efficiency over the tuning range. By varying the adjustment of the pre-set condenser it is possible to alter the maximum tuning capacity from less than .0001 mfd. to approximately .00025 mfd., and thus a value can be found which best suits the slow-motion condenser drive which is employed. The highest capacity is obtained when the pre-set is adjusted to its maximum capacity, whilst a total tuning capacity of about .00016 mfd. (and this is generally most convenient) is given when the pre-set

is adjusted approximately to its midway position. Should the condenser drive employed have an extremely high reduction ratio the capacity of the pre-set can be increased, but where the ratio is low, tuning is considerably simplified by turning the condenser towards its minimum capacity.

Another advantage of the pre-set condenser is that it makes possible a variation of wavelength range over certain limits. Thus, when the pre-set is at about one-half maximum capacity, a tuning range of, roughly, 20 to 40 metres is provided. A slight adjustment of the pre-set will enable the range to be taken down to about 17 metres, or up to the 49-metre band.

The L.F. Stage

The low-frequency amplifier consists of a resistance-capacity-coupled pentode. It

(Continued overleaf)

IN the issue of PRACTICAL AND AMATEUR WIRELESS dated September 14th, 1935, I gave constructional details for a single-valve short-wave set, which was called the "Simplest Short-Waver." This unit could be used as either a complete receiver or as an adapter or converter in connection with an existing set. The little unit was made by a large number of readers, and right from the date of publication letters have regularly been received by the Editor from readers who have been very enthusiastic concerning the results which it has given.

Unfortunately, the issue in which the article appeared was completely "sold out," and many who wished to obtain the back number were unable to do so. It was for that reason that the Editor reprinted the descriptive article in the issue dated December 12th, 1936. This brought forth a further outburst of good reception reports from those who had built it.

More Volume

Despite the undoubted popularity of the single-valve set, I believe that there are probably many enthusiastic short-wave constructors who would like to build a similar type of set, but of a rather more ambitious nature. That is why the modified circuit and pictorial illustration are given in this article. Those who remember the original set will see at once that the basic design remains unaltered, and that the same home-made coil and H.F. choke are employed. But there is now a second valve, this being a pentode used as low-frequency amplifier. Additionally, the construction is this time shown as being carried out on a wooden or metallised chassis instead of on a simple baseboard. This layout makes for a more modern appearance as well as tending towards rather better efficiency; nevertheless, there is no objection to using a baseboard as before, provided that the components in the detector circuit are grouped in a manner similar to that of the original set.

Standard Components

As in the original design, there are no special components to be bought, and the receiver can be built by those constructors who have not previously done any short-wave work and who, therefore, have no S.W. components at hand. It is, of course, necessary to use a special coil and choke, but these items are home-made, and need cost no more than a few coppers. A .0005-mfd. tuning condenser is used, in conjunction with any really good slow-motion drive, and there is a .0005-mfd. (maximum) pre-set condenser in series with this. The

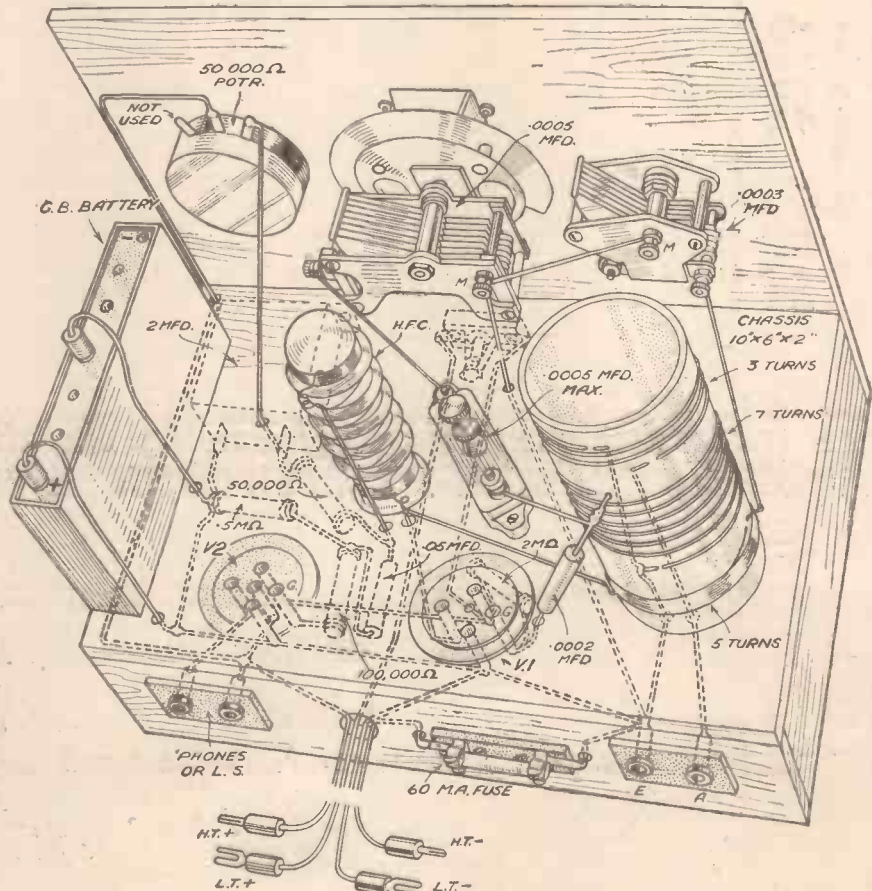


Fig. 1.—Pictorial view of the "Simplest Short-wave Two" showing the wiring connections.

SHORT-WAVE SECTION

(Continued from previous page)

might be argued that R.C. coupling does not give any step-up, and, therefore, that it is inefficient by comparison with transformer coupling. This is partly true; but R.C. coupling is less expensive and is generally completely free from instability troubles which are sometimes present when using an L.F. transformer. In any case, the amplification provided by the pentode itself is sufficient to ensure loudspeaker signals from many transmissions, and to give amply loud 'phone signals from any station in the world—provided that a fairly good aerial is employed.

A 100,000-ohm "stopper" resistance is included in the grid circuit of the pentode, and this is sufficient to prevent H.F. from "escaping" into the L.F. circuit. Apart from this, the low-frequency amplifier is perfectly standard, and is the same as is used on broadcast wavelengths. This resistance, as well as the other fixed resistances used, should be of the non-inductive (not wire-wound) pattern, and any good make can be used. The resistances can all be of the half-watt type if desired, but there is, of course, no harm in using components of higher wattage rating.

Principal Parts Required

None of the components, other than the coil and choke, is critical, but they should all be of good quality. The valve-holders can be standard Clix components, but it is worth while to use the pattern with low-loss ceramic base; it should be observed that one is of the four-pin, and the other of the five-pin type, but two five-pin holders can be employed if preferred by leaving the centre socket of V.1 disconnected.

A rather unusual arrangement is the use of a 50,000-ohm. variable resistance or potentiometer for decoupling the anode circuit of the detector. This provides an excellent method of feeding the optimum H.T. voltage to the valve, and of pre-setting the most suitable conditions for smooth reaction. It is also useful when a very fine reaction setting is required when receiving a "difficult" station. The resistance can be set initially by adjusting the reaction condenser to its midway position and then turning the knob of the variable resistance until the detector just commences to oscillate, with the tuning condenser turned to its midway position.

Making the Coil

The variable resistance should, for preference, be of the carbon-track pattern, since a wire-wound component is likely to be rather "noisy" when used in this part of the circuit. It is worth mentioning, however, that the variable component can actually be replaced by a fixed resistance of similar value if the constructor is prepared to forgo the additional refinement which it confers.

Constructional details of the coil and H.F.

choke have been given in the previous articles to which reference has been made above, but they will be repeated briefly. The coil consists of three windings on a 2in. diameter shellacked cardboard or paxolin tube; the aerial winding consists of three turns of 26-gauge enamelled or d.c.c. wire slightly spaced; the grid coil has seven turns of 20-gauge d.c.c. or enamelled wire spaced by the diameter of the wire; and the reaction coil has five turns of 26-gauge wire (the same as used for the aerial winding) placed side by side. The disposition of the windings is shown in Fig. 1, where it can also be seen that they are all wound in the same direction. After winding, it is a good plan to apply a couple of thin coats of shellac varnish to the coil, since this prevents the windings from slipping.

from any chemist, and can later be mounted on the chassis by pushing it on to a cork attached by means of a wood-screw. The turns are arranged in five "piles," as shown in Fig. 1, these being placed about $\frac{1}{4}$ in. apart to reduce the self-capacity. The ends of the winding are secured by binding a strip of insulating tape round the tube, and it is best to solder short lengths of flex to the thinner wire for making connection to the other components. As with the coil, two coats of thin shellac varnish should be given to the choke after winding, to hold the wire in position.

Tuning

All other constructional details will be evident from the pictorial view of the

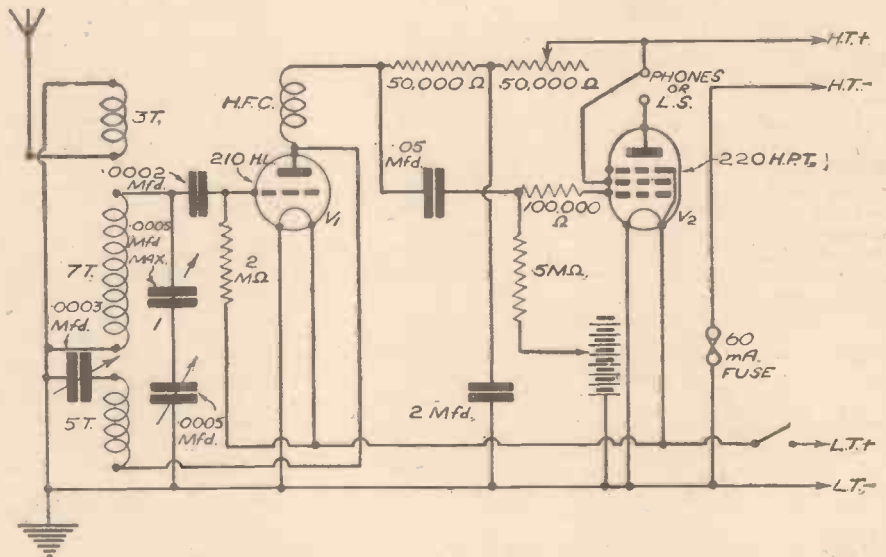


Fig. 2.—Theoretical circuit diagram of the "Simplest Short-Wave Two."

It can also be seen from Fig. 1 that the ends of the windings are anchored by passing them through pairs of holes in the former.

Note carefully the connections to the three windings, since if these are reversed reaction will not be obtained. The coil can be attached to the chassis (or baseboard) by means of small angle brackets or by making it a push fit over a disc of wood, or a large cork, screwed to the chassis.

H.F. Choke Details

The choke consists of a total of 150 turns of 36-gauge enamelled wire wound on a glass test tube $\frac{1}{4}$ in. in diameter. A length of ordinary glass or paxolin tubing could be used as an alternative. The test tube can be bought for about a penny

receiver given in Fig. 1. With regard to the operation of the set, this is the same as with any other Det. L.F. short-waver. When the detector has been brought to the verge of oscillation—indicated by a "breathing" sound in the 'phones—the tuning condenser should be operated slowly. If necessary, the reaction condenser should be adjusted meanwhile, in order to keep the detector just at the oscillation point. When a carrier-wave whistle is heard, reaction should be eased off, and the tuning condenser finally adjusted. It is best to use an H.T. voltage of 120, when the Cossor 220 H.P.T. will require 4.5 volts grid bias; if the H.T. voltage is reduced to 100 it will be possible to cut down the G.B. to 3 volts. A wide range of H.T. voltages can be applied to the Cossor 210 H.L. detector by means of the variable decoupling resistance.

SEVERAL manufacturers have drawn attention to radio gramophone motors becoming noisy due to lack of oiling. It would appear that though the instructions issued with radio gramophones lay great stress on the necessity for periodically oiling motors, little attention is given by actual users. It is apparently nothing unusual for listeners to use a radiogramophone for three or four years without so much as using a single drop of oil. However well made the gramophone motor may be, it cannot possibly stand this treatment. It is only necessary to remove the "D",

CARE OF RADIOGRAM MOTORS

shaped spring in the centre of the turntable, and to insert a small quantity of suitable oil in the two or three oiler holes or cups that will be revealed. Some types of motors also have a grease cup, which should be screwed down periodically. This cup should be removed and refilled with grease about every two years. Similarly, there is a great tendency to use the same gramophone needle over and over again, because a radiogram gives good reproduction with

a needle that would sound hideous on a mechanical gramophone. This is false economy, as the wear inflicted on gramophone records with one needle is at least as bad with a pick-up as with a sound-box.

The majority of radio gramophones have automatic stops, and failure of this to function in 99 cases out of 100 is due to a gramophone needle having rolled under the turntable and become lodged in the mechanism. Should the automatic stop fail to work, the turntable may be removed, when the offending needle can be readily discovered.

IDEAS for AMATEUR TRANSMITTERS

(Concluded from page 30, March 27th issue).

HERE are some further points worth mentioning in connection with transmitting coils generally:—

(1) 12 or 14 SWG bare copper wire can usually be obtained at ironmongers' by the pound weight. No. 12 runs about 30ft. to the pound.

(2) Form your turns to leave enough room for crocodile clips, i.e., so that turns will not be shorted. This means spacing about 1/4 in. or so.

(3) Celluloid for making the strips, which should be 1/4 in. wide, can often be obtained from a garage; old side-curtains are quite good enough.

(4) A substitute for the amyl acetate-celluloid paste is "Durofix," obtainable at ironmongers'. A 6d. tube will do one average-size coil.

(5) It is always best to make up coils having an even number of turns. Then, the centre-tap connection comes underneath, midway between the mounting ends.

(7) Don't leave off the grease proofed paper mentioned—you can get enough to last a life-time for 3d.—because it prevents the celluloid paste sticking to the cord, and keeps the paste where it is wanted. Some paste will stick to the paper, but it is easier to get the paper off than strands of string.

(8) Don't expect your first effort to make one of these coils to be a huge success. There is knack in the whole job, but after a little practice coils can be run up in half-an-hour or so.

Mounting Low-power Inductances

Coils for the crystal oscillator or buffer frequency-doubler stages can be close-wound on a 2in. diameter former, using No. 18 enamelled. If plug-in formers are not available, it is sometimes a problem how to mount such coils. One good way is to make use of banana-plugs and sockets. The latter are fixed the required

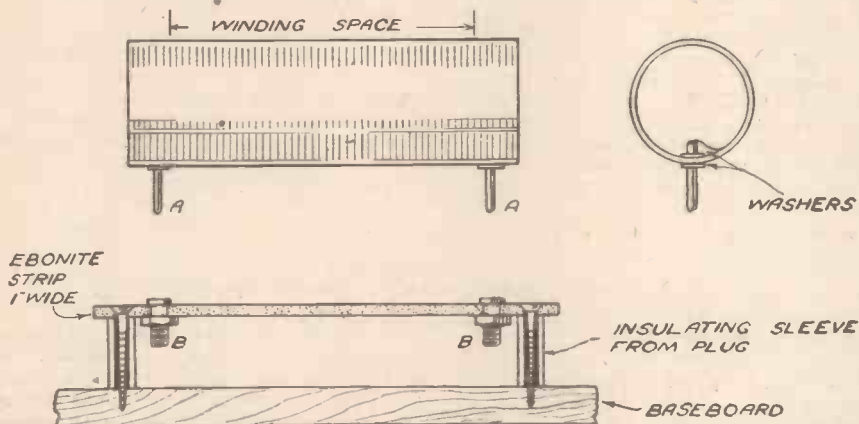


Fig. 2. Showing a convenient method of mounting low-power coils. A-A are plugs with the insulating sleeving removed, B-B are corresponding sockets. The sleeves from the plugs are used as spacers for holding the mounting strip away from the baseboard.

(6) Coils of No. 12 wire should be used; low capacity to keep the circulating current down. If the coil warms up, losses ensue. To explain this: A 14-turn copper-tube coil in the P.A. stage with 300 mmfd. in parallel for 80 m., will warm up with 10-15 watts input, due to the high circulating current. Using a 30-turn coil of No. 12 of the type described, with about 50 mfd. in parallel for the same band, the coil will remain quite cold with 100 watts input, as the circulating current will be very low. The driven P.A. stage should always have a low capacity tank circuit.

distance apart on an ebonite strip, and the plugs have the insulating portion removed. Then drill holes at the ends of the coil former so that the stripped plugs are a tight fit. Slip 3/16in. brass washers over the plugs on each side, soldering them in position. The ends of the coil are then soldered to the plugs which, while they are tight electrically, have sufficient play to centre with the sockets.

Fig. 2 shows the idea, also how to use the discarded insulating sleeves of the plugs to act as spacers supporting the mounting strip.

ITEMS OF INTEREST

Neon Tuning Indicators

THE use of a neon tuning indicator for the correct tuning of a receiver is now generally understood. Some readers may have overlooked the advantage of this device when reganging, as it will act equally well as an indicator for the correct setting of tuning condensers as it does for the main tuning control.

Variety from Hanley

A VARIETY bill is to be broadcast from the Theatre Royal, Hanley, in the Midland Regional programme, on April 1st, when the chief turn will be given by Jan Ralfini and his Band.

Quarterly Talk

MR. G. L. MARSHALL, Northern Ireland Regional Director, is to give his quarterly talk on April 1, in which he will review plans for broadcasting during the coming quarter, April-June.

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- All valves employed on short waves.

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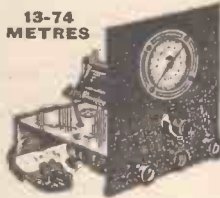


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COMPONENTS TESTED IN OUR NEW LABORATORY

New Bulgin Switches

TWO new switches of the toggle type have been added to the Bulgin range, but these are of specialised application. Unlike the ordinary toggle switch, there is only one "set" position. When the dolly is depressed it must be held in the alternative position in order to make the necessary change in circuit, and it immediately returns to its original position when released. One of the switches is adjusted to be "On" in the set position, whereas the other is "Off" in that position, and accordingly they may find numerous applications in experimental circuits. For instance, for meter switching, where measurements are only required from time to time, the meter may be wired with the "off" type switch connected through a series resistance, so that it is impossible to damage the meter due to an overload, as the switch will have to be depressed and held in position in order to cut out the necessary series resistance. Alternatively, the other type may be used with current meters provided with shunts for a similar safeguard. Numerous other applications will occur to the experimenter, and the switches are rated at 3 amps. 250 volts. The samples which we have tested function perfectly satisfactorily, and it appears that the spring loading is much stronger than is provided for the ordinary type of toggle. The result is that the moment the dolly is released the contact returns with a very definite movement to its original position, and there is no risk of a defective or poor contact being provided. In all other respects the switch is up to the high standard set by Bulgin apparatus. The price is 1s. 9d. each, and the type numbers are S.171 for the "Off" type and S.172 for the "On" type.

Philco Demonstration Aerial

ALTHOUGH intended primarily for service engineers and those whose work entails the demonstration of receivers in a customer's home where an aerial may not already be fitted, the Philco Company's new aerial will be found of considerably wider application. The accompanying illus-

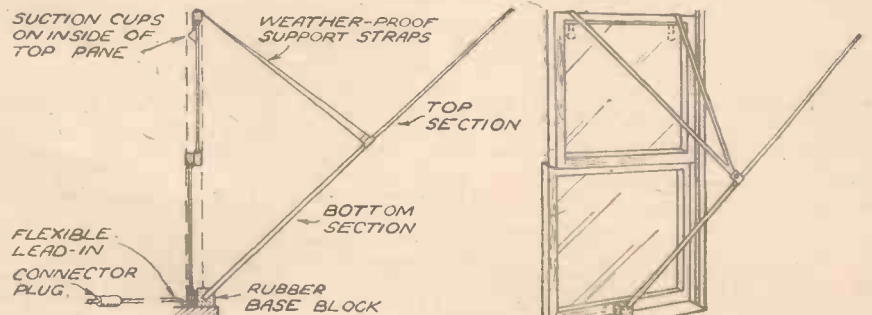
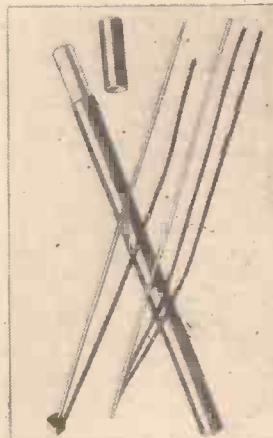
tration shows the complete apparatus, with the waterproof carrying case which is supplied with it. The aerial consists of two lengths of metallic tubing with a ferrule for connection between the two. A length of weather-proof strapping is provided with suction cups at the two ends, and these are pressed against the inner surface of the window glass, near the top of the frame, and the other ends passed outside the window. The small ebonite block attached to the end of one length of tubing is then placed on the outside of the window, and the result is that the aerial rod is left projecting outside the window as shown in the sketch. The price of this aerial is 14s. complete, and it will be found of great value for experimental work.

Russell's Hertzite

EXPERIMENTERS of the early days will remember the difficulty which was experienced in obtaining suitable crystals for use in the simple type of receiver, and a considerable degree of popularity was obtained with the form of galena known as Russell's Hertzite. This was extremely sensitive and very little difficulty was experienced in locating a good spot, although naturally the pressure on the contact wire required a little adjustment in order to make the most of the crystal. Owing to the increased interest in crystal receivers, the maker of this particular item has decided to market it again, and it is now obtainable as in the old days, complete in a box with a suitable cat-whisker, at 1s. A suitable detector mount of the glass-enclosed type may be obtained for 1s. 3d. A sketch and details of a crystal receiver are supplied with the detector. The address is L. G. Russell, "Radiomail," Tanworth-in-Arden, Birmingham.

Record Valves

IN addition to a wide range of battery and mains valves of standard characteristics, the Record Radio Company can now supply "Yale" valves for American receivers. The standard valves range in price from 3s. 3d. to 11s., and include pentodes, octodes and others.



The new Philco Demonstration Aerial, seen above with its waterproof carrying case, and in the lower illustration, the method of erecting it.

BRIEF RADIO BIOGRAPHIES—4

By RUTH MASCHWITZ

Jane Carr

JANE CARR, member of the popular White Coons, has never had any doubts about her career. At the age of two she decided to go on the stage. Her first performances were given on the landing with her dolls as audience seated on the stairs. Later her grandfather made a small stage for her at the top of the house, and Jane used to give song and dance exhibitions to her friends.

While still at school she broadcast—conversations between a monkey and a Teddy Bear—for which she was paid the princely sum of ten shillings.

Her father is a doctor, and the family was against a theatrical career. However, at seventeen, immediately she left school, she joined a repertory company. She studied the leading lady's performance in minute detail, and when she fell ill Jane was able to take her place. Later she joined the Hull repertory company, and toured with the Brandon Thomas seasons. In 1932 she came to the West End and appeared in two revues, and "Mother of Pearl." Since then she has been concentrating on films.

Two Aberdeen terriers are Jane's constant companions—in fact, during television they have been known to become entangled in the apparatus! On one occasion before a broadcast at St. George's Hall, leaping out of a taxi, they were terrified by the crowd and took refuge under a car. On the promise of an autograph spectators hastened to extricate them. The dogs became more frightened and took flight, but were eventually captured while listeners waited to hear Jane broadcast!

Nora Gruhn

NORA GRUHN, who has broadcast frequently for all types of B.B.C. programmes, is another artist who decided at an early age what her career should be. When three years old "I'm going to be an opera singer," she pronounced with great solemnity. At nine she was a composer. Each song she wrote was higher than the last, and when she sang them to her father who is a singing master, he could not fail to be impressed. He took her seriously in hand, and his training was followed by several years at the Royal College of Music, where Nora made a study of the piano.

Then she went to Germany and sang sixty roles or so in opera in a small town. The audiences, consisting of every grade of society, were intensely musical and attended the opera regularly. They often made presents to the artists which usually consisted of flowers and fruit. On one occasion Nora was presented with a huge basket which was unfortunately insecurely fastened. This resulted in a cascade of onions and carrots pouring over the stage. Next day in the market an old woman apologised for the mishap, and presented her with two bananas for consolation.

Nora went on to the Cologne Opera House, and since her return to England has sung at Covent Garden, taking part in the International Season for several years.

A charming reunion was recently effected when her old nurse, after listening to the radio, rang up Nora to ask if she really were the child she had looked after at the age of three.

The British Long-Distance Listeners' Club

More Abbreviations

MEMBER R. A. Loveland, of Haywards Heath, has sent us a few more commonly used abbreviations to add to the list which we recently published in this column. He also refers to the RST scale which we have already discussed, but the main terms worth mentioning are as follows:—

QSB—Fading (i.e., Your sigs. are R8, QSB to R4).

QSY—Can you (or shall I) change frequency?

BCL—Broadcast Listener.

DX—Distance.

FB—Fine Business.

HI—Laughter.

Rx—Receiver.

SKED—Schedule.

Wx—Weather.

There are, of course, many other terms, especially in the "Q" Code, and for those who wish to obtain a complete list we suggest that they obtain a copy of the G.P.O. Handbook for Wireless Telegraph Operators from His Majesty's Stationery Office, price 9d.

From Portuguese E. Africa

MR. D. E. WHYTE, who is a member resident in Beira, sends us an interesting letter in which he concludes by stating that he would be happy to hear from other members who want a live correspondent to exchange ideas, etc. His full address is P.O. Box 441, Beira, Portuguese East Africa, and perhaps those members who desire to do so, will communicate with him direct.

Verifications

REGARDING the recent controversy over QSL cards, another member, Mr. Hamilton, of Tadworth, says that during 1936 he sent out some 150 reports with postage, and received 110 cards, "which goes to show that a good report does more good than junk." He suggests that those readers who have not been fortunate enough to secure verification cards should try again, giving a much more detailed report.

With the Colt

THE Colt All-Wave Three which was described some time ago seems to have given extremely favourable results in the hands of Member F. E. Goffe, of Henley-on-Thames. He says: "My list is not in any particular order. But as I got the cricket results and play from VK3LR, I think that is pretty good. I also received W2XAF, W2XAD, W2XE, W8XAL, W3XAL, W9XF, CT1AA, EAQ, OLR, TPAL, TFJ, VKSLR, JVN, VK3LR.

Amateurs: ON4ZA in contact with VE1AW, HK1Z, E18, F3JD, HA8N, SU1KG, FU1MK, VU2CQ, G5TZ, G6PW, G6QB, PAWN, VK3PL, VI2AK, GU2CQ, G5NI, G18N, G2HC, E18L, G6AG, W3FIH, W1BLO, W2IFY, W3MD, W12RW, W2IKY, W2SAV.

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- LATEST SCREENED-GRID CIRCUIT, comprising
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This wonderful chassis will bring you a wide choice of English and foreign programmes with amazing purity of tone and remarkable volume. Available at this astonishing bargain price only from N.T.S. Secure yours while they last.

2/6 down secures 1 balance in 12 monthly payments of 4/-. Also available with 3 Cosor Valves at 45/-, or 3/- down and 12 monthly payments of 4/3.

Complete with 3 Valves.

2/6
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HALCYON AUTODYNE SHORT WAVE CONVERTER

Instantly attached to your present A.C. Mains set and makes it an efficient All-Wave Receiver.

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With Mullard 354V Valve.

Stand your set on this amazing unit and hear the whole world through your present familiar receiver. Only from N.T.S. is this famous converter obtainable at this astounding bargain price. Secure yours now!

- FOR A.C. MAINS SETS ONLY
- 14-60 metres. ● No alterations to your set.
- Simply attach, and your set is an all-waver, a special switch enabling short-wave or broadcast reception to be enjoyed at will. ● Tuning and Sensitivity controls. ● Dial calibrated degrees. ● Walnut finished cabinet. Complete with plug-in adaptor and instructions. ● For A.C. mains sets only.

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2/6
DOWN

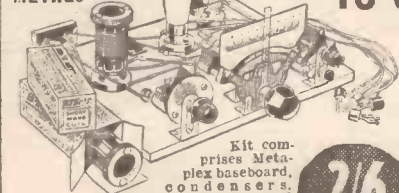
BARGAIN 1-valve S.W. KIT

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12-94 METRES

Cash or C.O.D.

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Kit comprises Metalplex baseboard, condensers, switch, valve and coil holders, H.F. choke, terminals, slow-motion drive 3 coils, wire, and FULL WIRING DIAGRAM. Less valve. Cash or C.O.D. Carriage Paid, 19/6, or 2/6 down and 8 monthly payments of 2/6. If headphones and valve required with Kit, deposit 2/6 and 11 monthly payments of 3/4.

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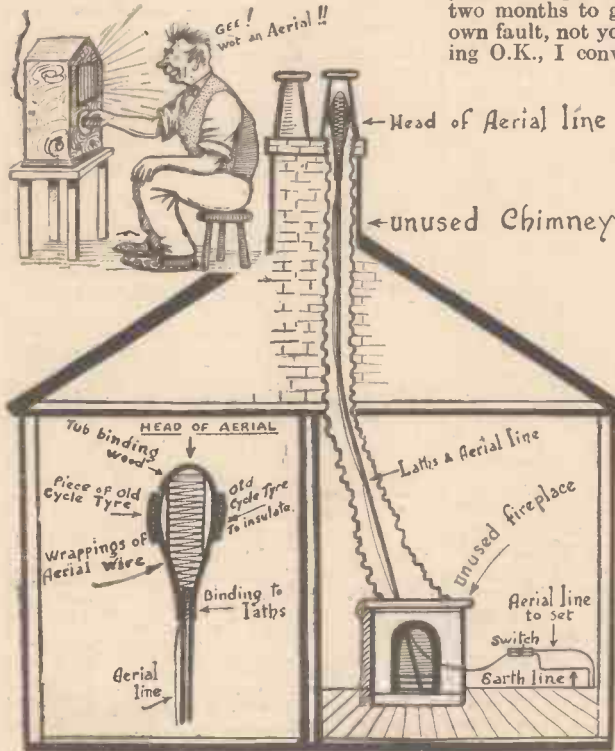
EST. 1924

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).

A Novel Indoor Aerial

SIR,—The following idea may prove useful to City dwellers and others who can only use an indoor aerial, and wish to get the best reception. I have tried out the idea and find it is as good, if not better, than most outdoor aerials. The idea is to pass an aerial line right up an unused bedroom or attic chimney, as shown in the sketch.



A general view of Mr. G. E. Hopton's novel indoor aerial.

Obtain 3 7ft. laths (2d. each), 1 piece of wooden hooping off an old tub, 2 pieces (6in. long) out from an old cycle tyre, a suitable length of aerial wire, some stout binding cord, and a 2-way switch.

Bend the wooden hoop round until it forms an oval, bind the ends of this on to the first lath, then work the aerial wire inside of this "criss-cross" fashion (see sketch). Bind the pieces of old tyre to each side of oval to insulate it from the brickwork of chimney, letting the lead from aerial run down the side of the lath to which it is bound by a little binding cord at 2-ft. intervals.

As it is gently passed up the chimney (care being taken not to disturb any soot), bind on the other two laths, connect your lead to the switch, which gives the aerial line to set, and earth lead (in case of lightning).

Before I tried this idea, I had an ordinary

indoor aerial—now my set seems to have doubled its pulling power.—G. E. HOPTON (Manchester).

Simple One-valver

SIR,—It is exactly twelve months since I became interested in wireless and, of course, your valuable paper. In the third book I received, you showed a diagram of your "Simple One-Valver." It took me two months to get a signal out of it—my own fault, not yours. Having got it working O.K., I converted it into an adapter,

and used it in conjunction with an eight-year-old "Straight 3," and enjoyed L.S. reception from the local stations. As time went on, I put in good short-wave components and improved it. I am enclosing my log of stations received from August 19th, 1936, all, of course, "phone" transmissions.

Also in two of last year's issues were letters with reference to "How old is a valve?" Well, the valves used in the receiver up to one month ago were Mullard, one of them eight years old and two ten years old, and they are still used and working as well as ever in the "Straight 3," but when I constructed an 0-v-1, I got new valves.

Now, last of all, I desire to get in touch with any S.W.L. in Bolton, either by letter or come round and see me.—HAROLD WILLETS,

1, Moorfield Grove, Tonge Moor, Bolton, Lancs.

[The log is too extensive to publish, but includes quite a number of W stations, and over 200 G stations.—Ed.]

On Two Valves

SIR,—I feel that I must drop you a few lines in appreciation of your paper. Since I started taking this paper, I must say my interest in radio has increased a hundredfold. So thanks very much for your most interesting articles and, for special mention, those on amateur transmitting.

Having seen many S.W. logs published in PRACTICAL AND AMATEUR WIRELESS, and not seeing one from this district I thought maybe mine would be of interest.

14 mc. fone: F3FA, F3PK, VE1AW, VE1JA, LA1G, HB9BY, HB9A, II TMT, IISR, SUICH, SUIKG, VP9G, PY2EJ,

VO1I, OZINW, HI5X, SM7WR, SM5SV and 59 W stations. These stations were heard during the last fortnight.

The receiver is an 0-v-1 with 20ft. indoor aerial. Reports are sent by printed card, and I do not use reply coupons.—KEN. N. SMITH (Ossett).

A Good Ten-metre Log

SIR,—As I have not seen any ten-metre reports from this district in PRACTICAL AND AMATEUR WIRELESS, I am sending mine.

My receiver is a S.G.-v-2, and goes down to 7 metres. For ultra-short waves, I use a 12-ft. vertical aerial, while on short waves, a 33ft. inverted "L" gives best results. Here is my 10 metre log.

- W1CCZ, W1HQN, W1HHU, W1IMA,
- W1ETD, W1CKF, W1ZD, W1JZA,
- W1DEY, W1BQQ, W1COO, W1WV,
- W1IYT, W1ADM, W1DNL, W1GDY,
- W2AMM, W2EJO, W2IEF, W2GJK,
- W2JQR, W2DKJ, W2FGV, W2HWX,
- W2HGU, W2ADI, W2CUZ, W2JKC,
- W2FWK, W3CYK, W3AUC, W3EMM,
- W3GIZ, W3FPL, W3PC, W3AIB,
- W3CWG, W3AKX, W3FVO, W3GPM,
- W3FKK, W4EDQ, W4BYY, W4BMR,
- W4FT, W4ANN, W4NN, W4GRZ,
- W5DUK, W5DDP, W8FSA, W8EBS,
- W8OBX, W8CHB, W8KTW, W8LWA,
- W8FYC, W8MWL, W8BDO, W9ORA,
- W9BOF, W9BHT, W9EKD, YL2CZ,
- YL2CJ, YL2BG, YL2ZZ.

I find that most of the W fones on 10 metres QSL, whether return postage is enclosed or not, and I have QSL's from a good number of the above.

Among other stations I have received are W2XDV (8.43 metres), which comes over about R6-7 every day; W1XAO and W2XEM, two police stations; and W9XAZ. I have QSL's from W1XAO—which is usually about R8—and W2XDV.

Alexandra Palace comes in about R7 on the loudspeaker.

A reader asks about W4BYY; in August last year I sent him a report for 14 mc. reception, and he sent a QSL by return: I did not enclose return postage, but as he has now raised his power to 450 watts, he is probably getting more reports than he can cope with.—J. G. COCKRILL (Westcliff-on-Sea).

CUT THIS OUT EACH WEEK.

Do you know

—THAT an A.C. receiver designed for use on 50-cycle mains should not be used on mains of lower periodicity.

—THAT an earth lead may often be used as an aerial simply by connecting it to the aerial socket.

—THAT when the above procedure is adopted it often results in a reduction of atmospheric noises.

—THAT headphones should always be joined to a mains receiver through fixed condensers.

—THAT gas-pipes are not advisable for earth connections to any receiver.

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 Neuen, 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.

RADIO CLUBS AND 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.

West London Radio Society

THE annual general meeting of the above Society was held at Headquarters recently, when several new committee members were elected, and arrangements for the summer were discussed. Meetings are held weekly at Ross and Robinson, Ltd., 16, Bond Street, Ealing, W.5, on Tuesday evenings, at 8.15 p.m. All particulars may be obtained from the Hon. Sec., D. Reid, 15, Tring Avenue, Ealing Common, W.5.

Radio-Physical and Television Society

ON March 2 a demonstration was arranged at the premises of Messrs. Kamroe Radio Co., Ltd., of an H.M.V. television receiver, at which a party of thirty members and friends attended. The demonstration was entirely successful, the members expressing the view that it was the best they had ever seen.

At the lecture given at the society's headquarters on March 5, by the President, Dr. C. G. Lemon, the subject chosen was "Experiments in Light," and mainly consisted in showing how the human eye is very easily deceived. The beginning of the lecture dealt with the construction of the eye and particular stress was laid on the fovea centralis at which the centre of vision occurs.

The main part of the lecture consisted of demonstrations showing how the eye can be artificially fatigued to different colours and thereby giving an entirely different colour version of an object; and also, by means of rotating discs, colours were produced from black and white drawings.

The society's headquarters have been redecorated and a library has been installed, which contains radio and scientific publications, for the benefit of members. Two meetings are held weekly: on Wednesday evenings at 8.15, when members can attend for general discussion, use of library, morse test, and calibration of apparatus;

and on Friday at 8 p.m. lectures are given on radio and other subjects.

Enquiries concerning the society should be addressed to the Hon. Secretary at headquarters, 72A, North End Road (off Talgarth Road), West Kensington, W.14.

Southall Radio Society

ABOUT one hundred people—the best attendance of the season—were present to hear a representative of Messrs. Lissen, Ltd., give a talk on short-wave reception, with special reference to his firm's products. The talk was illustrated with lantern slides, and a demonstration of several of Messrs. Lissen's receivers followed. Conditions for short-wave reception were reasonably good, and a number of U.S.A. stations were received at entertainment strength.

The most ambitious summer programme which the society has ever attempted is in the course of preparation, and interested readers should get in touch immediately with the Hon. Secretary, Mr. H. F. Reeve, 26, Green Drive, Southall, if they wish to take part in any of the contests arranged.

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.

J. S. (Mull). We thank you for your offer, but another reader had previously sent an issue and it has been sent on to the querist.

W. H. S. (Fenstanton). We have no details from the station in question, but suggest you send them a reception report.

W. H. T. (Via Rotherham). We cannot guarantee any receiver to pick up the countries named as conditions vary from time to time and in different parts of the country. We can only suggest that the superhet. is the most likely receiver for your purpose and in this connection we recommend the Vitesse. Ordinary 7/22 is quite suitable.

R. F. T. (N.10). If sufficient interest is shown in the circuit we shall publish details.

J. Z. (Malta). The series of articles for the Service Engineer which we recently published should meet all of your requirements.

R. G. (Cheltenham). We do not think you can carry out the process satisfactorily at home. We suggest you send the speaker to a firm who specialises in the work. A capacity bridge would be the only satisfactory method of carrying out the condenser tests.

G. H. (Brixham). So far as we know all of the programmes are "electrical transcriptions," or gramophone recordings. Write to the company concerned for full particulars.

L. R. (Leeds). Either the output is not sufficiently smoothed, or the receiver circuits need decoupling. The latter is an important point.

E. A. J. (Potton). 500,000 ohms and .5 megohm are one and the same. Your set is apparently not ganged correctly. We suggest that you re-trim the I.F. transformers.

J. I. (Alcester). Unfortunately all of the issues are now out of print.

A. T. R. (Birkenhead). We are not familiar with the speaker and suggest that you write to Messrs. Lissen concerning it. We cannot advise concerning the transformer without further details.

J. S. H. (Southampton). Try the effect of increasing the H.T. applied to the detector valve, as this can cause the trouble mentioned.

R. P. (Walton-on-Thames). We do not carry blueprints of commercial receivers, and suggest you write direct to Messrs. Telsen.

W. W. (Croxley Green). Your query is not clear. There are many short-wave condensers and you are not restricted to any one capacity. The capacity governs the wave-range of the coil which is in use.

G. C. (N.7). The valves should be suitable and approximately 9 volts G.B. should be used.

J. H. B. (Broadstairs). The old pattern 6-pin coil was not standardised, and we cannot give you connection details. A good local radio dealer should be able to trace out the appropriate pins for you.

H. H. (Marlborough). The battery is not of a higher resistance, but a lower resistance. You are apparently confusing voltage and resistance. However, modern valves are designed to take 150 volts and, therefore, you need not worry about the additional 30 volts. Use tappings as with an ordinary H.T. battery to obtain maximum results, and then calculate the values of resistance for each tapping by measuring the current flowing at each point.

G. M. (Weymouth). Either 4,000 or 8,000 ohms is suitable. The specified make was Ericssons.

C. M. B. (Patcham). Apparently the set is unstable, and when the efficiency of the stage is reduced the instability ceases. We advise careful attention to layout and to the voltages used in each stage.

H. F. (Cardiff). We have not described a set of the type mentioned.

G. J. B. (Bexley Heath). We have no details of the coil and, therefore, cannot advise you. It should, however, be quite suitable for a simple crystal set, in which the efficiency is not very high. The coils mentioned were used in the Add-on-Superhet Unit.

J. S. (Sheffield 8). The only way to prevent the trouble will be to use a transformer for the speaker.

K. W. C. (Birmingham). We have no details of a set of the type mentioned.

J. P. N. (Beverley). We cannot quote a price as we are not certain that the coil unit, for instance, is still obtainable. Write to Messrs. Peto Scott. Some difficulty may be experienced on the short waves with the mains unit.

A. S. (W.12). As mentioned previously, the users of the apparatus should take steps to prevent the trouble. Obtain a form from your local Post Office in order to make the necessary complaint. There is a possibility that it will shortly be made illegal to use interfering apparatus.

S.G. (Glasgow, G.5). We cannot trace the set from your details. Can you give further particulars.

F.E. (Birmingham, 8). A switch must be used, and should be of the 3-point type. The aerial or anode is joined to the point marked "tap." I.F. means the intermediate-frequency; that is, the frequency into which the received station is converted for subsequent amplification.

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Summit Three (HF Pen, D, Pen)	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow)	—	PW41
Hall-Mark Cadet (D, LF, Pen (RC))	10.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW40
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)	17.8.35	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)	—	PW64
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	20.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69
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Beta Universal Four (SG, D, LF, Cl. B)	—	PW17
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Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF, Pen, D, Push-Pull)	—	PW46
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Selectone A.C. Radiogram Two (D, Pow)	—	PW19
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A.C. Three (SG, D, Pen)	—	PW29
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D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
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Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
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A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
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D.C. £5 Superhet (Three-valve)	1.12.34	PW42
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F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	—	PW60
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QUERIES and ENQUIRIES

Class B, Q.P.P. and Push-pull

"As I am a beginner, I should like to know the differences between Push-pull, Q.P.P. and Class B output stages."—G. A. (Tyrone).

PRIMARILY, these stages are identical, in that they consist of two valves working together in place of a single valve. The differences lie in the working characteristics, and to understand these fully it is necessary to know how a valve functions. It is obviously beyond the scope of a reply to give full details, but briefly it may be stated that the ordinary push-pull stage employs two identical valves (generally triodes) which are biased to work on the centre of the grid-volts anode-current curve. Class B (which also utilises two triodes) is biased so that grid current flows, and a special input transformer is used. In the Q.P.P. stage each valve (generally pentodes) is biased so that with no signal there is no anode current, i.e., they are adjusted to a quiescent condition. Full details have been given in the past and will be dealt with again at some future date.

Making a Wave-trap

"Would you please let me know how to make a wave-trap and also whether I could use the electric light supply for an electric door bell, instead of H.T. batteries? If so, how?"—E. N. (E.16).

A WAVE-TRAP consists simply of a circuit tuned to the frequency of the station it is desired to cut out. Thus any standard coil may be used with a standard variable condenser in parallel. If you wish to make the coil (for the medium-wave band), wind 45 or 50 turns of No. 22 D.C.C. on a 3in. diameter former, and tap this coil 10 turns from one end. Connect this tapping to the aerial terminal on your present set, and connect the aerial to the opposite end of the wave-trap coil. A standard .0005 mfd. variable condenser should be joined across the two ends of the coil. If there is a fixed or variable condenser in your present aerial lead, short-circuit it. The electric light mains may be used to operate a bell by connecting a transformer between the mains and the bell-push circuit. It is usual to use a transformer delivering 4 to 8 volts for this purpose, and standard components of this type may be obtained from any good electrical store.

Substituting H.F. Pentodes

"In my radio receiver at present I am using two Osram S.G. valves before the detector. Do you think there would be much advantage in substituting H.F. pentodes for these? Would I get sufficient voltage to work a Westinghouse Detector to the best advantage?"—H. G. H. (Oswestry).

IN some cases there is nothing to be gained merely by changing an S.G. for an H.F. pentode valve. It is possible, however, by suitable circuit design to obtain a higher gain per stage with pentodes, with better

stability. In your case it may be found that merely by changing the valves no noticeable improvement will take place, but by altering the values of H.T. applied to anodes and screening grids it may be possible to obtain greater efficiency per stage. This, in turn, may lead to some form of instability, which will only be cured by modifying the layout slightly. In view of the circuit you are using we recommend the change, and after a few experiments you should find that you can gain quite a lot by the change, and should be able to load the Westector on the majority of stations.

Noises

"I have been experimenting with a short-wave one-valve set which satisfies my requirements to a large extent. I am troubled, however, by a rustling sound which

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.

Please note also, that queries must be limited to two per reader, and 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 different department.

If a postal reply is desired, a stamped addressed envelope must be enclosed. 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.

occurs when the tuning condenser is adjusted. The effect is more pronounced when the plates are nearly 'all in.' The condenser in question is .0001 mfd. of well-known make. The pigtails is in good condition, and the slow-motion dial which I use has no part in causing the sound. None of the electrical connections are made through moving parts of the component, which is mounted on a metallised panel near the coil. I hope I have given enough details for you to diagnose the complaint, and pass on the remedy."—N. E. C. (N.12).

THE most likely cause of the trouble, from the fact that it is worse when the vanes are nearly all intermeshed, is dust. This gets between the plates and gives rise to discharges between the moving and fixed plates, which sound in the 'phones or speaker as faint rustling noises. The remedy is, of course, to clean the condenser, and for this purpose an ordinary pipe-cleaner is most suitable. It should be passed between the plates carefully, and if it is first drawn between your finger and thumb, upon which one drop of thin oil is placed, it will retain sufficient oil to take away all dust without leaving an oily surface to pick up further dust later on. In some cases, however, moving metallic parts can give rise to the rustling noise, but this is generally constant at all parts of

the tuning dial, unless it is due to dirt between the moving parts.

Total Anode Current

"Will you please let me know the total anode current taken by the following three valves and what rating H.T. eliminator I would require to feed these valves with approximately 140 volts of H.T.? The valves are Mullard V.P.2, PM.1.H.L., and PM.22A."—H. W. G. (St. Helens).

THE three valves are presumably used in an H.F.-detector-L.F. circuit, and therefore you must consider the first valve at its maximum anode current rating, it being of the variable- μ type. The maximum current for this valve is 3.75 mA, the detector will take about 1 or 1.5 mA and the output valve 9.5 mA at maximum H.T. To this must be added the screening-grid current and therefore the total current is only about 15 mA, and any good standard eliminator may be obtained to deliver this current at the voltage mentioned. We cannot recommend individual makes, but suggest that you visit your local radio dealer and ask to see models delivering between 15 and 20 mA at 130 to 150 volts.

Lucerne Coil

"Could you tell me where I could get the Lucerne coil for the Mullard Master Three Star? I have tried one or two shops but they have not got it."—H. L. (S.W.17).

THE coil is not generally stocked now, unfortunately, but it may easily be constructed at home. We gave full constructional details of the two types of Lucerne coil in our issue dated March 13th last, and as stated therein, the coil formers and wire may be obtained direct from Messrs. Peto-Scott.

Using a Gang Condenser

"I have a two-gang tuning condenser, but without trimmers. What sort of coils should I use? I want to make an S.G. Three receiver."—S. B. (Leiston).

THE two-gang condenser may be used to tune any two-gang coil unit, but in order to balance out stray capacities due to wiring, etc., some form of external trimmer should be provided. This may consist of a Microdenser mounted on the panel, or any similar very small valve condenser, and it should be wired in parallel with the section of the gang condenser which tunes the coil used in the detector stage. The aerial coil will generally tune flatly, due to the damping of the aerial-earth circuit, and thus the same critical degree of tuning is not required. The additional trimmer may be used as a vernier tuning device, and if you have any scrap material you could make up a suitable trimmer from two fixed plates from an old variable condenser and a single moving plate, spacing them about double the usual spacing by using two spacing washers.

Turntable Speed

"I have a clockwork gramophone with pick-up, but notice that the pitch alters with the speed. How can I make sure that the speed is right? The set is the A.C. Hall Mark and gives splendid results."—D. W. (Brent).

AS you have A.C. electric lighting, to ensure correct motor speed with a clockwork turntable a stroboscope is invaluable, and one of these speed-indicating discs may be obtained free upon application to Cosmocord Ltd., Cambridge Arterial Road, Enfield, Middlesex.

The coupon on Cover iii must be attached to every query.

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SHORT-WAVE SPECIALISTS

Announce 1937
SHORT-WAVE MANUAL

Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aeriads, Class B amplifications, neutralizations, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free, 7½d. including catalogue.

1937 Short-wave Catalogue only (3 times enlarged) price 1½d., post free.

TELSEN screened dual range coils, switched, 2/11 each. Pair 5/3. Milliammeters, 25 ma. upwards, 5/9. Super, 8/9.

AMERICAN mains transformers 230v. fully shrouded, 350/350, 6.3v., 5v., 6/11. Majestic 250/250, 2.5v., 5 v., 4/11.

HEAVY DUTY mains transformer worth 35/- 350/350, 150ma.; 4v. 2.5ACT, 4v. GACT, 12/6.

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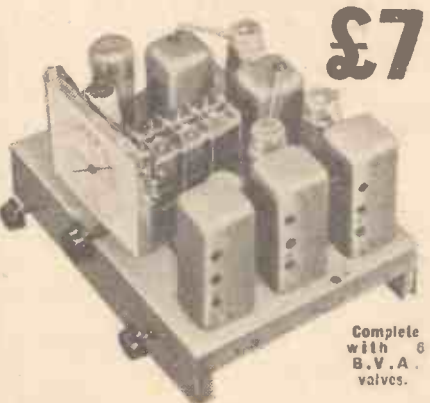
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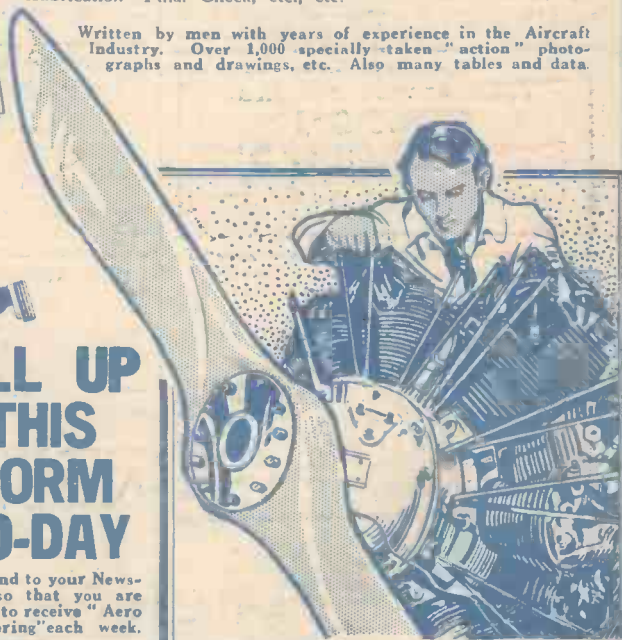
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HOTTING-UP THE SIMPLE RECEIVER

See page 77



Practical and Amateur Wireless

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ROUND *the* WORLD of WIRELESS

Remote Control

THE majority of listeners now make use of some kind of remote listening point, and whether this takes the form of a simple single speaker placed in another part of the normal living room, or a cabinet speaker permanently fixed in another room, some form of remote control is desirable. The term "remote control" can embrace many combinations, ranging from the simple action of switching off the receiver, to the tuning of a number of stations, and there is immense scope for the handy mechanical-minded amateur to construct apparatus which will put into effect these ideas. An ordinary switch cannot satisfactorily be used with long flex leads to switch off a battery or mains set; in the former case owing to the loss of voltage through the leads, and in the second case owing to the various risks which are run when unprotected flex carries mains supplies for a considerable distance. Various relay devices have been placed on the market from time to time, but have not attained the popularity they deserved. This seems in many cases to have been due to the fact that the separate battery operating the relay has been neglected, and the relay device has accordingly failed to function efficiently. However, the various schemes which can be put into effect, and which will give satisfaction in practically every combination of distant control, will be found fully detailed and illustrated on the centre pages of this issue. Certain commercial components are included in this article which should be read by every listener, even though a distant listening point is not at present installed.

Free Power

THE problem of power radiated by wireless has been solved. At least, the following details would go to show that it may one day be possible to drive cars and other vehicles by means of power picked up from the air. A resident in America who lives opposite the WBZ transmitter lights his house and grounds by means of lamps which are fed from an aerial specially tuned to pick up the energy from the WBZ aerial system. Westinghouse officials say "He has had several 500-watt lamps going for some time, and recently removed them and substituted a single 1,000-watt lamp.

This is located on the front of his home and illuminates the lawn. Incidentally, the man has received a number of severe burns while experimenting and adjusting, but this does not seem to deter him from using WBZ's energy."

B.B.C. and Foreign Artists

IN view of the accusations regarding the B.B.C. partiality to foreign artists, a secret census was taken. For the last three months of 1936 the results show that the B.B.C. has every right to be called

some cases of severe interference on the 5-metro band were found to originate at transmitters fitted with the directional type of aerial, when used with a radiating receiver. This point should therefore be borne in mind.

Wire-less!

IN a recent talk the P.M.G. announced that over 100,000 miles of wire were laid down by the Post Office for B.B.C. broadcasts during the past year. This was for outside broadcasts only, and does not take into account permanent wiring between stations, which amounts to thousands of miles of cable and wire. The linking of stations for television purposes will necessitate many hundreds of miles of a most expensive form of cable, but in this case the postal authorities will also make use of it in order to carry a number of telephone communications.

Marches of the Nations

THE B.B.C. Scottish Orchestra, conducted by Guy Warrack, will take an extended but tuneful journey on April 13th. It will play marches of the nations: "The Washington Post" (America), by Sousa; "Prince Igor" (Russia), by Borodin; "Le Regiment de Sambre et Meuse" (France), by Planquette; "Turkish March from 'The Ruins of Athens'" (Germany), by Beethoven; "Granada" (Spain), by Garcia; "Radetsky" (Austria), by Johann Strauss (father); and "Pomp and Circumstance No. 2, in A Minor" (England), by Elgar.

Wired Broadcasting

IT is reported that experiments have recently been carried out by the Post Office authorities at Karlshamm, in Sweden, with a view to radiating broadcast programmes over a telephone line simultaneously with three ordinary conversations. Successful results have been obtained so far, and it is quite likely that wired broadcasting may eventually play an important part in Scandinavian broadcasting, more especially in Norway, owing to the difficulties of reception due to the mountainous nature of the country.

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"British." Only 2.76 per cent. of all the artists broadcasting during that period were foreign. In drama 1,690 artists were British and eight were foreigners. Variety employed 1,119 British and 77 foreign artists. Television had 819 British and 77 foreign artists, and in the talks series the figures were 1,202 British and 75 foreign.

Directional Aerials

A NUMBER of amateur transmitters are now using the directional type of aerial which is made to rotate so that the effects may be adjusted according to the stations being received or worked. An American magazine points out that recently

ROUND the WORLD of WIRELESS (Continued)

New Stations for India

IT is reported that the Indian Government has placed a contract with Marconi's Wireless Telegraph Co., Ltd., for the supply of four five-kilowatt medium-wave stations, and one short-wave station, for the extension of the broadcasting system in India.

Military Band Concert

THE R. A. Lister Military Band, conducted by S. T. Webber, will broadcast a programme from the Western Regional on April 11th. The soloist will be Meta Murray (soprano), who was born at Ilfracombe. In addition to appearing on London platforms, she has appeared with nearly all the leading seaside resort orchestras.

Radio Activities in North Africa

ACCORDING to a recent report, the number of listeners in the French



Miss Bebe Daniels and Mr. Ben Lyon, the famous American film stars, are here seen congratulating Mr. Felix Mendelssohn and Mr. Edward P. Genn, the well-known organisers, on the success of their stage, screen and radio celebrities concert, held at the London Palladium recently in aid of Charing Cross Hospital.

possessions in N. Africa is nearly 100,000, and is increasing daily. Of this number, French Morocco accounts for 30,000, Algeria for 50,000, while the remainder are in Tunisia. The greater part of the population of these countries speaks Arabic, and consequently there is an increasing demand for a larger number of talks in Arabic, and also for native music.

Variety Programme

IN a short variety programme to be broadcast from the Midland Regional

INTERESTING and TOPICAL NEWS and NOTES

on April 16th the artists will be Carmino Tamburro (piano-accordion), Christine Holt (comediienne), and Scott and Dixon and a piano. Tamburro is an Italian artist resident in Birmingham; Miss Holt is joint organiser of Croft Hermits Repertory Company, Shrewsbury; and Scott and Dixon are a young Coventry duo who have broadcast in Club variety.

A Musical Mélange

ON April 14th, Martyn Webster will present a musical mélange entitled "A Young Man's Fancy," on the lines of the popular programmes broadcast last year, "Spring is in the Air." The soloists will be Gordon Little, who was in "Wild Violets," and Marjorie Westbury. Reginald Burston will conduct the B.B.C. Midland Revue Chorus and the Revue Orchestra.

Gilbert and Sullivan Programme

ON April 17th, Reginald Burston will conduct the B.B.C. Midland Orchestra in a programme of Sullivan's music, and George Gibbs will sing some of Gilbert's "Bab Ballads," set by Adrian Beecham.

William Rees Concert

VINCENT DAVIES (tenor) and Harold Fielding (violin) will be the soloists at the William Rees Concert which is to be broadcast from the Milton Hall, Manchester, on April 10th. The programme will include Armstrong Gibbs' Suite, "Peacock Pie," Mozart's "Eine Kleine Nacht Musik," and an Air and Dance by Delius. The orchestra will be conducted by William Rees.

Munn and Felton's Band

THIS Northamptonshire band, which won the Championship at the Crystal Palace in 1935, is to give a popular programme on April 11th from a Midland studio, with S. H. Boddington conducting. The Clef Trio will sing two groups of songs.

Midland Orchestral Concert

ON April 11th, Johan Hock will conduct the Birmingham Philharmonic String

Orchestra in a programme which will include the third Brandenburg Concerto and Grieg's Holberg Suite. This will be the second concert to be broadcast from the Concert Hall at Bournville.

B.B.C. Scottish Orchestra

ON April 12th, the B.B.C. Scottish Orchestra, conducted by Guy Warrack, will broadcast the overture to "Fidelio," by Beethoven; "La Fandole," by Dubois; and Symphony No. 6 in



Monte Rey, the well-known radio star, who sings with Gerald's "Music Shop," and is often heard with Joe Loss and his band in the late night dance music.

F, by Boyce, arranged Lambert. May Lymburn (contralto) will sing with orchestra the aria "O mio Fernando," from "La Favorita," by Donizetti, and the aria "Habanera," from "Carmen," by Bizet; and without orchestra, "Angels Guard Thee," by Godard (violoncello obligato—John B. Dickson), "Sea Wrack," by Harty, and "Love's Philosophy," by Quilter.

SOLVE THIS!

PROBLEM No. 238

After completing the construction of a four-valve superhet, Julian switched on, but was disappointed to find that only the local station could be picked up. The volume of this was low and it could be heard at the same strength at all points on the tuning scale. What was the fault? Three books will be awarded for the first three correct solutions opened. Address your solutions 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. 238 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, April 12th, 1937.

Solution to Problem No. 237

There was an internal short-circuit in the tone-control condenser.

Books have been forwarded to the three readers who successfully solved Problem No. 236.

A Novel Auto-Dial

Based on the Automatic Telephone System, this Tuning Control will be Found Very Interesting for the Constructor

THE majority of radio listeners take their entertainment from only a few regular stations. To avoid twirling the tuning knob, and watching the pointer traversing the usual dial, a semi-automatic dial, such as is illustrated in the accompanying diagrams, enables the desired

Modifying the Set

The only alterations to the existing lay-out of the set are the removal of the on-off switch, the condenser drive and dial, and the raising of the tuning-condenser on a wood mounting-block as shown in Fig. 7. The minimum length of condenser spindle needed is $\frac{1}{2}$ in. and if this is not available, as is most unlikely, a short extension spindle with coupling must be employed. The condenser should not be fully screwed down yet.

Making the Dial

To prepare the finger-holes in the auto-dial the latter, complete with mounting-collar, small paper-face for names and guide-circle as shown in Fig. 1, is attached to the condenser spindle. The back-of-panel dial is then slipped over the collar but is not glued in position. With the condenser set to the minimum position, the indication OFF is printed on the auto-dial in the six

Fig. 6.—Details of the panel layout.

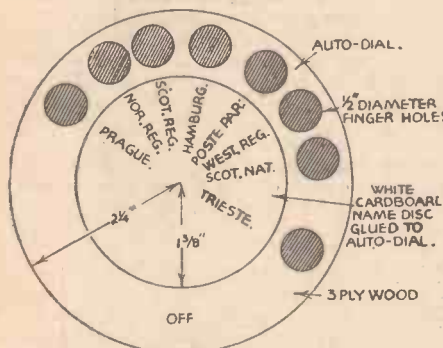
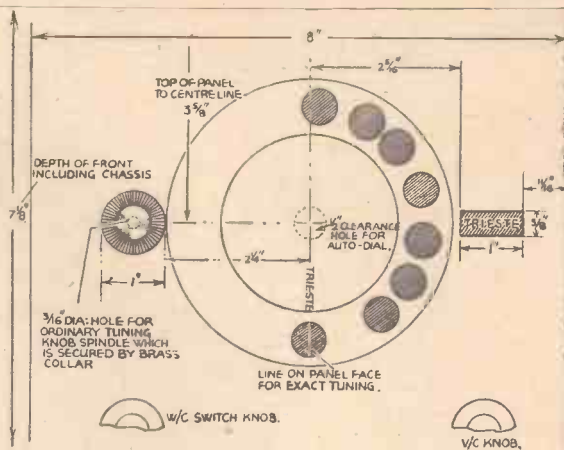
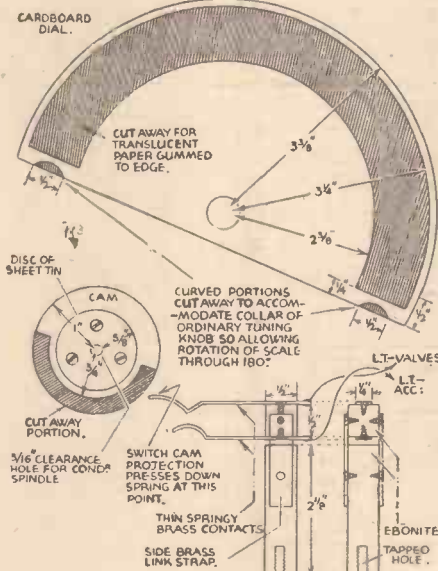
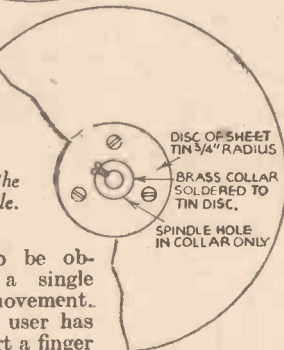


Fig. 1.—Front view of the auto-dial.

Fig. 2 (right).—Back of auto-dial, showing method of securing it to the condenser-spindle.



Figs. 3, 4 and 5.—Cardboard station name dial; "on-off" switch cam; and details of switch contact blades.

o'clock position. Each of the stations to be permanently tuned by the auto-dial is then tuned in, and every time a dot is made on the guide-circle of the auto-dial at the six o'clock position. The dots must be separated by at least $\frac{1}{16}$ in., as the holes would overlap if less, and stations which come closer than this cannot be provided for on the dial.

At the same time as the dots are made, the name of the station corresponding to the finger-hole is printed on the small white face of the auto-dial opposite the hole, and also printed through the panel window on the surface of the back-of-panel

dial. The whole assembly is then removed, and the circular on-off cam is slipped over the condenser spindle, but not secured. The holes in the auto-dial are drilled to $\frac{1}{16}$ in. diameter and the portion of the back-of-panel dial between the guide-arcs is cut out and used as a template to locate the station-names on a slightly larger piece of translucent paper of similar shape, which is gummed to the cardboard dial over the cut-out position.

Mounting the Dial

The auto-dial is then placed in position on the panel with its collar through the clearance hole, the back-of-panel dial is placed on the collar and the condenser is moved forwards until the spindle enters the collar, the grub-screw being then tightened. The condenser must not be screwed to the mounting-block until this final positioning of the dial. After slackening the grub-screw, the auto-dial is aligned with the condenser in minimum position, and locked fast. The dial is then moved by a finger-hole to a station. The back-of-panel dial is then aligned and glued to the collar and the on-off switch is mounted and the circular cam is positioned so that the projection just rests on the top contact with the condenser at minimum. The cam is soldered to the collar in this position. The bottom contact is then bent up to within a very short distance of the V-part

(Continued on page 89)

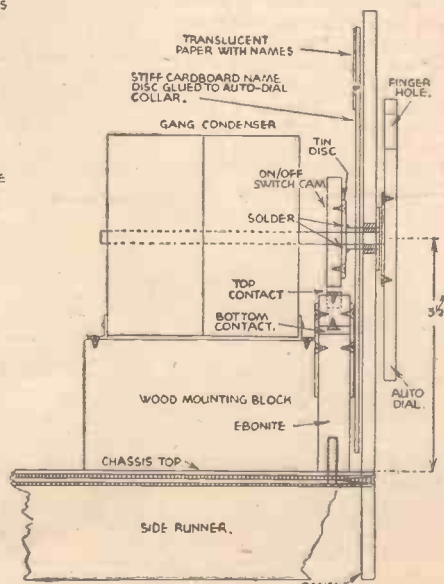


Fig. 7.—Side view of the complete assembly (control knob not shown).

programme to be obtained with a single rapid rotary movement. To do so the user has simply to insert a finger in the hole in the auto-dial opposite the selected station name, and move the hole clockwise down to the six o'clock position. This not only sets the tuning condenser to its correct location, but also switches on the receiver, and the only further operations required are the turning up of the volume-control and the very occasional setting of the wave-change switch if long-wave as well as medium-wave stations are accommodated on the auto-dial. When the programme is thus secured the name of the station appears in the panel-window, and is also illuminated, since an economy-type dial-light is mounted on a brass bracket screwed to the chassis behind the translucent portion of the back-of-the-panel name-dial behind the window. The light is wired across the filament terminals of any of the valveholders or, if more convenient, across the contacts of the on-off switch of Fig. 5.

Provision for ordinary tuning is made by the lin. diameter knob with plain periphery, which rubs against the auto-dial and actuates it through a reduction ratio of 4.5:1. This knob is shown in Fig. 6 on the left of the panel, with the window on the right, but if it is desired to have it on the right for right-hand operation, the dispositions on the panel have merely to be reversed. The knob is rotated in an anti-clockwise direction to tune.

Common Faults in Set Design

In this Article some of the Common Errors made by Constructors are Pointed Out, and the Remedies Explained

OF all the many pitfalls into which an amateur constructor can fall, one of the most common is that illustrated in Figure 1 which shows the

often become completely unstable if this condenser is misconnected.

Anode Bend Detector

Figure 3 shows an anode bend detector, the design of which is very bad. Resistance "R," will only be of sufficiently high value to bias the valve back to zero, and an incoming signal will make the grid positive, which will increase the anode current, and by virtue of the fact that the converse brings about no change, rectification will occur, but the undesirable feature is that as the anode current increases, so will the grid bias increase, because the anode current has to pass through resistance "R." This means a considerable loss of signal strength, and is a sort of low-frequency automatic volume control whereby the stronger the modulation, the less the magnification of the valve, which will obviously tend to take the life out of any orchestration, and rob a musical programme of a considerable percentage of light and shade. The correct method is shown in

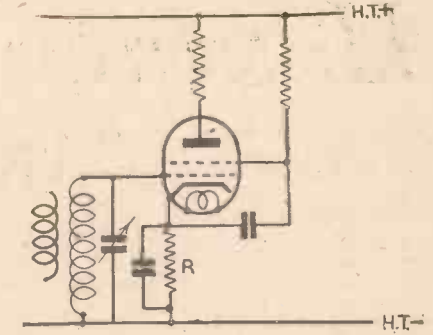
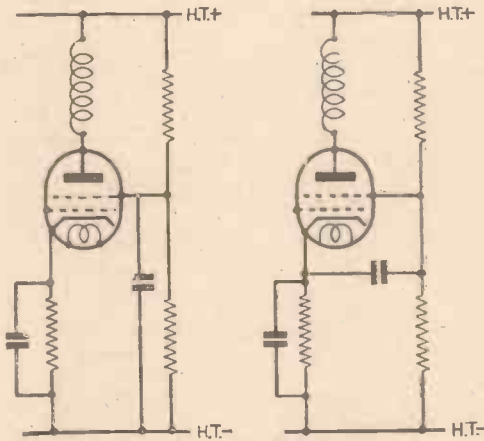


Fig. 3.—An anode bend detector with automatic bias, which is very bad in theory and practice.

placed to give V-1 its correct grid bias. For example, if the value of R-2 is such that the output valve receives 12 volts bias, and it is desired to give the detector valve 9 volts bias, the tapping will be placed one-quarter of the way from the cathode end of the power-valve bias. The condenser C-1 is not necessary unless the bias required by the detector makes it necessary to use the tapping referred to; that is to say, if detector and power valve both require the same bias, the cathode of one is connected to the cathode of the other, when the condenser C-2 will be the only one required.

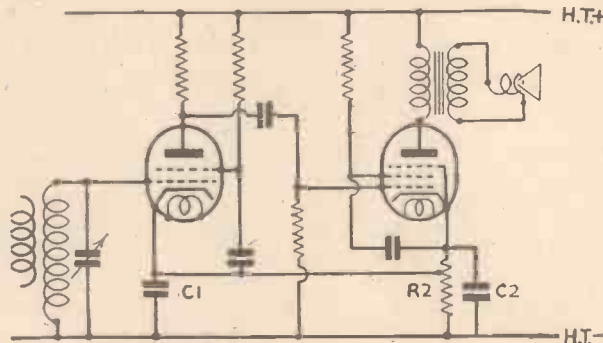
Choke-fed Output Transformer

While on the subject of pentodes, attention is drawn to the very common but particularly undesirable arrangement shown in Figure 6. The moving-coil loudspeaker output transformer is choke fed, and no cathode by-pass condenser is used, and the low potential end of the speaker is returned to HT-. The disadvantage of this arrangement is the very serious loss of bass. The source of energy is across the anode-cathode of the valve, and the primary of the speaker transformer and the cathode resistance R-1 are in series, and at, say, 50 cycles the resistance of R-1 could



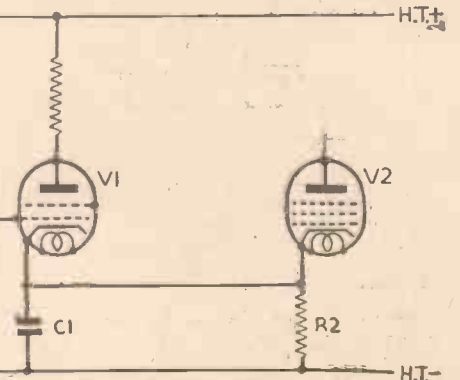
Figs. 1 and 2 show two methods of tying down the screen of an S.G. valve. The method shown in Fig. 2 is more correct.

screen by-pass condenser connected between the screen of a screen-grid valve and chassis (HT-). This mistake probably arises from the use of the expression, "earthing the screen." If the expression "earthing" is taken to mean the elimination of HF potential on the screen, the term is true enough, but it is misleading as it doesn't necessarily mean a direct contact to earth. The proper connection is between screen and cathode, as shown in Figure 2. Admittedly it is sometimes immaterial, particularly if the cathode resistance by-pass condenser is large, but a set which is inclined to be unstable will

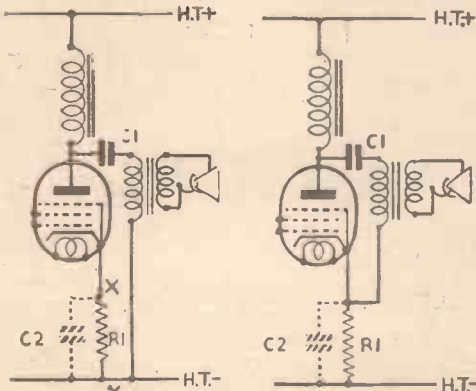


Figs. 4 and 5.—Two suggested methods of arranging for automatic bias with an anode bend rectifier.

skeleton form in Figure 5, where V-1 is, of course, the anode bend detector, and V-2 is the output valve, the low-frequency coupling, or intermediate LF stage, being omitted for the sake of clarity. It will be observed that the cathode of V-1 is taken to the cathode of V-2, the idea being that the anode current of the power valve passing through R-2 is so large compared to the maximum anode current passing through V-1, that the change in the latter due to the incoming signal will have no appreciable effect on the bias, which will be held steady by the anode current of the power valve to within 1 per cent. or so. For the sake of those who might wish to use this arrangement, the full diagram is given in Figure 4, where it will be observed that the cathode of V-1 is taken to a tapping on R-2, so



easily be several times the impedance of the speaker. If a by-pass condenser is used, shown dotted, a considerable improvement would be effected, but C-1 would then be virtually in series with C-2 at low frequencies, and if each condenser were about 2 mfd., the net result would be equal to a 1-mfd. condenser used properly. Even if C-2 is one of the many-mfd electrolytic types it is desirable to adopt the arrangement shown at Figure 7, where the low potential end of the loudspeaker is connected to the cathode. To really appreciate the loss of bass in R-1, it is necessary to use a quick change-over switch arranged to connect the speaker to the points "X" or "Y" when it will be found that the really low notes are double or treble when the speaker is returned to the cathode.



Figs. 6 and 7.—The method of arranging the output circuit when an indirectly-heated valve with auto-bias is used.

Hotting-up a "Straight" Set

Some Easy Methods of Improving the Performance of a "Straight" Set. Reference is made to the Det.-L.F. Circuit, but the Suggested Modifications are Equally Applicable when there is an H.F. Stage. By FRANK PRESTON

THE expression "hotting-up" is used more frequently in connection with petrol engines than wireless sets, but it gives the idea of improving performance. Many motor mechanics can take a perfectly standard engine and, by careful attention to detail, modify it to such purpose that its brake horse-power is increased very considerably.

In the same way, a clever radio enthusiast can improve the reception provided by a simple circuit arrangement to a very satisfactory extent. When referring to a simple receiver, I have in mind either a det.-L.F. arrangement, or a simple type of H.F.-det.-L.F. circuit. There are many points in favour of simple circuits of these types, not least of which is their straightforward nature and the absence of "snags" which sometimes arise when dealing with an advanced design of superhet, or

channels on each side of those transmissions; that is, unless the nearest transmitters are only a few miles away, and then it is prac-

tween the detector anode and earth, as shown in Fig. 2. This will reduce the effect of the normal reaction condenser, and should generally be adjusted so that its capacity is half-way between maximum and minimum. It can be set most easily by turning the tuning condenser to such a position on the medium-wave band that a signal is not being received. After that, "swing" the reaction condenser backward and forward and note whether or not there is a sudden "plop" as oscillation commences. There should not be; instead, a faint "breathing" sound should indicate when the set is on the verge of oscillation. As the reaction condenser is advanced further, this should gradually become fainter, although it will still be heard.

If this result is not obtained, try different settings of the pre-set condenser, repeating the backward and forward movement of the reaction condenser between each setting. It will be found that the reaction condenser has to be advanced to a greater degree to obtain oscillation as the pre-set condenser is adjusted to give a higher capacity. This does not matter, provided that it is still possible to obtain oscillation over the complete range of the tuning condenser. The pre-set condenser gives a similar effect to that which used to be obtained by using a differential-reaction condenser, but its action is under more complete control.

When smooth control cannot be obtained in spite of the addition of this condenser, try the effect of connecting a 250-ohm fixed resistance in series with the reaction circuit at one of the points marked X. This is generally helpful.

Variable Decoupling Resistance

It is unusual in these days to use separate H.T. leads for the various valves, instead of which the high-tension supply for the detector valve is obtained through a

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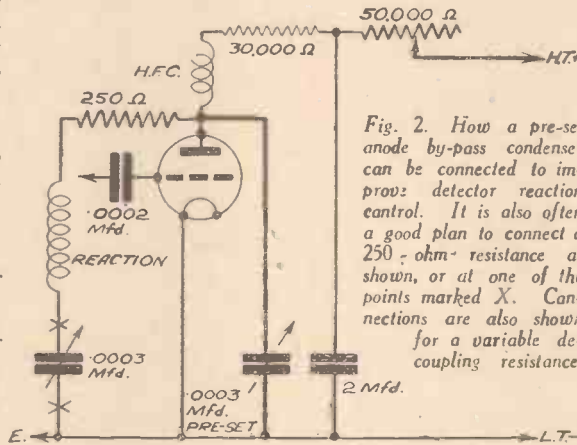


Fig. 2. How a pre-set anode by-pass condenser can be connected to improve detector reaction control. It is also often a good plan to connect a 250-ohm resistance as shown, or at one of the points marked X. Connections are also shown for a variable decoupling resistance.

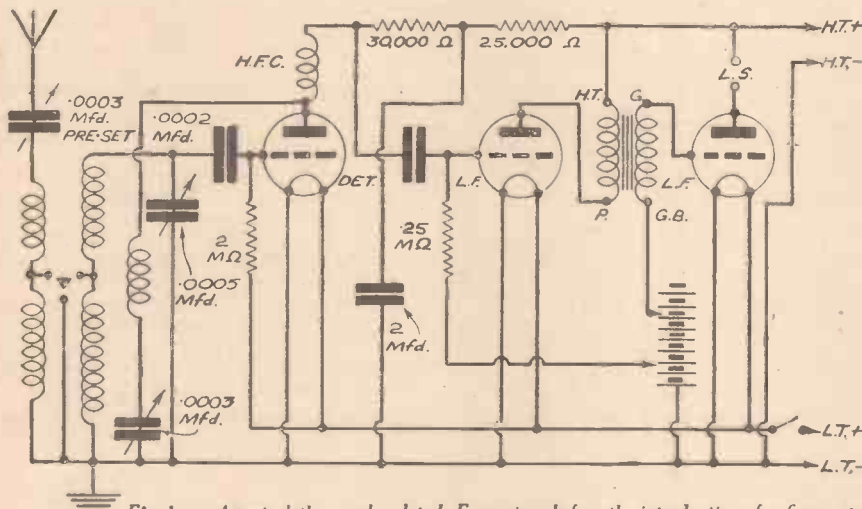


Fig. 1. A typical three-valve det.-L.F. receiver before the introduction of refinements.

with a highly-sensitive "straight" circuit incorporating two or more high-frequency stages.

A Typical Circuit

As an example of a popular type of three-valve, battery-operated det.-L.F. circuit, we might take the diagram shown in Fig. 1. This is an arrangement which has been favoured by constructors for more than ten years, and which best lends itself to modification and non-complicated experiment. Theoretically, a set using this circuit has a very restricted range, and is not very selective. But in practice it can often be made sufficiently sensitive to give good loudspeaker reception of a large number of both British and Continental stations. The selectivity question is more difficult of solution, and "hair-line" tuning cannot be either expected or obtained without reducing the sensitivity to a considerable extent.

Provided, however, that the tuning coil is of good, modern design, it should not be necessary to contend with interference from local stations outside a range of four or five

tically essential to employ at least one stage of tuned H.F. amplification. The success of this type of circuit depends almost entirely, as far as range is concerned, upon the smooth action of the reaction control. If this is so arranged that the detector "glides" smoothly into oscillation—without any sign of "plop" or "groan"—a modern detector valve can operate very efficiently.

Detector Anode By-pass

Here, again, much depends upon the design of the coil, but careful attention to the reaction circuit itself will be fully justified. One of the best methods of improving the reaction control is by connecting a .0003-mfd. pre-set condenser be-

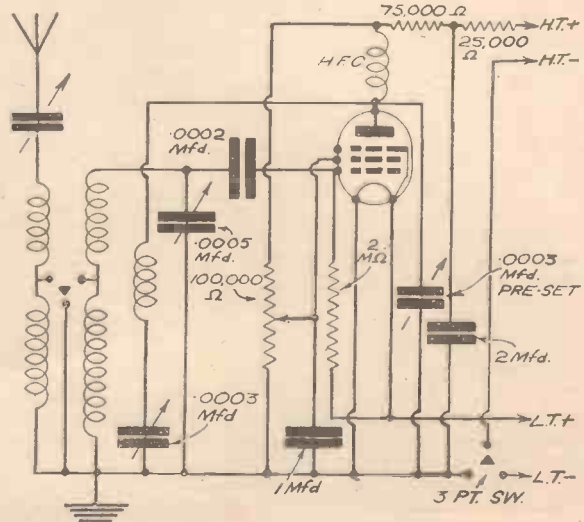


Fig. 3. How an H.F. pentode can be used as a very efficient detector.

(Continued from previous page)

decoupling resistance between the first L.F. coupling and the single H.T.+ lead. The objection to this method is that the most suitable voltage cannot easily be found by experiment. Another disadvantage is that a high resistance has generally to be used to ensure fairly good reaction control on weak signals, and the handling capacity of the detector valve is reduced for local-station reception. It is, therefore, well worth while to use a variable resistance for decoupling purposes, so that it can be adjusted to the best position for any particular station. A 50,000-ohm variable resistance is usually most satisfactory, and is connected as shown in Fig. 2, where it is assumed that resistance-capacity coupling is used between the first two valves. The resistance should be of the carbon-track (not wire-wound) type, since it must be noiseless in action, and does not have to carry more than about 2 mA. It can be adjusted until the reaction results mentioned above are obtained, although signal strength of the more powerful transmissions can be increased by reducing the value of resistance in circuit.

It is not normally necessary to use more than two or three alternative settings for different stations, so it is convenient after finding these to mark the panel at the different positions of the pointer.

H.F. Pentode as Detector

Probably the best method of all of improving detector efficiency, as well as smoothness of reaction control, is by using an H.F. pentode valve as detector. Connections for this are shown in Fig. 3, where the coil is the same as that shown in Fig. 1. The connections which were made to the "anode" socket of the triode valve-holder are made to the anode terminal on top of the valve. As the anode socket becomes the connection to the screening grid, it should be joined to the slider of a 100,000-ohm non-wire-wound potentiometer connected between H.T.+ and H.T.—, whilst a .1-mfd. non-inductive (tubular) condenser should be connected between the screening grid and earth. In this case, it is unnecessary to use a variable decoupling

resistance, but the pre-set by-pass condenser is still desirable. A wide range of control can be obtained by means of the potentiometer, which can be used as an additional "vernier" reaction control if desired. In practice, it will generally be found that the potentiometer requires very little adjustment after the optimum setting has been found.

There is one important point which must not be forgotten when using a potentiometer in this manner. It is that the on-off switch

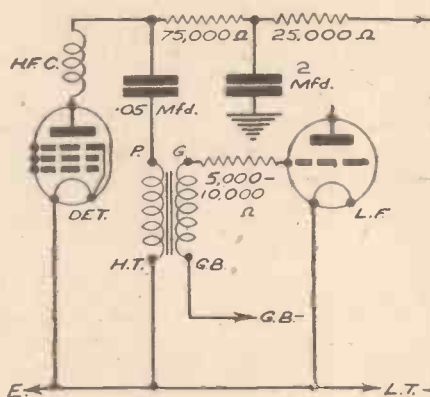


Fig. 4. Method of parallel-feeding an ordinary L.F. transformer, and of inserting a "stopper" resistance in the grid circuit of the first L.F. valve.

must be capable of breaking the potentiometer circuit when the set is off. This can most easily be arranged by replacing the two-point on-off switch shown in Fig. 1 by a three-point switch, as in Fig. 3.

The L.F. Coupling

It is also worth remembering that an H.F. pentode operates most effectively as a detector when followed by R.C. or parallel-fed-transformer coupling, and that the anode resistance should be not less than 75,000 ohms. Theorists will argue that a resistance of at least 250,000-ohms is essential for correct operation of the valve,

but this is not borne out in practice. When ordinary transformer coupling is used in the set it is best to change it for one of the systems just referred to. For ease of reference, the method of converting plain transformer coupling to parallel-fed coupling is shown in Fig. 4.

Before leaving the question of good reaction control it should be mentioned that the H.F. choke plays an important part in the detector circuit. A poor choke can spoil the set, so it pays to buy a good one with a rated inductance value of not less than 250,000 microhenries. In many sets it will be found that reception is not altered when the choke is short-circuited; that generally means that it is not good enough for the job.

L.F. Circuits

There is not usually very much which can be done in the L.F. circuit which could be described as "hotting-up" but it is no use improving the detector stage and leaving the low-frequency amplifier in an inefficient condition. One of the changes which is nearly always worth while concerns the first L.F. coupling. When there are two L.F. stages it is best in nearly every instance to use a form of resistance coupling for the first, as mentioned above, and a change from a "straight" transformer is nearly always justified by the improved reception.

Another simple addition which is commonly used in short-wave sets, but not often in those intended for medium- and long-wave reception, is a fixed resistance in the grid lead to the first L.F. valve, as also shown in Fig. 4. This not only decouples the grid circuit, but acts as a "stopper" to any H.F. which manages to escape past the H.F. choke and anode by-pass condenser. The value is rarely critical, and might be anything between 5,000 and 100,000 ohms—20,000 ohms is generally satisfactory for broadcast use.

Automatic grid bias is also worth while and to be recommended on every score. As the method of adding this has frequently been described in these pages it will not be repeated here.

ITEMS OF INTEREST

Teleradio for Lonely Islanders

CAPE BARREN ISLAND, in Bass Strait, is the home of thirty white Australians, and over a hundred half-castes, remnants of the Tasmanian aborigines. In order to relieve their feeling of isolation, the Tasmanian Government has arranged with Amalgamated Wireless to provide a teleradio station to receive from and send messages to Flinders Island Radio Station, which is in touch with the mainland. The apparatus is small and compact, and is specially designed to derive its power from large accumulators charged by wind power.

Between Houses

THAT well-known comedian and mimic, Skeets Martin, will top the bill in the "Between Houses" broadcast from the Manchester studios on April 12th. Listeners will laugh again at his inimitable imitation of an old car climbing a hill. Other artists taking part in the programme will include Douglas Maynard, Edna Ashby, and James Calderbank.



Every luxury imaginable will be provided on the S.S. "Strathmore" of the P & O line when 1,000 Philco dealers make their 1937 cruise to Lisbon from July 10 to 16 inclusive. The liner which has been chartered for the occasion is shown in our illustration, and entertainment of a wide variety has been planned for the dealers while on board or ashore.



On Your Wavelength

By THERMION

My Club Directory

SEVERAL club secretaries have responded to my recent request for the names and addresses of their officials, but there are still many blanks in my lists. I have the names of every wireless club in the country, but that is of little use to me unless I have an up-to-date list of officials. If you are associated with a wireless club please give your secretary a poke in the ribs and tell him that he is not doing his job properly if he is not regularly sending in a report of the meetings. Remind him also that I want his name and address, as well as those of all the other officials. If this information is not forthcoming from him your club will be omitted from the first directory of wireless clubs to be published—and the only one! The Chairman of the Bideford and District Short-Wave Society says:—

“You are perfectly right when you remark (in a recent paragraph) that many similar clubs fail through lack of proper organisation. There is usually a certain amount of disagreement after the first few meetings as to the lines along which activity should be developed; if the beginners do not get what they want, they become dissatisfied, while if they are “fed” all the time, the more technical members resign. In my experience, there is generally very little team spirit, and the success of the whole undertaking nearly always devolves upon two or three members willing to do all the work. If a club is lucky enough to have such members it is successful, and more so if it has a strong chairman who knows how to run meetings and keep a balance between the beginners and the technical members. We endeavour to do this by working to a programme laid down in advance, which arranges that the fortnightly meetings are

devoted alternately to Reception and Transmission. The trouble then is

that it tends to split the membership. “Having had experience of four clubs in various parts of the country, I know what the practical difficulties are!”

Lack of Enthusiasm?

ANOTHER reader writes as follows:—

“I am very pleased to note you are interested in the wireless clubs, and like yourself I have been puzzled why there is a lack of enthusiasm on the part of radio fans, especially in this part of the country. Now, Newcastle-on-Tyne is a very large city and surrounded by old and new districts no farther than three miles out, yet when I had a letter published in the local evening paper last year I got very few replies. These replies, together with other ‘boys’ I had foraged out to the number of 27, led me to believe it was possible to form a club up here. I obtained an excellent high room at a reasonable rent and sent out invitations to a meeting. Then I got a shock—four turned up, and the following week five was our total. The ‘boys’ that were all for it at first never peeped in; consequently, there was nothing else to do but abandon the idea as the cost would have been prohibitive to myself. What annoyed me was that the experienced hands, who definitely promised every possible help, let the inexperienced down; in fact, one chap said he did not want anything to do with it unless everyone had the same amount of knowledge as himself. What can you make of that sort of thing? However, the months of preparation and the loss of two to three pounds did not dampen my spirits too much, and for the last seven months two of my protégés have visited my house pretty regularly, and they now have four-valve short-wavers besides being members of the

B.L.D.L.C. It is a pity every radio fan is not so keen as these two youngsters (17 and 16 years of age—mine 32). Well, Thermion, I would be pleased if you could squeeze my name and address into your page, because I intend to have another good shot at forming a club up here. To end this letter, I might add I enjoy your pages, especially the ‘kicks’ you give—good fun, isn’t it? Thanks for any help you can give to the idea.”

His name and address is: Geo. Castle, 10, Henry Street, Gosforth, Newcastle-on-Tyne, Northumberland.

A Cure for Rats

ON the principle of setting a thief to catch a thief someone has discovered that certain music will kill rats, and so we have the modern counterpart of that beautiful story told in poetry by Browning and entitled “The Pied Piper of Hamelin.” I am led to believe so from a letter I have received from T. S. W., of Mansfield, Notts, the home of the famous W.B. Speaker. This is what the reader says:—

“Here is an incident which has come to my notice. It beats your story of the silkworms.

“A Danish farmer was plagued by rats. He tried to get rid of them by having loudspeakers installed in the barns. Soon all the rats were gone. Crooning music seemed to have the best results. When this was turned on, they simply picked up their tails and ran!

“Readers’ remarks about jazz are the most amusing I have yet heard. From their views I can see that they do not even know music. In fact, they are ‘musically illiterate.’

“An old fossil of their (pro-jazz) clan has now found out that jazz does not come from the negroes but from the Red Indians! Perhaps he heard the ‘Indian Love-call.’

“Still, I do not blame you for not liking the jazz you hear on the radio. For the most part, it is insipid, but please try and make a difference between good jazz and jazz as

turned out by *palais de danse* bands. Dance bands and others are hated as much by the real swing fan as by yourself."

Instead of calling them crooners in future, we must call them, therefore, chief rats! How aptly Browning's lines fit them: "Lazy ribald, with idle pipe and vesture piebald." Like the Mayor in the poem, I tell them to do their worst, and to blow their pipes until they burst; or perhaps some super-crooner like a musical adept will charm them into the River Weser, wherein they will all plunge and perish, not excluding the one who is as stout as Julius Cæsar. Come to think of it, perhaps crooners and jazz musicians are the queer people who emerged from the mountainside in Transylvania, having been trepanned there by the piper as a revenge for the non-payment of his thousand guilders.

The Next Step

PROGRESS during the past few years has moved so fast that it is a little difficult to endeavour to make forecasts. We have had the A.V.C. circuit, noise suppression, and, finally, all-wave receivers of various types. There now seems little else that can be done to the existing broadcast receiver, by which I refer to the domestic, as distinct from the experimental or laboratory receiver. Tuning has been simplified, even to the stage where the set automatically pulls itself into tune when the pointer is set to a position which is not quite correct. I wonder if any readers can forecast the next step in the development of the receiver for domestic use? It is quite an interesting pastime to sit down and visualise the trend of progress from the simple crystal set as it originally appeared, and then go through the various stages leading up to a modern superhet, such, for instance, as is sold in America. There they have 15 and 16 valve sets, with practically every form of circuit combination and refinement which it is possible to build to-day. Strangely enough, many of these "refinements" do not appear on the English market, although many of them have been tried out and did not catch on. Perhaps some suggestions from listeners, as to the lines which they would like development to take, would give some indication as to what may be expected next season.

A Studio of the Future

I AM interested to hear that a studio, new to this country, known as the "live end—dead end" type, has been evolved as the result of research in studio design at the



Vitesse Tone and Volume Controls

A READER who built the *Vitesse* All-waver last week complained that he could get no results. When tests were made it was found that the centre tags of the volume and tone-control potentiometers were in direct contact with the chassis through the spindle. He had not used the specified potentiometers and had not insulated the spindles from the chassis. The grid of the triode section of the double-diode-triode and the H.T.3 lead were, therefore, short-circuited to the chassis. After the spindles had been insulated from the chassis satisfactory reception was obtained. Most modern potentiometers have their spindles insulated from the centre tag, but there are still many available in which the spindle is in direct contact with the tag. If a meter is not available for checking this important point it is always advisable to insulate the spindle from the metal chassis or the supporting bracket in order to avoid the possibility of a short-circuit.

I.F. Transformer Trimming

WHEN adjusting the trimmer screws on I.F. transformers it is advisable to use an insulated screwdriver, as the screw is in direct contact with the trimmer vanes in many makes of transformer. The trimmer condenser is, of course, joined to the winding of the transformer, and, therefore, the screw attached to the primary winding trimmer is at a high potential with respect to the transformer-screening can. If an uninsulated screwdriver is used it is very difficult to keep it clear of the screening can when adjustment is being made and, therefore, the winding can be damaged due to excessive current passing through it. In a battery set fitted with a fuse in the H.T.—lead, the fuse would blow before damage would occur, but it is always best to try and avoid this. If an insulated screwdriver is not easily available the insulated section of an accumulator spade terminal may be placed in the trimming hole and the screwdriver passed through this.

Qualitone Dial Lights

A FEW readers have written to ask whether dial lights can easily be fitted to the Qualitone. If 6 volt .3 amp. bulbs are used no difficulty need be experienced. The two bulbs should be wired in series and connected between the barretter and the lead at present connecting the barretter to the rectifier-heater pin. Alternatively a 15-watt 240-volt lamp may be used as a dial light.

B.B.C. The half of such a studio which accommodates the orchestra will be free of acoustical treatment on floor, walls, and ceiling, all the absorption necessary being concentrated in the other half, in which the microphone is normally placed. Acoustical treatment using no less than six inches of "mineral wool" has been specified in some cases. Recent experience suggests the desirability of having the floor uncarpeted, and preferably constructed of polished wood.

Such a feature of studio acoustics as "live end—dead end" design can only be tested in actual practice, as it is impossible to devise any laboratory experiment to examine its effectiveness. Features such as wooden floors and reflecting walls in the studio were found to be undesirable five or six years ago, but now microphones of extremely good performance are available it is becoming true to say that the best conditions for broadcasting are practically the same as those which give perfect listening within the studio. Thus the tendency is for an orchestral studio to approximate as regards acoustical design to an ideal concert hall.

Mr. Appleton Resigns

WEST REGIONAL listeners will learn with regret that Mr. E. R. Appleton resigns his appointment as West of England Regional Director as from June 30th next. I understand that Mr. Appleton proposes to start a new youth movement of the English-speaking peoples. He is well known as the founder of the Silent Fellowship and the author of the "Joan and Betty" series of broadcasts for children.

Mr. Appleton joined the B.B.C. in 1924 as Director of the Cardiff Station, subsequently becoming Director of the West Region.

Another Scotch Joke

I HAVE received the following interesting note from H.M.V., and I feel I must pass it on. As I said before, most Scots can tell a good story about the canniness of their fellow countrymen, and I have the feeling that many of them are invented in Scotland. However, here is a letter received by Messrs. Donaldson's, of Edinburgh, from a customer.

"DEAR SIR,—Would you kindly call and let me know if there is a gram. pick-up on this set I got, you said there was, at the back of machine it has three holes—A1, A2, E, HC—what this HC is I can't say, unless it's Hot and Cold water.

"Will you come and see it and let me know what you are going to do about it?"

YOU HAVE BEEN WARNED BY RADIO

Professor Hilton, on November 19th, 1936, from the B.B.C. broadcast a warning. The warning was to the effect that while there are many really good and reliable Colleges teaching by correspondence, there are many others which are colleges by name only. He said some so-called colleges rented a couple of rooms in a large building in a well-known street. Some made great promises which they did not intend to fulfil. Some claimed successes they could not prove. In some cases the names of prominent men were quoted who were in no way connected with the working of the College.

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your own vocation, or prepare you for the examination which you have in view.

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There is a tide in the affairs of man which, if taken at the flood, leads on to fortune and success. There are three things which come not back: the sped arrow, the spoken word and the lost opportunity—this is your opportunity. If it is your desire to make progress and establish yourself in a good career, write to us for free particulars on any subject which interests you, or if your career is not decided, write and tell us of your likes and dislikes, and we will give you practical advice as to the possibilities of a vocation and how to succeed in it. You will be under no obligation whatever. It is our pleasure to help. We never take students for courses unless we feel satisfied they are suitable. Do not forget that success is not the prerogative of the brilliant. Our experience of over 30 years proves that the will to succeed achieves more than outstanding brilliancy.



J.W. Bennett

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Jim Duck

Art Dept. 104.

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YOUR CHANCE



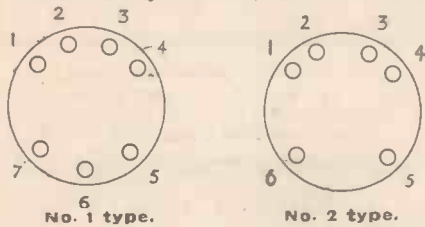
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VALVES—TYPES AND PURPOSES

In Concluding the Article which was Published Last Week, We Now Deal with Continental Valve Types, and One or Two Other Valves Which Are Not So Well Known

As mentioned last week, there still remains the type of valve used on the Continent, and commonly referred to as the Continental valve. These are provided with six and seven pins and the arrangement of these does not conform to any British pattern. The well known Ostar-Ganz valves are obtainable still, in certain types, with these pin arrangements, although some of them are fitted with British type bases. Some of the valve-holders of the Continental pattern carry a strip of metal across the centre, and this continues a screen inserted in the base of the valve and greatly assists in obtaining stability and hum-free working. In the Ostar-Ganz valves, the method of screening is carried out by covering the glass bulb



Continental Valves

Type.	Base.	PIN CONNECTIONS							Top Cap
		1	2	3	4	5	6	7	
H.F. Pentode ..	1	G2	H	H	C	A	G3	—	G1
H.F. Pentode ..	2	G2	H	H	C	A	M	G3	G1
Triode ..	2	—	H	H	C	A	M	G1	—
Double Diode ..	2	G2	H	H	C	D1	—	—	D2
Frequency Changer	2	G2	H	H	C	A	Ao	Go	G1
Output Pentode ..	1	G2	H	H	C	A	G1, G3	—	—
Output Pentode ..	2	G2	H	H	C	A	G3	G1	—
Rectifier ..	1	C1	H	H	C2	A2	A1	—	—
Rectifier ..	2	C1	H	H	C2	A2	—	A1	—

Popularity Race

THE B.B.C. announces that as a result of the voting by listeners for their favourite melody in the fourth programme, the series of "Songs you might never have heard" has become a "popularity race" between two songs—"She's an Angel of the Great White Way" and "McDougall, McNab and McKie."

Voting, as anticipated, is declining as the series draws to an end and 2,655 votes have been recorded. There is no change in the placing of the first three songs chosen. They are as follows:—

1. "McDougall, McNab and McKie" 761 votes
2. "She's an Angel of the Great White Way" 486 votes
3. "The Riveter" 372 votes

None of the seven new songs heard by listeners for the first time has been "placed." Thus, at present, "She's an Angel of the Great White Way" has been twice first and three times second, and "McDougall, McNab and McKie" has been twice first, second once and twice third. They have always been among the

with a copper netting, instead of spraying it with zinc or other metal as in the case of British valves. The attached table shows the pin arrangements and the main types which are available, with pin connection references.

Other Types

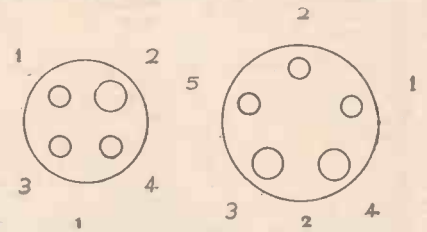
A number of receivers on sale in this country utilise American pattern valves, and although the new International Marconi

Hivac Valves

Type.	Base.	PIN CONNECTIONS					Top Cap
		1	2	3	4	5	
Tetrode (S.G.) ..	1	A	G	F	F	—	—
Triode ..	1	G2	G1	F	F	—	A
Output Pentode ..	2	A	G1	F	F	G2	—

Range embraces a number of American types, it does not include them all. These are obtainable with several different heater ratings, ranging from 1.1 volts up to 7.5 volts, and some special types are available

with 12.6, 25, 30, and 14 volt heaters. Apart from the fact that the slope of



American valves is quite different from the English valves, there are also some interesting types of pentode available, with characteristics not met with over here. This makes it very difficult to replace an American pentode by a British valve, and in many cases it will be found impossible to find an English equivalent.

Midget Pin Connections

To complete the data of pin connections the table above shows the arrangement of the four and five-pin Hivac valves, which are only obtainable in three types. The base of these valves is provided with a locating pin, but in any case the pins are of different sizes and this assists in ascertaining the correct location if for any reason the valves are to be used without a valve-holder, as mentioned in the Short-wave section this week.

Two Interesting Broadcasts

first three. "The Riveter" has been first once and third twice.

So far, nearly 45,000 votes have been received from listeners and there is one more programme yet to be broadcast, on April 12th, when, before the final voting, listeners will hear only those manuscript melodies which have been first, second, third or fourth during the series.

After the remaining programme, listeners are again invited to send postcard votes, naming the song which they liked the best, to the B.B.C., Broadcasting House, Portland Place, London, W.1. Postcards should be marked "Listeners' Vote" and should bear the listener's name and address.

The Cricket Season

THE B.B.C.'s Outside Broadcast Department is sending Tommy Woodroffe to visit a famous cricket bat factory at Nottingham on April 28th. His idea is, if feasible, to paint in words, with the noises of the factory as background, a picture

of the making of a cricket bat. Mr. Woodroffe has discovered that there are many distinctive noises in the making of a

bat which are so characteristic as to be quite useful in giving a vivid sound picture. To this accompaniment the B.B.C. observer will pass along the various processes from start to finish, telling listeners how the blade, handle and binding are progressing.

The story starts with the piles of oblong shapes of willow stored for a considerable time for ripening. The blade part then passes along through various shaping processes to the final bench where, united to its handle, the name of the firm is stamped on the bat and a last finish given to the binding.

With a switch-over, listeners will be flicked from Nottingham to Lord's, where they will actually hear the willow, now turned into bats, being used at the nets, where Lord's ground staff are rapidly getting into training for the opening of the season. It is hoped that well-known figures of the cricket world will be present at the Lord's nets for this occasion. The B.B.C. observer has not yet been chosen.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

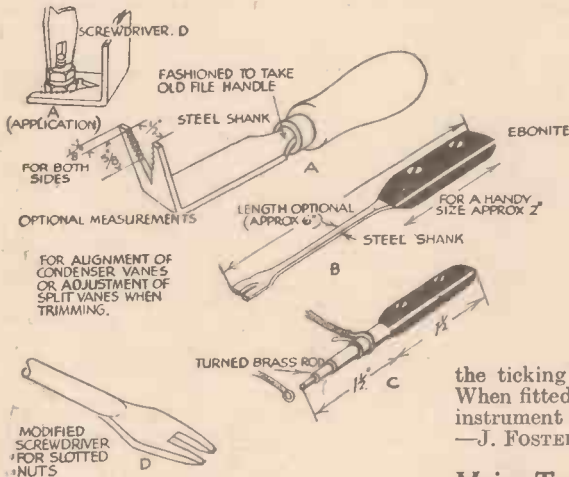
Radio Accessory Adjustment Tools

OTHER readers may find the same delight in the construction of their own adjusting kit as I do, and the accompanying drawings illustrate a few of the designs which I have created for facilitating the handling of chassis with closely assembled components.

The desire for a tool which would alleviate the trouble occasioned by barely accessible locked nuts resulted in the design detailed at "A." By the aid of this simple tool I now find that the old awkward method of using snipe-nosed pliers is obviated.

The tool "B" was the result of a necessity for a long-shanked trimming implement.

A loop fashioner "C," although very handy when once constructed, is not very



Handy accessory tools for the radio adjusting kit.

necessary in the average kit, but will assist the beginner in attaining neatness in construction.

The modified screwdriver "D" has been definitely an asset and its use is clarified in the inset of the application of tool "A."—H. COPPS (Ilford).

Automatic Morse Key

HERE is another suggestion for automatic morse transmission embodying an idea which I have had in use at my station for some time. As will be seen, the standard gramophone turntable and motor is employed, the electrical circuit being completed through the turntable, via the wiper against the spindle, and another one rubbing against the edge. To interrupt this electrical circuit ordinary insulation tape is affixed to the edge of the table, and to give the required make-and-break the tape is punched in combinations of holes corresponding to dots and dashes. A simple way of cutting these gaps is by pressing the tape on a sheet of glass, and using the corner of a razor blade with a

THAT DODGE OF YOURS!

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metal rule or straight-edge. A punch may be made for a quicker scheme, and would enable new "messages" or combinations to be made quickly to interchange. If the key is inserted in the main H.T. lead a relay circuit may be employed as shown in the smaller diagram.—H. G. P. Williams (Hove).

A Button Microphone Improvement

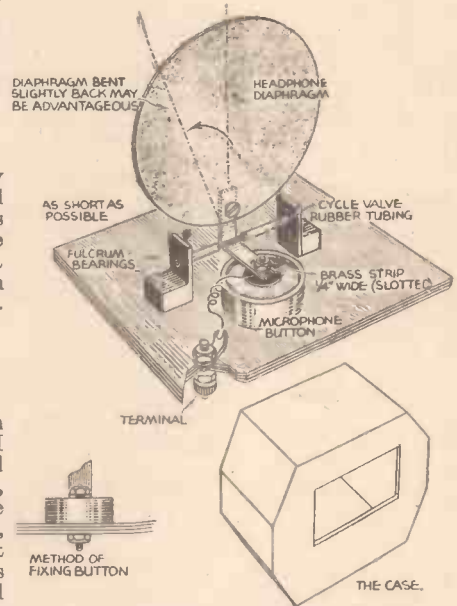
WHILE trying out a button microphone recently, I devised the method illustrated for increasing the sensitivity, with complete success. The sketches are self-explanatory, and although the arrangement needs careful adjustment it is well worth while, for I found that with this addition, the microphone would record the "whistle" instead of a "blow,"

the ticking of a watch, and tearing paper. When fitted in a neat case this inexpensive instrument is quite attractive and efficient.—J. FOSTER (Manchester).

Mains Transformer Hint

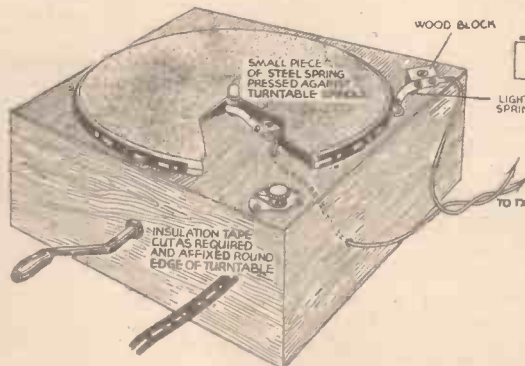
THE experimenter is often in need of various voltages for test purposes, and I have found that it is possible in many cases to utilise an old mains transformer for this purpose. I refer, of course, to A.C. supplies, and although on the input side it is possible to connect the

mains to the 0 and, say, 200 volt sockets to obtain various voltages in steps of 10 up to 50 with certain makes of transformer, there is also a possibility of obtaining certain ranges on the output side. For instance, recently I wished to try a circuit with

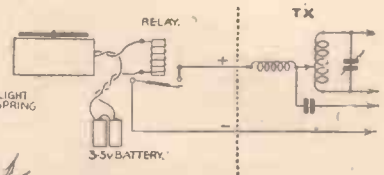


Method of improving a button microphone.

American valves which required 6.3 volts for the heater supply. This was obtained from the ordinary 4-volt output, by utilising one complete 4-volt winding and half of another 4-volt winding. This was between one end and the centre-tap, but a word of warning is necessary, as the two windings must be joined in phase. This may easily be checked with a good meter, and if wrongly connected, it will be found that the voltage is lower than a single winding. By using the windings delivering a large current, the additional .3 volts was easily obtained.—E. D. STYX (Hendon).



Adapting a gramophone table as an automatic morse sender. The circuit diagram is given in the inset.



THE PRACTICAL MOTORIST EVERY 3^D FRIDAY Packed with Practical Articles of Interest to the Owner-driver.

ONE of the most controversial, yet fascinating, diversions in radio is remote control, and those experimenters who have an aptitude for designing mechanical movements, will find in this article a pleasant relaxation from the more common radio problems.

The reception of a required signal on any receiver is carried out by means of a variable capacity across the coil, and forms the basis of the ideas mentioned in this article. The simplicity of this principle gives way to a more complex state when the question arises of controlling this capacity other than by the direct manipulation of the condenser, and the natural tendency is to revert to the motor control methods, of which there have been many designs and suggestions. There have, of course, been produced receivers embodying a mechanically-operated control system capable of selecting about fifteen stations, and again models have been marketed embodying the telephone dial principle of selection, but these are few and far between. Home constructors have, therefore, an interesting opening for experiment, and in a number of cases, quite satisfactory selector mechanisms have been perfected, making it easy for those who find, even now, a difficulty in tuning a required station accurately.

A Motor-driven System

The principle of one such idea is shown in Fig. 1, from which it will be seen that the complicated movement predominates the

its speed being reduced through a worm gear. On the required wavelength being reached, the pre-adjusted cam (a) breaks the motor supply circuit through the opening of the contacts c_1 and consequently the moving vanes of the condenser come to rest in the required position for the reception of the station chosen.

A further programme may be preferred to the one selected by this first operation and b_2 is pressed; immediately the motor starts up over contacts c_2 and the same operation ensues, thus it will be seen that this idea embodies one of the simpler methods of direct drive control. Now, supposing the condenser vanes have reached the minimum capacity setting (the moving vanes being all out), or the operator wishes to revert to the station controlled by a preceding button, say b_3 , a reversed polarity is brought into circuit by pressure on b_1 and the normal operation ensues, but both buttons must be pressed, since the motor supply is governed by the two front contacts on b_1 this time, and not, as previously, over the two back contacts. Further refine-

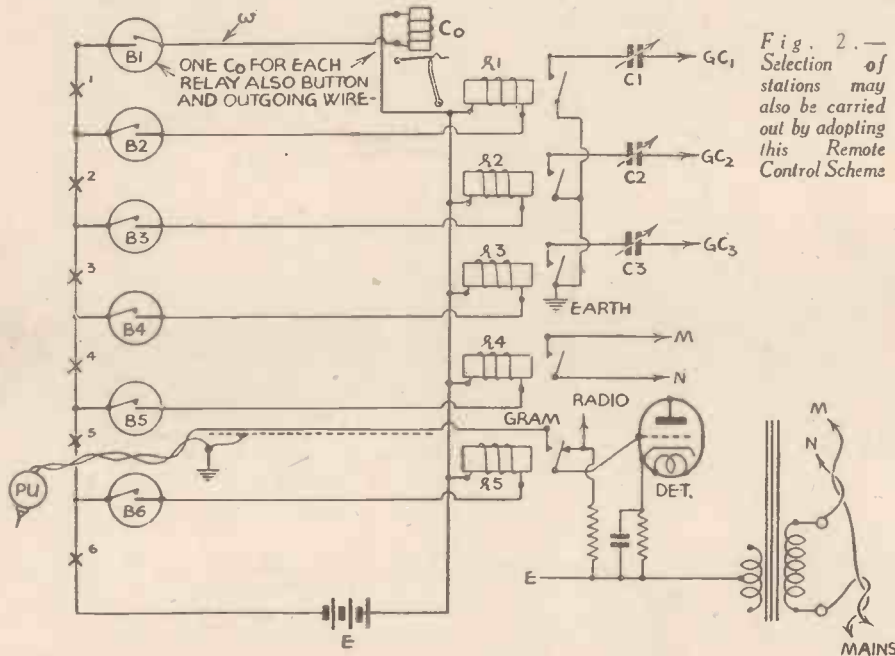


Fig. 2.— Selection of stations may also be carried out by adopting this Remote Control Scheme

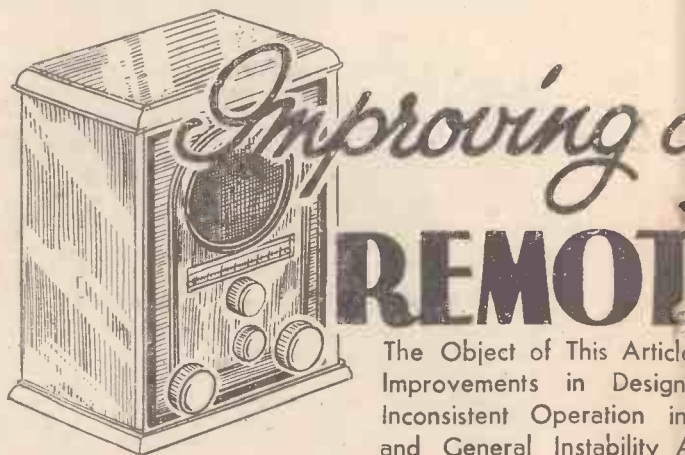
chassis of the receiver, and this idea, as will be apparent, would be an impracticable project commercially.

Concerning the operation of this system, and overlooking such technical setbacks as stray capacities, induced magnetic flux, etc., it will first be apparent that direct drive of the ganged condenser is quite a favourable adoption providing all "play" in the respective motor mechanism is eliminated. The selection of wavelengths is predetermined by the aid of cams, and in operation the button b_1 is pressed; this button, as for all selector buttons, is designed with two sets of contacts, and a circuit is completed through the contacts c_1 . The motor drives the condenser and cam assembly,

ment is in the employment of one of each set of button contacts for station pre-illumination by independent bulbs, the voltage for these being obtained from a separate battery. Maximum or minimum condenser setting is indicated by a pilot light included on the control unit, and is obtained, as illustrated, simply by another small cam fitment on the condenser extension shaft.

The following faults, which are liable to occur unless the assembly is designed to fine limits, will be of interest.

- (1) Sluggishness, or adversely excessive motive force resulting in incorrect setting of the condenser.
- (2) Over-running cam control contacts.



The Object of This Article
Improvements in Design
Inconsistent Operation in
and General Instability A
Designs and

- (3) Bad setting of cam contacts.
- (4) Play in reduction mechanism.

A Relay-operated Device

Other and more satisfactory methods of wavelength selection employing predetermined condenser settings, have been devised and there is no doubt that the most simple method is that employing addition and subtraction of differing independent capacity values across an inductance. Fig. 2 shows a circuit which has been employed extensively by the writer for a considerable time, the only detriment in this scheme being the necessity for numerous buttons, relays, preset condensers and multi-wire cables, if a wide selection of stations is to be handled. The operating principles are as follows: The wavelengths of the selected stations are first ascertained and jotted down for future reference, then the station with the lowest wavelength—from the list—is tuned in on the receiver in the normal way; the sensitivity of the receiver is then increased; and the next station in increasing wavelength order is ascertained and "logged," or "set," by an additional condenser across the existing variable condenser in the

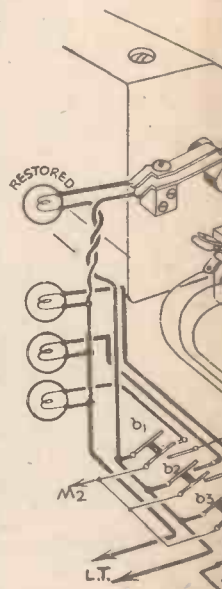


Fig. 1.—An

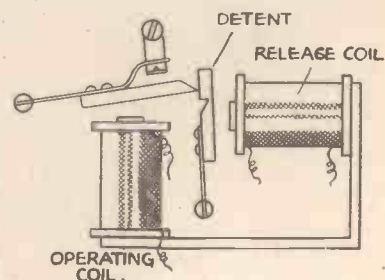


Fig. 4.—How the relay may be arranged for various circuit schemes.

receiver (c_1 , Fig. 2). The capacities of these additional condensers are, of course, dependent on the waveband being used, but

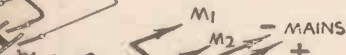
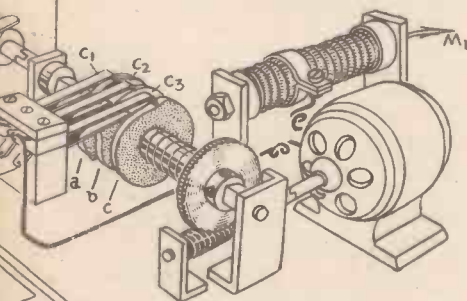
and Stabilising CONTROL

is to Discuss Possible
s, Explain Causes of
Various Movements,
Arising Through Faulty
Systems.



for medium and long waves it may be from .0002 to .0005 mfd.

Referring now to the circuit, relays r_1 to r_3 are the capacity adding relays and have only make and break contacts; r_4 is for switching the receiver on and off, r_5 is



elaborate scheme utilising an electric motor.

the gramophone-radio change-over relay, and acts like the ordinary single-pole double-throw switch.

Each relay being of the locking armature type, and constructed from good class electric bell movements, requires an individual "cut-out" as illustrated by C_0 , but only one C_0 is shown for the purpose of clarity. $GC_1, 2$ and 3 constitute one side

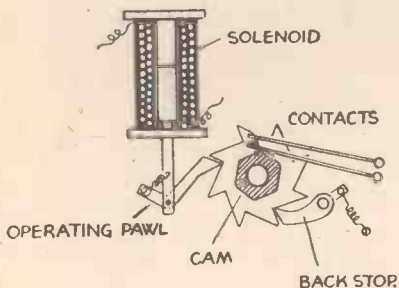


Fig. 5.—Another relay or solenoid-operated device.

of each of the setting condensers C_1, C_2 and C_3 , and whilst for single tuned circuits in straight receivers they are commoned

and connected to the grid end of the tuning coil in the receiver, they may be individually used for band-pass or multi-tuned circuits, but extra trimmers would be necessary for accuracy.

C_1 is brought into circuit by pressing button B_2 , r_1 , introducing this extra capacity. B_1 is for the cut-out which, of course, in this case releases the armature of r_1 , and here it must be mentioned that extra outgoing wires "w" are necessary for each successive relay cut-out.

The introduction of further capacities is by repetition of this operation, and is effected progressively by B_3 and B_4 , the previous capacities being nullified by their appropriate relay cut-outs.

Station indicating bulbs may be inserted at the points marked x^1 to x^6 , and their rating should be consistent with the relay operating voltage supply "E" without their resistance being excessive, and thereby impeding the "snap" action of the relay and cut outs through extra load.

The most important relay is the main supply relay, or in the case of battery receivers, the L.T. supply relay— r_4 , and the contacts M.N. should therefore be platinum or gold and silver, those in the

A sequence of capacity introduction is obtained by series anode relays R_1, R_2, R_3 and R_4 , and the valve V_1 ; grid voltage regulation will result in a proportional difference in anode current of say 0 to 30 mA, thus a maximum of six relays might be employed with this valve operating in the following order on application of bias: 1st relay=5 mA, 2nd relay=10 mA, 3rd relay=15, 4th relay=20, etc., and in our case there being only four relays in use, a greater margin of operation, and a greater current distribution to each relay is allowed resulting in the 30 mA being divided thus: R_4 , first relay to operate = 7 mA, $R_3=21$ mA, $R_1=28$ mA.

Operation

The impulse switch I/Sw is ganged, but insulated, to the control arm of the grid voltage regulating resistance "r" and the following action takes place.

(a) Arm of I/Sw leaves normal "dead" position "A," contacts with "B" and an impulse current energises C_0 , but this is premature, and, of course, is only important in the return of the arm to "A." The arm then contacts "C" and an impulse is given to the heater circuit relay "HR," this relay completes the circuits for the heaters of V_1 and V_2 over "f" and "e" and is mechanically held. The wiper of the potentiometer "r" is meanwhile decreasing the grid voltage of V_1 and thereby causing an increase in anode current Ia.

(b) Immediately the working current required by R_4 is reached, this relay, only, operates, and alters the wavelength through

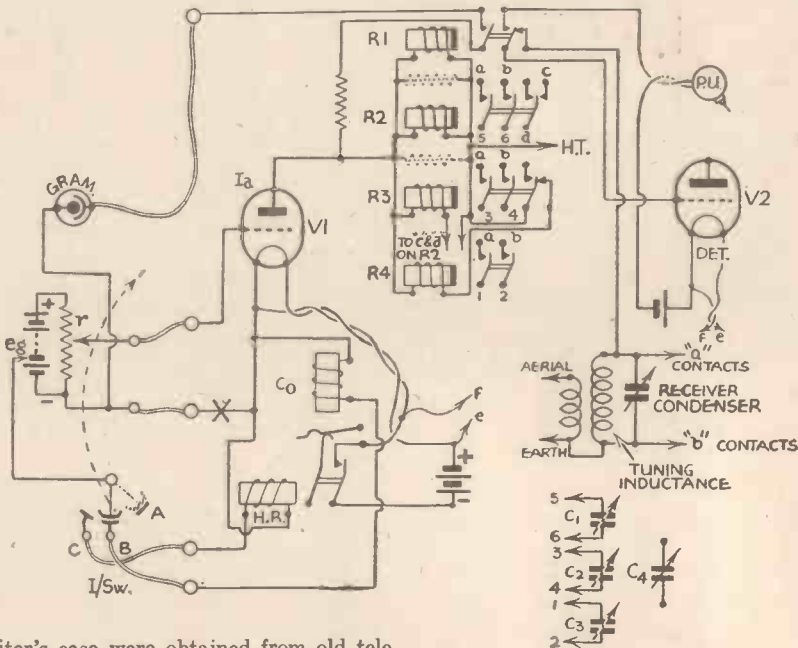


Fig. 3.—The outgoing wiring may be reduced by making use of a valve as shown in this scheme.

writer's case were obtained from old telephone key switches, and soldered to the contact strips employed in each relay; they proved very satisfactory in operation.

Fig. 3 is intended to show a possible solution to the question of excessive outgoing wiring, and the employment of a valve instead of just a distant voltage-regulating resistance for the relay supply is due to the necessity for a constant voltage supply, but permitting of current variation only, for certain types of sensitive relays.

As will be seen from this circuit only five outgoing wires would be required as against eleven, excluding P.U. wiring, for the system just explained.

the capacity C_3 (to which may be added a separate reaction circuit (condenser C_4) for weaker signals, and this is applicable in each instance, and naturally dependent on the circuit of receiver employed).

(c) Continued movement of "r" results in a greater anode current and so the next relay to operate would be R_3 . Now the two back contacts on this relay, over which R_4 is held, are broken, and R_4 is therefore

(Continued on page 87)

Eliminating Second Channel Interference

This Article Describes Various Ways and Means of Counteracting this Form of Interference in Superhet Receivers

THE most popular receiver to-day is undoubtedly the superhet because of its great selectivity and range. Nevertheless, it suffers from a rather serious snag—that of whistles appearing at various settings of the dial. These are caused by the actual process of frequency changing.

A powerful station (usually the local) can produce even a small voltage at the grid of the frequency changer when the set is tuned to a station widely differing in wavelength from that of the local; and if this difference in wavelength happens to be equal to, a product of, or even an harmonic of the intermediate frequency, then a beat note is obtained, and a whistle is audible.

When the intermediate frequency is, as it usually is, 110 kc/s, it is apparent that when the oscillator is tuned to 1,110 kc/s, stations of wavelengths corresponding to 1,000 kc/s and 1,220 kc/s will both produce

1,039 kc/s and 777 kc/s respectively. This interference corresponds to wavelengths of 323 metres and 450 metres, approximately, and if these are the only whistles that occur, they are not of very great importance.

Selective Tuned Circuits

A complete remedy lies in the provision of several highly selective tuned circuits prior to the first detector valve, but this is an expensive proposition and not worth while, and it also removes the advantage of a superhet in giving a high degree of selectivity in a simple and cheap manner through the action of the I.F. circuits.

Experience has shown that two H.F. tuned circuits (either of the band-pass type or two single circuits coupled by an H.F. valve) are sufficient to remove all whistles other than those caused by the local station. Even two local stations should

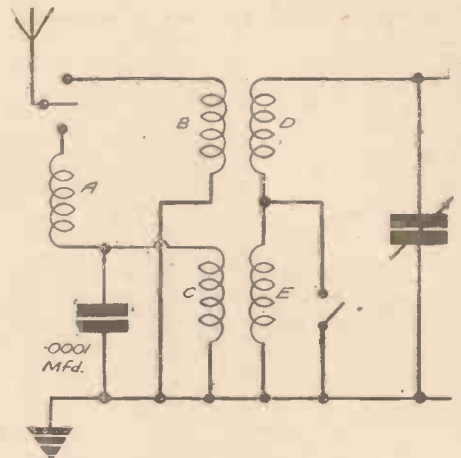


Fig. 2.—Circuit diagram of a 465 kc. long wave filter applied to an H.F. transformer: A, I.F. filter coil; B, Medium-wave coupling coil; C, Long-wave coupling coil; D, Medium-wave tuning coil; E, Long-wave tuning coil.

extra highly selective circuits, it follows that the first thing to do is to carefully check the ganging of the tuned circuits and get this as accurate as possible, and also to see that the I.F. transformers are adjusted to the correct frequency. It is very possible that this check will provide more accurate ganging and that greater freedom from whistles will result.

Many readers will no doubt have had the experience of continual retrimming of the H.F. circuits and adjustment of the I.F. transformers without any appreciable reduction of the number of whistles. If they are situated near a powerful local transmitter they are almost bound to have come across this effect, which is caused, not by misalignment of the tuned circuits, but by overloading of the first detector by the local station (or stations). With a good aerial, a local transmission can easily impress anything up to 20 volts R.M.S. on the grid of the first detector and part of this voltage must of necessity always be present whatever the setting of the tuning condensers. When this is added to the voltage of the received station, it is apparent that overloading will easily occur and cause whistles.

Reducing the input to the receiver, either by using a shorter and less efficient aerial system, or by inserting a small condenser in series with the existing aerial and the receiver, will effect a cure, but it will, of course, reduce the strength of all stations in the same proportion, so that more post-detector amplification will in all probability be necessary. Where A.V.C. is fitted, the set will, because the input is reduced, have to work under more sensitive conditions. The controlled valves will amplify more with the result that valve hiss and atmospherics will be increased.

Avoiding Overloading

A case in point was a superhet, with an H.F. stage preceding the first detector, in use in London. The I.F. transformers and the H.F. tuned circuits had been accurately adjusted by means of an oscillator and an output meter, but when the set was tried out on ordinary broadcasting transmissions with a good aerial, whistles occurred all round the dial and reception of the local stations was almost impossible due to very severe distortion. The latter, of course, provided a very important clue to the cause of the whistles. It was not due to misalignment of the tuned circuits, but to overloading of the first detector.

(Continued on opposite page)

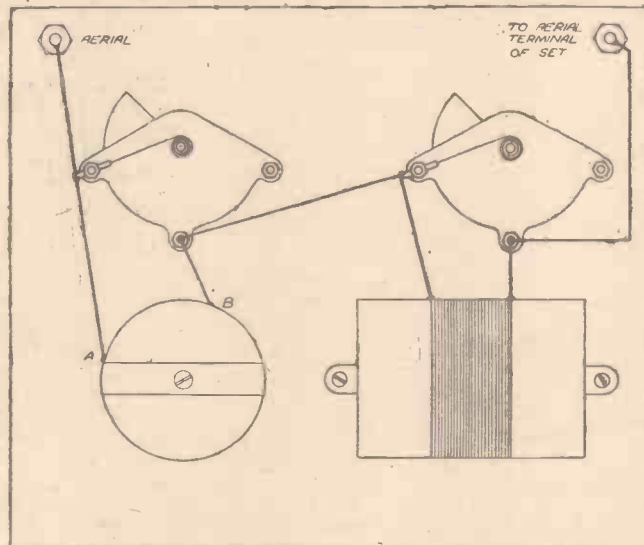


Fig. 1.—A twin wave-trap for removing second channel interference on medium waves.

A, Beginning of winding; B, End of winding.

the required intermediate frequency of 110 kc/s. Interference will result and, if the unwanted transmission happens to be very powerful, then the interference will be serious and a loud whistle will be heard.

The obvious remedy for this trouble is to introduce sufficient selectivity in the H.F. circuits to prevent the unwanted signals occurring at the grid of the frequency-changer valve when the set is tuned to the desired transmission. Unfortunately, if the unwanted signal is the local station, second channel interference is almost inevitable, as it is not a practical proposition to introduce sufficient H.F. selectivity.

In London the frequency of the two local stations (London National and London Regional) is 1,149 kc/s and 877 kc/s respectively, so that with an intermediate frequency of 110 kc/s, second channel interference will occur at 929 kc/s and 677 kc/s, the oscillator being tuned to

produce only two whistles, corresponding to received transmissions lower than the frequency of the local stations by twice the intermediate frequency.

Correct Ganging Necessary

It sometimes happens, however, that whistles are produced all round the dial. If these do not disappear when the local stations are closed down, then they must be due to H.F. or I.F. instability and are outside the scope of this article. If, however, no whistles are apparent when the local stations are not working, then it is safe to assume that they are caused by second channel interference. It is important before tackling a problem of this nature to make sure that it is second channel interference, and not instability which is the cause of the trouble.

Having seen that second channel interference can be removed by the provision of

ELIMINATING SECOND CHANNEL INTERFERENCE

(Continued from previous page)

A very short aerial (just a yard of wire attached to the aerial terminal of the receiver) gave perfect reception of the local stations and the set was free of all whistles except the two normal second channels to be expected at 323 metres and 450 metres, but, of course, strength of foreign stations was greatly reduced. While a "local-distance" switch would, at first sight, appear to answer the purpose in a satisfactory manner, it was soon apparent that, although this would render undistorted reception of the local stations possible, it could not do anything towards removing the whistles. What was wanted was something that would reduce the strength of the locals without affecting other stations.

Many readers will remember the days of the wavetrap, and if they suffer from second channel interference with their modern superhet, they should not hesitate to visit their "junk box" and fetch out a wavetrap. Insert it between the aerial and the receiver, tune the set to the local station, and then adjust the wavetrap for minimum signal strength. It certainly effected a complete and lasting cure in the case of the superhet referred to above, and had but little effect on transmissions of near wavelength to the locals. For instance, Radio-Normandie is received at very good strength free of London National, while Hamburg is still a very good station just clear of London Regional.

A Twin Wavetrap

If there are two local stations, as there were in the case referred to above, a twin wavetrap should be used. This was made up of two coils of about 50 turns of wire each wound on 2 1/4 in. diameter formers, and each tuned by a .0005 mfd. bakelite dielectric condenser.

The condenser is connected right across the winding in each case, so that it tunes the whole coil. One end of the first coil is connected to the aerial and one end of the second coil to the aerial terminal of the set, the free ends of the two coils being joined together. The whole assembly is mounted on a small baseboard with the axis of the coils at right angles to prevent interference and breakthrough. The sketch (Fig. 1) makes the whole assembly very clear.

Tune-in one of the local stations, and adjust one wavetrap condenser for minimum response. Now tune in the other local station and repeat the procedure with the

second condenser. This will result in the strength of the local stations being reduced and will therefore remove the second channel whistles caused by them.

So far we have only considered an intermediate frequency of 110 kc/s, and its effect in producing whistles. It is apparent that if we can arrange the intermediate frequency so that the second channels normally produced fall outside the normal broadcast wavelengths, then we can produce a set which will be free of whistles. This gave rise to the development of an I.F. of 465 kc/s, and this frequency is now being widely used, as it renders the medium wave-band free of second channel interference, and enables the H.F. circuits to be much simpler. In fact, it is common practice with a 465 kc/s intermediate frequency to use only one tuned H.F. circuit, thus dispensing with a coil and a condenser, and making the initial cost of the receiver considerably cheaper.

When we come to long waves, however, the matter is somewhat different. It is possible, particularly near to a local station, for a small amount of medium-wave signal to creep through the self capacity of the coil when it is actually tuned to some long-wave station. Since the oscillation frequency when receiving long waves falls within the medium wave-band when using an I.F. of 465 kc/s, it is clear that any creep-through of this nature will give rise to whistles.

Aerial Circuit Filter

This is minimised by including a filter in the aerial circuit, this filter being switched in only when receiving long waves. This filter only permits signals up to about 350 kc/s to pass through and hence no creep-through of medium wave signals occurs. A coil of about 300 turns layer-wound on a former of 1 in. diameter is sufficient, or a special coil designed for this work may be obtained from Messrs. Bulgin. It is type S.W.50, and costs 2s. 6d. The size of the coil will vary with different sizes of aerial and different localities, but the actual value required can best be found by trial, it being easy to make a small coil, and then take off a few turns until the correct value is found. The ideal to aim at is a coil of just sufficient size to give good signal strength in daytime without excessive second-channel whistles at night. Fig. 2 shows a suggested method of connecting the filter. Note that the .0001 mfd. condenser is essential. A small mica fixed condenser is the type to use, or a .0002 mfd. preset may be employed.

operation sequence indicators and an example is illustrated in Fig. 3 for the P.U.

Restoration

(a) The restoration of the whole control system is simply in the return of the potentiometer/switch movement, whence it will be seen the following actions take place:—

- (1) R₁ releases—Radio on 3rd wavelength.
- (2) R₂ releases, R₃ operates—Radio on 2nd wavelength.
- (3) R₃ releases, R₄ operates—Radio on 1st wavelength.
- (4) "C" contacted by arm—Impulse to HR (of no consequence).
- (5) "B" contacted by arm—"Co" operates, releasing HR.
- (6) HR restored, heater supply of V₁ and V₂ broken over contacts of this relay. Co restores immediately having a non-mechanically held armature.

(To be continued)

IMPROVING AND STABILISING REMOTE CONTROL

(Continued from page 85)

released and the capacity C₃ is replaced by C₂ thus again resulting in an alteration of wavelength.

(d) The circuit for R₃ is likewise broken over two contacts of R₂, and again the wavelength is changed, this time by C₁.

(e) R₁ is the gramophone change-over relay, and is in the same sequence of operation, this relay necessitating maximum working current. The relay R₂, although held over this current, is designed to have a saturation point above that of the working current of R₁, and since the radio is cut off and the P.U. introduced into the circuit, this remains a question of design, since two further contacts could satisfactorily be employed to cut this relay out on the operation of R₁, as in the case of the previous movements.

Neon lights may be used as circuit

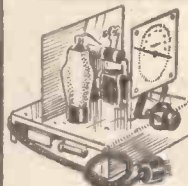
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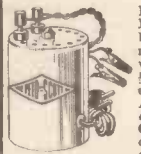
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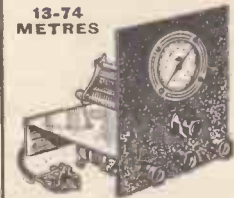
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SHORT WAVE SECTION

POCKET RADIO

The Short-wave Receiver Lends Itself Admirably to the Compact Form of Construction now Referred to as Pocket Radio. The Main Features of Design are Explained in this Article - - - - - By W. J. DELANEY

THERE is an increasing interest in the pocket type of portable, engendered partly by the increased publicity given to the police radio apparatus, and partly by the approaching summer months, when outdoor radio becomes the main interest of the amateur. The pocket set may be designed to cover any waveband, but although the ordinary broadcast band will appeal to many listeners, there are many reasons why a short-wave pocket set is the most practical proposition. Firstly, the tuning coil for the broadcast band can only be reduced to a certain size without losing considerable efficiency, whereas the short-wave coil is naturally of small dimensions. Secondly, the range of certain short-wave stations is much greater than the medium or long-wave stations, and a much smaller aerial is

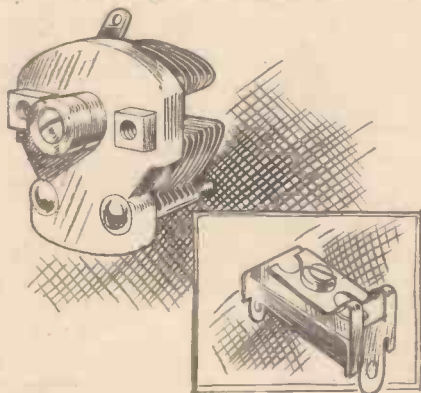


Fig. 1.—Ideal components for the pocket S.W. set, are now obtainable from various manufacturers.

required to provide good signals with a minimum of valves. It is true that the police radio apparatus is only designed primarily to operate over a small distance, say, in the precincts of a town or county, but a single-valve short-wave set will provide signals from America at quite good head-phone strength under favourable conditions, and thus there is a very wide field of entertainment available for the user of a pocket one-valve short-waver.

Valve Types

There is no need, however, to restrict design to one-valve circuits, but, naturally, as the main aim of the design is to enable the receiver to be made sufficiently compact to be contained in an ordinary pocket, the scope of the receiver design is naturally restricted.

For the most effective types of pocket set the acorn valve cannot be improved

upon. This has extremely low losses, is of very small dimensions, and oscillates very easily with a minimum of high-tension. The Hivac midgets are also very suitable, and are now obtainable in three types suitable for any combination or circuit, other than the superhet, of course. The voltage supply is considered in many cases to be a problem, but it is obvious that a set cannot be made self-contained, and then be of such a size that it may be placed in a normal pocket. A large pocket such as is found in certain types of overcoat will accommodate quite a large piece of apparatus, but in general the power supply should be in a separate container, ordinary flex being used to connect the two together. In this way, any tuning adjustments may more easily be carried out, as a much smaller and lighter piece of apparatus has to be held in the hand for the purpose.

Batteries

For the heater or filament supplies, the type of battery designed for use in various lamps will be found very suitable. There are many of these to choose from, the actual choice depending upon the overall size which can conveniently be accommodated. There are batteries for small torches, as well as the larger models made for large inspection lamps, and where a longer period of life is desired, special small L.T. accumulators of the unspillable type may be used. These two batteries should be purchased first, and then the container made, covered with leatherette or otherwise finished for neatness, with a hole to enable the four-way cord to be passed out for connection to the receiver.

Other Components

The coil will presumably be home-made,

the size and number of turns depending upon the wavelength. For short-wave results, this is an extremely simple job, twenty turns of 28 D.C.C. wire on a lin. tube for the grid winding, with a pile-wound coil of similar size for reaction, will enable the most useful section of the short-wave band to be covered by means of a 50 mmfd. condenser. This component may

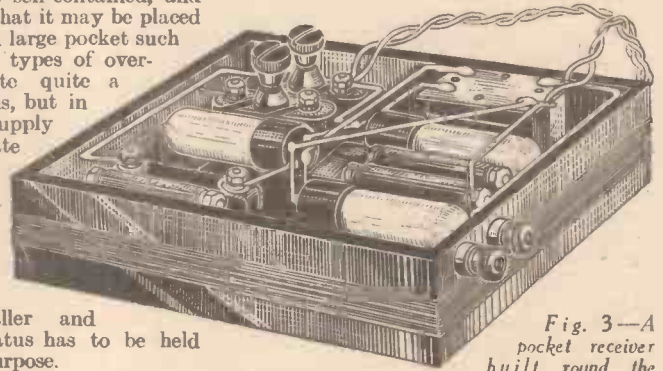
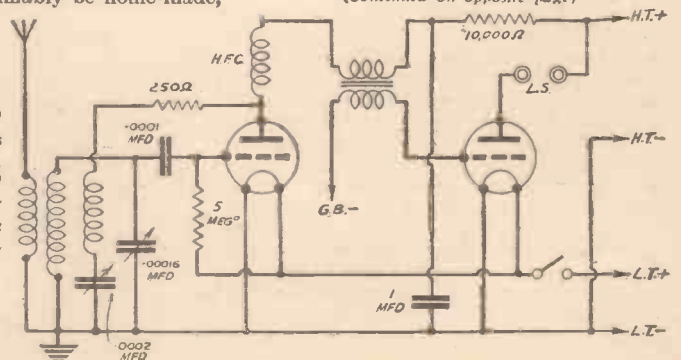


Fig. 3—A pocket receiver built round the Hivac Midget valves, and fitted with a frame aerial.

be one of the mica-dielectric trimmers sold for use with certain coils or I.F. components, or an air-spaced variable such as the Microdenser manufactured by Eddy-stone. Fixed condensers and resistors are now obtainable in extremely neat and compact units, the resistors of the half-watt type being ideal for a receiver of this nature, and the "manufacturer type" fixed condensers without casing taking their place with these components. If these are not available, an ordinary mica-type fixed condenser may be dismantled, the casing being broken away, or the wax filling being first scraped out and the terminals removed. No terminals should be used in a set of this type in view of the difficulty of finding a suitable small

Fig. 2.—The simplest S.W. circuit. This simple detector - L.F. combination does not possess the range or reliability of the properly-designed super-regenerative set.



(Continued on opposite page)

SHORT-WAVE SECTION

(Continued from facing page)

terminal which will offer sufficient area of contact to maintain the efficiency of the remainder of the parts. Therefore, plug and socket connections should be adopted for aerial, earth, and 'phones. From the Clix range suitable components may be selected which will offer all that is required in this connection. To enable the aerial to be connected without the need for a separate aerial coupling coil, and to preserve efficiency, a series-aerial condenser is indicated, and again the "trimmer" component may be used. The accompanying illustrations show these various parts, and give some indication of their size.

Construction

The method of assembly will depend upon the general overall dimensions which

other ear (in the case of very weak signals) a small pad may be made from cotton-wool and cloth to cover the ear.

Circuits

There are several interesting circuits which may be incorporated in pocket receivers of this nature, but in most cases it will be found that the simple reacting detector arrangement as shown in Fig. 2, will be the easiest to set up and put into good working order. The super-regenerative circuit will give louder signals if it is made to work properly, but in many cases it is found that the amateur, especially the beginner, cannot get maximum efficiency from this type of receiver. The self-quenching circuit is easiest and requires fewest components, and lends itself well to experimental work. Reflex arrangements may be found useful, but on the short waves they

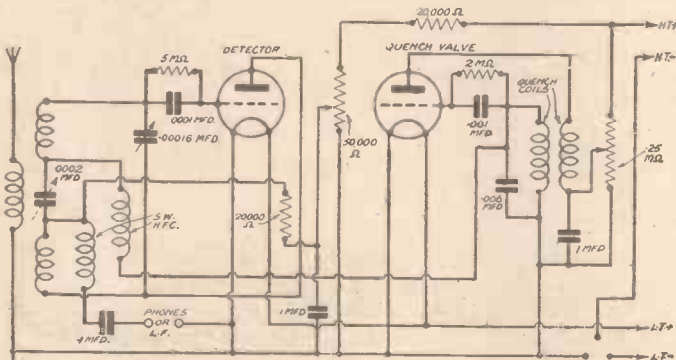


Fig. 4. — A super-regenerative receiver circuit which forms a good basis for a pocket receiver.

are to be adopted. Obviously, components will, as far as possible, be connected direct to each other without the intervention of connecting wires, and the acorn type of valve also may be used in a similar manner. The Hivac valve is provided with pins for insertion in a holder and to facilitate changing the valves a small sub-baseboard arrangement would be required. This may be avoided, however, by soldering the connections direct to the valve pins, and holding the valves in position in the case by means of rubber bands or some similar scheme. Thin paxolin is obtainable from Messrs. Peto-Scott from which the entire case, or the panel alone, may be constructed, and this is both light and strong enough for the purpose. It is also easily worked.

The Aerial

A number of interesting schemes may be introduced in the way of an aerial. A very short wire suffices for the majority of the shorter wavelengths, and if the receiver is to be used whilst walking, a length of copper wire may be stitched in the back of the coat. Thin wire will do, and will be sufficiently flexible to enable the coat to be folded or otherwise used without any ill effect. The end may be taken inside the pocket in which the receiver is installed and a plug fitted for connection to the aerial terminal. An alternative scheme is to use a length of flexible wire, a clip at the end enabling it to be attached to any object raised above the ground. In most cases an earth may be dispensed with, the capacity effect formed between the batteries and the body acting sufficiently for this particular type of apparatus.

Headphones will naturally be used, and where weight has to be considered, a single earpiece and headband, obtained by dismantling a normal pair of 'phones, will prove satisfactory. To prevent the normal outdoor sounds from affecting the

are not so simple to set up as on the broadcast bands. Where the size of the H.T. is not of great importance, L.F. stages may be included to provide louder signals, but the main aim of the pocket set is to obtain a useful and easily-carried receiver, and thus the overall size and weight must be kept down to a minimum. Sufficient has now been said to enable a suitable receiver to be constructed, and we shall be glad to hear from readers who succeed in constructing an efficient set of this type, with, perhaps, some test reports.

A NOVEL AUTO-DIAL

(Continued from page 75)

of the upper one. It is necessary to use a coupling with one grub-screw removed for the auto-dial, so as to have sufficient length to protrude through the panel and allow tightening of the remaining screw.

If desired, through one of the finger-holes when in the six o'clock position, a central vertical line may be scribed on the face of the panel and this serves, when exactly central in the hole, to indicate the precise on-tune point. Names of stations tuned by the ordinary knob may also be printed on the back dial before the guide portion is cut out, and transferred to the translucent paper as previously. (G. B.)

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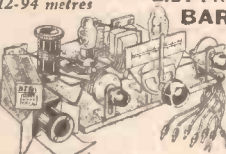
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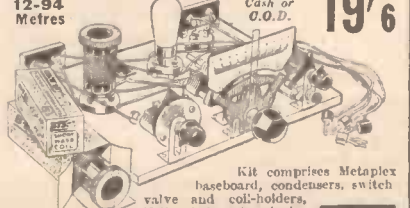
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Practical Television

April 10, 1937. Vol. 3. No. 45.

Television Belt

RAPID progress is being made in establishing a belt of coaxial cable which is to girdle London and enable engineers to use it for television purposes. Due to the presence of buildings and their material screening effects, it is difficult to establish a directional microwave radio link between the station at Alexandra Palace and any point of vantage where the television scanners may be in action undertaking an outside broadcast. It has been found preferable, therefore, to lay the cable and provide suitable tapping points where the television vans with their mobile apparatus can connect their own cables for the purpose of relaying the generated vision and sound signals. Because of their service importance, work on the trio of vans which will be used for this purpose is being accelerated, so that there will be enough time to carry out the stringent tests prior to televising parts of the Coronation procession. In this connection, experiments with telephoto lenses are being made so that actual close-ups of their Majesties in the Coronation coach can be transmitted. This is done quite frequently in ordinary news-reel work, and the success obtained has inspired the B.B.C. engineers to undertake work of a similar nature. This same cable belt should enable relays from well-known West End theatres to be included in the television programmes, for all O.B.'s tend to ease the present situation at Alexandra Palace, which is lack of adequate studio accommodation. Already, there is a suggestion afoot that the Alexandra Palace Theatre should be converted to a super studio, but questions of finance make this rather difficult.

Interference Effects

AT a lecture demonstration on the subject of high-definition television, given before the London section of the Institute of Wireless Technology recently, the lecturer illustrated very clearly the effects of interference on picture reception. A standard Baird receiver was used for the purpose, the aerial being attached to a chimney breast on the building roof and linked to the set by a long length of screened flexible feeder cable. Although only a temporary installation, the picture and cathode-ray tube screen were particularly clear, so certain forms of interference were introduced deliberately to show the audience what could occur under certain circumstances. A hand-turned magneto and sparking-plug indicated very clearly the distributed splashes of light which are brought about by the ignition systems of motor-cars. A simple buzzer and Morse key gave a somewhat similar effect, but of a more pronounced character. A high-frequency violet-ray machine was next tried, and this gave interference effects of a more serious nature, for bands of broken light lines appeared on the screen, destroying the picture quality and making looking-in an unpleasant pastime. Incidentally, one of the most virulent forms of interference yet experienced on any television set is introduced by medical

diathermy sets. These operate on ultra-short waves in the neighbourhood of six metres, the transmissions being passed right through patients undergoing treatment for such complaints as rheumatism, sciatica, bronchitis, etc. The range of the medical sets is fairly considerable, and the high frequency of the transmission beats with the carrier-wave of the B.B.C. television signal to produce intense chequered patterns on the screen. The effects are quite devastating, and the only cure seems to be an alteration in the diathermy equipment wavelength, or the apparatus can, in some cases, be adequately screened. It is known that some of the hospital authorities are voluntarily investigating this matter, and no doubt a satisfactory solution will be found.



Miss Elizabeth Cowell, the television hostess of the B.B.C. at Alexandra Palace, was unable to announce her television production, a ballet recital, recently, owing to indisposition. She was able, however, to have the pleasure of seeing her production with a Marconi television receiver at her home in Chelsea.

An American Demonstration

AN important television demonstration on a fairly large scale took place recently in Philadelphia. It was organised by the Philco Radio and Television Company, and for an hour the audience of press men, technical engineers and radio executives watched the results on six cathode-ray tube receivers arranged in a darkened room. The standard of definition recommended last year by the American R.M.A. was employed, namely, 441 lines, 60 frames interlaced to give thirty pictures per second. To enable comparisons to be made, part of the programme was radiated with the old 343 line definition, and those present could see the marked improvement effected by the 30 per cent. increase in picture lines. All transmissions in the

United States are still scheduled as experimental, and take place within the band of 42 to 86 megacycles. Efforts are being made in that country to secure this band permanently for television, but there are, at the moment, oppositions from certain of the Government departments.

Speaking of America recalls the fact that according to reports Baird's transatlantic television transmission in 1928 has been emulated, but on this occasion with high-definition signals. At the moment all these long distance results (readers will recall a similar report in South Africa) are looked upon as freak ranges, and in no case has a recognisable picture been seen over these distances as was the case with the short waves employed for the 1928 experiment. As work on ultra-short waves using high-powered radio transmitters and modulation frequencies calculated in megacycles has only been undertaken of recent date, however, it seems certain that many preconceived theoretical notions concerning range may need drastic revision. Whether this is a direct result of the new reflecting layers found by Watson Watt or from any other cause, only careful research will prove, but it behoves everyone to keep a very open mind on all matters relating to high-definition television.

Looking Ahead

NO doubt many readers will remember the huge British Empire Exhibition held at Wembley in 1924 and 1925. A somewhat similar effort is being planned in Scotland, where it is stated that an Empire Exhibition will be held in Glasgow next year. Naturally the nature of many of the exhibits is still somewhat embryo in character, but the authorities are most anxious to include television, and the establishment of a service in that country to synchronise with the opening of the exhibition would be of material benefit to all concerned. Ten million people attended the last big exhibition held in Glasgow as long ago as 1911, but much larger numbers are anticipated on this occasion.

RADIO CLUBS AND 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

ALTHOUGH the session has not yet ended, the Croydon Radio Society held its annual general meeting on Tuesday, March 16th, in St. Peter's Hall, S. Croydon, for presentation of the Balance Sheet and election of officers for next session. The vice-president, Mr. G. S. Vellacott, was in the Chair. The Balance Sheet proved this year to be an inspiring document, and after discussion was passed unanimously. Officers re-elected were: Chairman, Mr. W. J. Bird; hon. secretary, Mr. H. G. Salter; hon. publicity secretary, Mr. E. L. Cumbers; hon. treasurer, Mr. C. L. Amos; hon. auditor, Mr. A. Bateman; and hon. librarian, Mr. R. P. Jonas. A new face appeared as vice-chairman, Mr. G. A. Hoskins. In a discussion on the session, with a view to improvement for the future, Mr. Hoskins considered that the loud-speaker nights showed no signs of losing their usefulness, while other members urged more short-wave meetings, lectures on component parts and, of course, more talks by members themselves. Above all, said Mr. Vellacott in concluding, new members were always wanted and the Society prided itself on its welcome to them.

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

The West London Radio Society

THE above Society meets on Wednesday evenings at 8.0 at the premises of Ross and Robinson, 16, Bond Street, Ealing, W.5, and enthusiasts in radio are always given a hearty welcome. Recently, Morse classes have proved themselves popular with the members. On Wednesday, April 7th, a demonstration of Lissen short-wave and all-wave sets and components was given at the above address. All inquiries should be addressed to the Hon. Sec., D. Reid, 15, Tring Avenue, Ealing Common, W.5.

The Cardiff and District Short-wave Club

AT the last meeting of the above club, Mr. R. T. Matthews, G8AM, gave a very interesting talk—another in the series for the amateur transmitter—on CO/PA transmitters. This was followed by a demonstration of part of the gear in active use at G8AM's station, and everyone present was really surprised at the amount of R.F. in the transmitter driven by accumulators at 120 volts.

At the next meeting, Mr. H. H. Phillips, 2BQB, will give a talk and demonstration of interest to the receiving members of the Society. The merits of a straight receiver will be demonstrated by the operation of one of the latest Eddystone receivers. The dates of future meetings are as follows:—

April 15th and 29th, May 13th and 27th, each commencing at 8 p.m. If there should be any readers in this district interested in short waves, the Secretary, Mr. H. H. Phillips, will be interested to hear from them, at 132, Clare Road, Cardiff.

Portsmouth and District Wireless and Television Society

A CROWDED meeting of the above Society was held recently when a lecture was given by Mr. Newsome on

"Electrical Interference." By means of lantern slides Mr. Newsome traced the part played by G.P.O. engineers in eliminating interference by the fixing of suppressor devices. The various types of suppressors were described, and an actual demonstration of curing interference by an electric fan and flashing sign was given.

The Society has now got its own 16mm. ciné projector and would like to hear from manufacturers who loan films. Harold Leigh, 2BBG, 20, King Street, Southsea.

Southall Radio Society

THE speaker at the meeting on March 16th, was Mr. F. Charman, G6CJ, who gave a well informed lecture on "The Propagation of Radio Waves."

It is the normal practice for the Society to cease to hold weekly meetings after March 31st, but it is possible that an extension may be made this year, due to the large increase in membership which has made this session a notable one.

Details will be forwarded on inquiry being made to the Hon. Secretary.

The meeting of the Society on March 23rd was devoted to the transmitting group of the Society, who had promised to provide a programme.

Mr. Jack Maling, G5JL, exhibited and demonstrated an unusual type of transmitter which he had designed. He then gave details of other types of transmitters which were of general interest.

Details of the Society's future activity can be obtained on request from the Hon. Sec., Mr. H. F. Reeve, 26, Green Drive, Southall.

A trip to Paris is being planned for May 22nd, to the Paris Radio Show, the cost being £2 per head. Non-members of the Society who would like to join the party are invited to communicate with Mr. S. Gould, 3A, Argyle Road, West Ealing, W.13.

Exeter and District Wireless Society

AT the last meeting of the Exeter and District Wireless Society, there was a good attendance of members who thoroughly enjoyed a most interesting lecture given by L. W. Cornish, Esq., of the Exeter City Electricity Undertaking. Although not strictly a Wireless lecture, the subject being "Electricity as applied to Agriculture," with the help of over one hundred lantern slides, Mr. Cornish demonstrated the ways in which electricity could be used by the modern farmer and horticulturist. The heat treatment of the soil for the propagation of seedlings; the drying of grass as storage food for cattle through winter months; and plant irradiation were all dealt with in their turn.

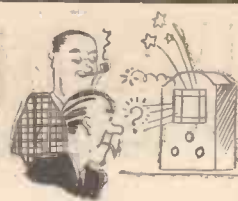
Meetings are held at No. 3, Dix's Field, Exeter, and those who desire to become members should apply to the Hon. Secretary, Mr. W. J. Ching, of 9, Sivell Place, Heavitree, Exeter.

Swindon and District Short-wave Society

ON March 18th a visit was paid by this society to the Swindon Telephone Exchange, where a very instructive evening was spent. The guide was Mr. Griffiths, of the Post Office staff, whose ability and courtesy added greatly to ensure an interesting evening. On Sunday, the 21st, the society visited the short-wave station G6LM, owned by Mr. R. A. Hiscocks, of Chippenham, who is a vice-president of the society. Great interest was taken in the gear, which was explained stage by stage by Mr. Hiscocks.—Hon. Sec., W. C. Barnes, 7, Surrey Road, Swindon.

(Continued on page 92)

Cried Smithson, "What's this that I've got? Is it Mars, or Australia, or what?" But his pal merely said, "You've got crackle, instead Of the Fluxite your wiring did not!"



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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).

JVN, Tokio

SIR,—While listening to a programme from JVN, Tokio, recently, the information was broadcast that from March 10th, JVN programmes would be radiated on 27.93 metres and 25.40 metres simultaneously.—S. PAVITT (Barnsbury).

Correspondent Wanted

SIR,—I have not seen a log of short-wave stations from North Wales, so I submit mine.

I have logged (and verified in most cases) W3XAL (16 m.), W8XK (19 m.), W2XAD, W8XK (25 m.), W1XAL, PMN, W3XAU, VK2ME, W2XAF, PRF5, JVP and W3XAL (50 m.) and, of course, most of the European S.W. stations and amateurs.

I would be very pleased to get in touch with any North Wales reader of PRACTICAL AND AMATEUR WIRELESS interested in S.W. listening.—NORMAN IVERS (18A, Cocdyfelin Road, Brymbo, Wrexham, North Wales).

Tax and Pirates

SIR,—Thermon suggests another tax on wireless sets. Don't you think a better round up of wireless pirates which must run into thousands, is a much better idea? Why has the Post Office not entertained the idea of publishing the names and addresses of all wireless licence holders in book or poster form, and displaying same in Post Offices for the inspection of the public. The pirates would soon pay up, rather than be found out by their neighbours.—J. L. (Renfrew).

[The P.O. could never publish an up-to-date list, as new licences are being issued daily. Also, should they omit a name, they could be sued for damage.—Ed.]

Blueprint Wanted

A READER is anxious to obtain a copy of the blueprint for the "Luxus" Superhet. Will any reader who has one of these blueprints to spare kindly forward it to the address given below?

Back Numbers Wanted

A NOTHER reader urgently requires copies of PRACTICAL AND AMATEUR WIRELESS dated September 24th, 1932, and October 1st, 1932. Any reader having these copies to spare is asked to send them along to our office at Tower House, Southampton Street, Strand, London, W.C.2.

A Reader's Thanks

SIR,—Some time ago I wrote to you to ask if you could supply a circuit for the British Radiophone Band-pass Tuning Pack, and you were kind enough to insert a note in a recent issue. One of your readers, noticing the inquiry, has been kind enough to send me the circuit for above, but I have mislaid it, including the sender's address, and what is worrying me is that I can't thank the sender for his kindness, and forward him his stamp. However,

I herewith tender him my thanks, and should I recover his address I will write him.—A. MAITLAND (Newcastle-on-Tyne).

Transmissions from W2XAD

SIR,—It may interest some readers to know that W2XAD has increased its period of transmission to 11 p.m. (G.M.T.) every day except Tuesdays, when it is on until midnight. This is so that listeners may hear the "Mail Bag," broadcast each Tuesday at 11.35 p.m., from both W2XAD and W2XAF.

Reports of reception of these stations are appreciated, and should be addressed to General Electric Company, 1, River Road, Schenectady, New York, U.S.A. These reports should give carrier strength, fading, interference, noise (not man-made), and overall merit.—S. JANES (Croydon).

A Log from South Birmingham

SIR,—I am very interested in your Readers' Letters column, particularly logs; but have not seen any from Birmingham (South).

On March 21st, from 19.30 to 19.55, I was listening on the 28 mc/s band and logged the following stations: W8CFG R8, W3GIZ R9, W2JAP R5, W2DNG R7, W2IPI R6, W1AA R8, WTW R9, W2IBU

CUT THIS OUT EACH WEEK

Do you know

—THAT selenium as used in the simple light-sensitive apparatus is insoluble.

—THAT a plug-in coil of large size makes a good temporary H.F. choke, but has an extensive field and must therefore be used with care.

—THAT an insulated earth lead will often enable various erratic tuning effects to be removed.

—THAT in some cases of severe electrical interference it is desirable to screen the leads to the interference-suppressing device.

—THAT a doublet-aerial system may be coupled to an existing receiver by winding a small coupling coil for the purpose.

—THAT the frequency response of an L.F. transformer is modified by connecting a resistance across the secondary winding.

—THAT in view of the above fact, some care is necessary when choosing a volume control for use in conjunction with a transformer-coupled L.F. stage.

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

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

R6, W2JIT R8, W3ZX R8, W2JFZ R8, W2KBO R7, W8HSP R7, W2IBU R6, W8QDW R8, RU9BZ R8, G2AK R9.

All loudspeaker signals, and received during twenty-five minutes' listening.

My receiver is a straight four, mains operated, with a one-valve converter.

My aerial is a dipole (self-constructed) 17ft. and 43ft., 50ft. twisted lead, no matching transformers, 30ft. high and pointing N. and S.—W. ROSS THOMPSON (Birmingham).

RADIO CLUBS AND SOCIETIES.

(Continued from page 91)

The Deptford Men's Institute Short-wave Club

WITH the coming of Easter the club concluded a period during which there has been a welcome increase of new members.

A recent event was a visit to "Magnet House," Kingsway, London, W.C.1, by courtesy of the G.E.C., to witness a demonstration of a modern television receiver. This visit was much enjoyed by all, and the demonstration was most successful.

The transmitting members of the club have now practically completed the short-wave transmitter which will shortly undergo its first tests.

The club reopened after Easter at 8 p.m. on Tuesday, April 6th, at the Deptford Men's Institute, Clyde Street, S.E.8. The fee is 1s. 3d. per term, and a buffet is available during each meeting. All inquiries should be addressed to the Hon. Sec., at the above address.

Sutton-in-Ashfield Radio Society

MEETINGS of this society are held on Sunday mornings from 10.30 a.m. to 1.30 p.m., at Toc H Room, Sutton. Herewith is a list of present officials, which are elected annually:—

Chairman, S. Stanley (G8GO), 15, Pelham Street, Sutton-in-Ashfield, Notts.

Vice-chairman, A. Marriott, 29, Columbia Avenue, Sutton-in-Ashfield, Notts.

Secretary, A. W. Fowler (2AAW), 78, Kirkby Road, Sutton-in-Ashfield.

Treasurer, R. H. Dove (2ADO), 10, Welbeck Street, Sutton-in-Ashfield, Notts.

Technician, J. Spragg (B.R.S. 2777), 22, Church Street, Sutton-in-Ashfield, Notts.

All communications to the Secretary, Sutton-in-Ashfield District Radio Society, c/o Toc H, Low Street, Sutton-in-Ashfield.

Halifax Experimental Radio Society

THIS society is open for lecturers, trade or otherwise, and the secretary will be glad to hear from anyone in or about the district who would be prepared to give a lecture.

The following is a list of officials of this society:—

Chairman, H. Crewe (G8CB), Simpson Street, Boothtown, Halifax.

Secretary, J. B. Bedford, Oak House, Triangle, Nr. Halifax.

Assistant-Secretary, W. Milner (2CKH), 23, Ovenden Road Terrace, Lee Mount, Halifax.

Treasurer, D. Ambler, 17, Ovenden Road Terrace, Lee Mount, Halifax.

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BRIEF RADIO BIOGRAPHIES—5

By RUTH MASCHWITZ

Walter Widdop

Walter Widdop, the tenor, who has broadcast since the Savoy Hill days, is a Lancashire man, and began his career as a member of the Bradford Dyers' Association. He was always singing, but when the organist who was arranging the local Sunday-school concert asked him to take part, Walter replied that he couldn't. "Tha can, and tha doesn't know it," was the response, and so Walter made his first public appearance as a singer. Unfortunately, he forgot that there was a second part to the programme, and never reappeared after the interval.

However, he began to study with William Hinchcliffe, of Halifax, and entered for musical competitions with some success. After seven years he decided to give up his work in the dye house and try out his luck in London as a singer. He joined the British National Opera Company, for which he has played innumerable rôles, and he has toured England, the States, Spain, Holland, Germany, and Australia.

He tells an amusing story of an incident that happened in Edinburgh. Exhausted by a long journey, he retired to bed before going to the theatre, and at 6.55 was awakened by the telephone bell. The performance was due to begin at 7. Walter threw on an overcoat, dashed into a taxi and reached the theatre in five minutes. He was playing the part of Siegfried and usually made up his legs with a rich brown colour, but his dresser, knowing there was not a moment to be lost, had borrowed a pair of tights. Walter leapt into them, hurried into his clothes, and was hustled on to the stage. Unfortunately, the tights were white and full of darns, and when the leading lady came on she thought his legs were covered with warts, and burst into giggles!

On another occasion, Walter was travelling up north to play Tristan, his lyre placed in the rack above his head. A curious fellow traveller was anxious to find out Walter's business, and after various tentative questions, asked where he was going.

"To Heaven," said Walter, and pointed to the rack. "That's why I've got my harp!"

TELEVISION LECTURES

A SHORT course of six lecture-demonstrations on Television will be given by H. J. Barton-Chapple, B.Sc (Hons., Lond.), etc., on Wednesdays at 8.0 p.m., commencing on April 14th, 1937, at the Norwood Technical Institute. The fee is 5s.

Outline Syllabus:—

April 14th.—Scanning methods and devices. Practical details of transmitting equipment.

April 21st.—Nature of generated signal. Ultra-short waves.

April 28th.—Channels and filters. Light modulation methods.

May 5th.—Cathode-ray tubes. Auxiliary equipment. Synchronising.

May 19th.—Television receivers. Installation problems. Recognising faults.

May 26th.—Electron multipliers. Big screen television. Special applications.

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.

M. B. (Rochdale). The set is a short-wave set. Do you mean that you wish to include higher wavelengths? If so, ordinary plug-in coils may be used for the purpose.

G. W. W. (S.E.4). An ordinary grid-leak is used. Alternatively, a 1-watt type resistor may be employed.

G. H. (Grantham). The coil is supplied by the British General Manufacturing Co., Ltd., Brockley Works, Brockley, S.E.4.

R. T. W. (Holbrook). We have no blueprint which utilises the parts named in your letter.

G. H. T. (Wickham Market). We think the contacts must be dirty, and a high-resistance contact is set up. This would cause the trouble, although we have not before experienced it.

F. F. (Redcliffe). We cannot identify the set and therefore hesitate to recommend new valves and modifications. A good local radio dealer may be able to help you.

H. C. H. (Edinburgh, 6). 22 D.C.C. wire will be suitable. Impedance will depend upon number of turns. An R.C. stage should be quite satisfactory but will not fully load the output stage.

T. W. S. (Northumberland). There is no receiver in our blueprint list which answers your requirements.

J. V. (Limerick). The connections are quite in order, but you have not indicated the directions of the windings on the reaction coil, and this may be wound in the wrong direction. The H.T. applied is critical.

W. B. (Liverpool 10). We cannot give definite information in the absence of constructional data, but 1,000 ohms will pass a current of 1 mA. per volt.

E. L. N. (E.2). The reader in question has been supplied by another reader, but we thank you for your offer. We regret that we have no data of the coils in question and you should communicate direct with the makers.

W. J. A. C. (Immingham). The ranges are 14.4 to 40, 32 to 90, 200 to 550, and 900 to 2,000 metres. The set is very sensitive for a one-valve and selectivity is governed by the coil design. This is adequate for the type of receiver which is embraced.

W. B. S. (Glackmannan). The book in question may now be purchased, the price being 5s. or 5s. 6d. by post from this address.

R. J. B. (N.16). You cannot reduce the reading, but may increase it by series and parallel resistances.

R. M. (Grangemouth). The circuit is quite in order, and if your voltages and aerial-earth system are correct, then the trouble must be due to operation. Short-wave receivers require careful handling, and tuning is very sharp.

S. W. D. C. (S.E.9). We regret to note your trouble, but think there must be some defect in the receiver. In these circumstances we do not recommend another make of transformer, but suggest that you check the wiring carefully.

A. G. C. (Reading). The receiver will have to be decoupled, and for a start we suggest you decouple the detector stage. Much depends upon the make and circuit details of the eliminator or mains unit. You can adopt the G.B. connections mentioned.

J. D. H. (Hawick). We regret that we cannot recommend a blueprint for the conversion mentioned. We cannot identify the coils and do not think they would be suitable for this particular set.

J. T. A. (Grimby). We do not know of any book dealing with the subject.

K. H. (Leicester). We cannot prepare diagrams to reader's individual requirements, and we have no blueprint which meets your needs. We have no details of the coil you mention.

G. P. M. (Edinburgh, 10). It is not possible to give the winding data. The transformer would have to be put on load and tested with good instruments as the windings are not identified. A good local radio dealer should be able to do this for you.

F. H. B. (S.E.20). The terms mean, roughly, the degree of amplification, the degree of separation between adjacent stations and the proneness to burst into oscillation at various settings of the dial. The latter should not be confused with reaction, and is due to poor design, wrong voltages, or defective components.

F. C. (Alexandria, Dum.). The set, being more sensitive, will naturally pick up more interference than a less sensitive set. The type of set surrounding you will not affect results, and, if anything, will demand that you use a set of the type mentioned.

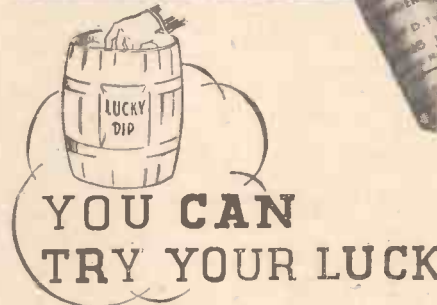
J. C. W. (Wembley). The trouble should not occur at your address. Can you give further particulars, as you may be mistaking the trouble for something else?

W. M. (Normanton). The details do not come within the scope of our query service. Messrs. Pitman may be able to supply some books on the subject.

G. J. (Cardiff). We regret that we cannot give details for the conversion. We have no blueprints of a suitable converter.

B. S. (Torquay). The book is obtainable from F. L. Postlethwaite, 41, Kinfawns Road, Goodmayes, Ilford, Essex, price 5s. 3d. post free.

F. N. (Gloucester). Regulate the charging rate for the smallest cell, in your case 1 amp. Build the automatic sender recently described, or that shown in this week's wrinkles page.



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PRACTICAL WIRELESS.		No. of
Date of Issue.	Blueprint	
CRYSTAL SETS.		
Blueprint, 6d.		
1937 Crystal Receiver	9.1.37	PW71
STRAIGHT SETS. Battery Operated.		
One-valve: Blueprint, 1s.		
All-wave Unipen (Pentode)		PW31A
Two-valve: Blueprint, 1s.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
Three-valve: Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (Trans.))		PW10
Sixty Shilling Three (D, 2LF (RC & Trans))		PW34A
Leader Three (SG, D, Pow)		PW35
Summit Three (HF Pen, D, Pen)	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow)		PW41
Hall-Mark Cadet (D, LF, Pen (RC))	10.3.35	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)	17.8.35	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)		PW64
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	20.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36	PW72
Four-valve: Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)		PW11
Beta Universal Four (SG, D, LF, Cl. B)		PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)		PW34C
Battery Hall-Mark 4 (HF, Pen, D, Push-Pull)		PW40
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)		PW18
A.C.-D.C. Two (SG, Pow)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow)		PW10
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)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (RC))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)		PW56
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70
Four-valve: Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)		PW20
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)		PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47
SUPERHETS.		
Battery Sets: Blueprints, 1s. each.		
£5 Superhet (Three Valve)		PW40
F. J. Camm's 2-valve Superhet Two-Valve	13.7.35	PW52
F. J. Camm's £4 Superhet		PW53
F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37	PW75
Mains Sets: Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve)		PW43
D.C. £5 Superhet (Three-valve)	1.12.34	PW42
Universal £5 Superhet (Three valve)		PW44
F. J. Camm's A.C. £4 Superhet 4		PW59
F. J. Camm's Universal £4 Superhet 4		PW60
"Qualitone" Universal Four	16.1.37	PW73
SHORT-WAVE SETS.		
Two-valve: Blueprint, 1s.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A

Three-valve: Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow)		PW30A
The Prefect 3 (D, 2 LF (RC and Trans))		PW63
The Bandspread S.W. Three (HF Pen, D (Pen), Pen)	20.8.36	PW68
"Tele-Cent" S.W.3 (SG, D (SG), Pen)	30.1.37	PW74
PORTABLES.		
Three-valve: Blueprint, 1s.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36	PW65
Four-valve: Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B)		PW12
MISCELLANEOUS.		
S.W. Converter-Adapter (1 valve)		PW48A
AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.		
Blueprints, 6d. each.		
Four-station Crystal Set	12.12.36	AW427
1934 Crystal Set		AW444
150-mile Crystal Set		AW450
STRAIGHT SETS. Battery Operated.		
One-valve: Blueprints, 1s. each.		
B.B.C. Special One-valver		AW397
Twenty-station Loudspeaker One-valver (Class B)		AW440
Two-valve: Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)		AW388
Full-volume Two (SG det. Pen)		AW392
B.B.C. National Two with Lucerne Coil (D, Trans)		AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)		AW388A
Lucerne Minor (D, Pen)		AW426
A Modern Two-valver	July '36	WM409
Three-valve: Blueprints, 1s. each.		
Class B Three (D, Trans, Class B)		AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-built Coil Three (SG, D, Trans)		AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher; Baseboard Model (SG, D, Pen)		AW417
1934 Ether Searcher; Chassis Model (SG, D, Pen)		AW419
Lucerne Ranger (SG, D, Trans)		AW422
Coscor Melody Maker with Lucerne Coils		AW423
Mullard Master Three with Lucerne Coils		AW424
£5 5s. Three; De Luxe Version (SG, D, Trans)	10.5.34	AW435
Lucerne Straight Three (D, RC, Trans)		AW437
All-Britain Three (HF Pen, D, Pen)		AW443
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)		WM271
£6 6s. Radiogram (D, RC, Trans)		WM318
Simple-tune Three (SG, D, Pen)	June '33	WM327
Economy-Pentode Three (SG, D, Pen)	Oct. '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)		WM351
£3 3s. Three (SG, D, Trans)	Mar. '34	WM354
Iron-core Band-pass Three (SG, D, QP 21)	June '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)		WM371
PTP Three (Pen, D, Pen)	June '35	WM398
Certainty Three (SG, D, Pen)	Sept. '35	WM393
Mintube Three (SG, D, Trans)	Oct. '35	WM396
All-wave Winning Three (SG, D, Pen)	Dec. '35	WM400
Four-valve: Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans)		AW370
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2 SG, D, Pen)		AW421
Crusaders' A.V.C. 4 (2 HF, D, QP 21)	18.8.34	AW445
(Pentode and Class B Outputs for above: Blueprints, 6d. each)	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B)	Aug. '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)		WM350
£5 5s. Battery Four (HF, D, 2LF)	Feb. '35	WM381
The H.K. four (SG, SG, D, Pen)	Mar. '35	WM334
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	April '36	WM401
Five-valve: Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)	May '33	WM322
Class B Quadradynic (2 SG, D, LF, Class B)	Dec. '33	WM344
New Class-B Five (2SG, D, LF, Class B)	Nov. '33	WM340
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.		AW403

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

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

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

Economy A.C. Two (D, Trans) A.C.		WM286
Unicorn A.C./D.C. Two (D, Pen)	Sept. '35	WM394
Three-valve: Blueprints, 1s. each.		
Home-Lover's New All-electric Three (SG, D, Trans) A.C.		AW383
S.G. Three (SG, D, Pen) A.C.		AW390
A.C. Triodyne (SG, D, Pen) A.C.	10.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.0.34	AW439
Mantovani A.C. Three (HF Pen, D, Pen) A.C.		WM374
£15 15s. A.C. Radiogram (HF, D, Pen)	Jan. '36	WM401
Four-valve: Blueprints, 1s. 6d. each.		
All-Metal Four (2 SG, D, Pen)	July '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	May '35	WM386
SUPERHETS.		
Battery Sets: Blueprints, 1s. 6d. each.		
Modern Super Senior		WM375
Varsity Four	Oct. '35	WM395
The Request All-Waver	June '36	WM407
1935 Super Five Battery (Superhet)		WM379
Mains Sets: Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.		AW425
Heptode Super Three A.C.	May '34	WM359
"W.M." Radiogram Super A.C.		WM366
1935 A.C. Stenode	Apr. '35	WM385
PORTABLES.		
Four-valve: Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW390
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
TWO H.F. Portable (2 SG, D, QP21)	June '34	WM363
Tyers Portable (SG, D, 2 Trans)		WM367
SHORT-WAVE SETS—Battery Operated.		
One-valve: Blueprints, 1s. each.		
S.W. One-valver converter (Price 6d.)		AW329
S.W. One-valve for America	23.1.37	AW420
Rome Short-Waver		AW452
Two-valve: Blueprints, 1s. each.		
Ultra-short Battery Two (SG det., Pen)	Feb. '36	WM402
Home-made Coil Two (D, Pen)		AW440
Three-valve: Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)		AW355
Experimenter's 5-metre Set (D, Trans, Super-gen)	30.6.34	AW438
Experimenter's Short-wave (SG, D, Pen)	Jan. 19, '35	AW463
The Carrier Short-waver (SG, D, P)	July '35	WM390
Four-valve: Blueprints, 1s. 6d. each.		
A. W. Short-Wave World-Beater (HF Pen, D, RC, Trans)		AW436
Empire Short-waver (SG, D, RC, Trans)		WM313
Standard Four-valver Short-waver (SG, D, LF, P)	Mar. '35	WM383
Superhet: Blueprint, 1s. 6d.		
Simplified Short-waver Super	Nov. '35	WM397
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Two-valve Mains short-waver (D, Pen) A.C.		AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.		WM368
"W.M." Long-wave Converter		WM380
Three-valve: Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.		WM352
Four-valve: Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35	WM391
MISCELLANEOUS.		
Enthusiast's Power Amplifier (170)	June, '35	WM387
Listener's 5-watt A.C. Amplifier (1/0)	Sept. '35	WM392
Radio Unit (2v.) for WM392	Nov. '35	WM398
Harris Electrogram (battery amplifier) (1/-)	Dec. '35	WM399
De-Luxe Concert A.C. Electrogram	Mar. '36	WM403
New Style Short-waver Adapter (1/-)	June '35	WM388
Trickle Charger (6d.)	Jan. 5, '35	AW462
Short-wave Adapter (1/-)	Dec. 1, '34	AW456
Superhet Converter (1/-)	Dec. 1, '34	AW457
B.L.D.L.C. Short-wave Converter (1/-)	May, '36	WM405
Wilson Tone Master (1/-)	June '36	WM403
The W.M. A.C. Short-Wave Converter (1/-)	July '36	WM403



QUERIES and ENQUIRIES

Converting to All-wave

"I own a 3-valve battery set, and am anxious to know if it is possible to combine short-wave components with the set and make it a 3-wave set. I have noticed several short-wave sets in your Blueprint Service that may answer my question, but being an absolute beginner I cannot tell."—H. H. (Leeds).

It is possible to remove the present tuning circuits and replace them by "all-wave tuners." This may, however, necessitate replacing some of the components by those designed to give highest efficiency on the short waves, and the general design of the receiver may be such that maximum efficiency will not be obtained on short waves. Therefore, the simplest solution to your problem is to make up a short-wave adaptor or converter, the latter if the receiver utilises an H.F. stage. This will enable you to cover the short waves in addition to the broadcast bands, and will be simplest to build and operate. Blueprint PW48A, describes a suitable unit which may be used for A.C. apparatus should you eventually change over to this form of operation.

QSL Cards

"I have just built my first short waver, and up to now have had satisfactory results. Being a newcomer, however, I do not know to which stations to send for cards. I would be grateful if you would tell me the type of stations one sends to, and how to send."—G. E. L. (Northenden).

THE amateur transmitters in all countries make a feature of their QSL cards, but certain broadcasting stations abroad also have a printed verification card carrying details of the station. As you may have seen in our correspondence columns, however, there is not always a ready response to the amateur who sends details of a transmission, and unless you can supply the transmitter with very full details of his signals, giving all important data such as weather conditions, fading, your aerial and receiver arrangements, etc., he will not be justified in sending a QSL card. A list of amateur station addresses will be found in the Radio Amateur Call Book, obtainable from F. L. Postlethwaite, 41, Kinfauns Road, Goodmayes, Ilford, Essex, price 5s. 3d. post free.

Class B Valve Connections

"Please can you tell me where I can obtain an ebonite former 3in. by 4in. to use in the 1-valver for America? It must have 6 ribs. Also could you tell me the position of the two grids, the two anodes, and the filament in a Class B valve, and what is the seventh pin for? Is it essential which pin, Grid 1 or Grid 2, you join the different components to?"—G. J. P. (E.11).

THE ebonite former may be obtained from Messrs. Peto Scott. In a Class B valve one pin is unconnected and is, therefore, ignored. The connections, looking down on the valveholders and with the "odd" socket at the top are as follows: The two sockets at the bottom, which are

closer together, are the filaments. Proceeding clockwise the next socket is Anode 1 and the next Grid 1. The top socket (corresponding to the 12 o'clock position on a clock) is Grid 2 and the next Anode 2. The remaining socket is the blank one. It is immaterial which grid you connect to each end of the transformer, but naturally Grid 1 and Grid 2 are the electrodes of one half, and Grid 2 and Anode 2 are the other half.

Service Equipment

"Is the issue of your paper, July 14th, 1934, containing a description of a Signal Generator now available, and does it give

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.

Please note also, that queries must be limited to two per reader, and 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 different department.

If a postal reply is desired, a stamped addressed envelope must be enclosed. 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.

instructions for making the apparatus? I do a good deal of spare-time repairs and service, and feel the need of such gear. Are there any other articles dealing with test gear which would be of use to me? I am a mechanic with tools enough to make apparatus."—R. W. B. (Albourne, Sussex).

THE issue in question is now out of print, but there have since been several articles on the subject of test equipment which should be of use to you. We refer you particularly to the articles entitled "For the Experimenter," which commenced in our issue dated December 28th, 1935, and continued to March 14th, 1936. The latter issue contained the description of an R.F. Oscillator or Signal Generator, and in the series all of the essential equipment for a service engineer was described. Back numbers cost 4d. by post.

Oscillator Coils

"I have some ganged coils at home, and I find that these were intended for use with a pentagrid or heptode circuit. I am now anxious to make up a new circuit in which to use a triode-hexode or combined type of valve and am uncertain whether the coils will be suitable. Perhaps you can advise on this point?"—F. R. (Golders Green).

OSCILLATOR coils specified for a heptode may be used satisfactorily in conjunction with a triode-hexode, and the same coil will generally work with a mains or a battery-type valve. Some manufacturers specify different types for battery and mains valves, however, and in such cases it

is advisable to follow the manufacturer's advice. In the case of the battery-type triode-pentode the valve filament current passes through the reaction winding of the oscillator coil and, therefore, care should be taken to choose a coil having a reaction winding that will pass this current. In the case of the mains triode-pentode, however, it is the anode-cathode current that passes through the reaction winding and, therefore, no special precaution need be taken as this current is very low compared with the filament current passed by the battery type.

International Prefixes

"I have received amateur transmissions and, although I could only hear the English station, I should be interested to know to what countries he was talking. I could not understand all of the talk, but he appeared to speak to some station beginning with 'I' and also with 'CL.' Could you tell me what countries these were?"—G. R. (Penge).

THE initial "I" is adopted for transmitters in Italy, but we cannot trace any prefix CL. We think that, if this was a telephony transmission, the operator said Zee L, the letter Z usually being called Zee as in America.

Short-wave Sets

"Will you please let me know where I can obtain a copy of the 'Q' code. I would also like to know if you can supply me with a blue-print or circuit diagram of an ultra-short-wave receiver from 5 to 80 metres, and an U.S.W. transmitter covering 5 to 20 metres."—J. S. McF. (Liverpool, 5).

THE "Q" code will be found in one of the R.S.G.B. publications, and also in the *Radio Telegraphists' Handbook* obtainable from His Majesty's Stationery Office, Kingsway, W.C.2. There is also a special edition of the "Q" code with especial reference to aircraft radio operation, which may be obtained from the same source. The "Tele-Cent" S.W.3, blueprint PW74 is the only receiver we can recommend in respect of your second request, and we have no blueprints of transmitters of any type.

H.T. Output

"I would like to know the answer to the following problem. I have a metal rectifier (H.T.8) that gives a current output of 60 mA. Will this output remain constant, i.e., what will the current output be, when using two valves taking 14 and 36 mA. (40 in all)?"—J. W. P. (Pontefract).

WE presume that your query relates to the voltage and not to the current, as this is determined by the valves in use. The voltage regulation curves of the metal rectifier, as well as of a valve rectifier, show that the voltage is dependent to a certain extent upon the current. Thus, the H.T.8, when fed from a transformer delivering 200 volts, will give approximately 275 volts at 60. milliamps, but if only 15 mA are taken the voltage output will rise to nearly 500. This will depend, of course, upon the characteristics of the transformer, and also upon the chokes and other impedances connected in the output circuit. Therefore, if your valves take 40 milliamps in all, the average voltage output will probably be in the neighbourhood of 375 volts, assuming a standard-type smoothing choke with a D.C. resistance of 500 ohms or so.

The coupon on Cover iii must be attached to every query.

Miscellaneous Advertisements

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

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

RADIOMART
SHORT-WAVE SPECIALISTS
Announce 1937
SHORT-WAVE MANUAL

Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aerials, Class B amplifications, neutralizations, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free, 7½d. including catalogue.

1937 Short-wave Catalogue only (3 times enlarged) price 1½d., post free.

TELSEN screened dual range coils, switched, 2/11 each. Pair 5/3. Milliammeters, 25 ma. upwards, 5/9. Super, 6/9.

AMERICAN mains transformers 230v. fully shrouded, 350/350, 6.3v., 5v., 6/11. Majestic 250/250, 2.5v., 5v., 4/11.

HEAVY DUTY mains transformer worth 35/-, 350/350. 150 ma.; 4v. 2.5ACT., 4v. GACT., 12/6. 465 KC/S., IF transformers, 3/11. Telsen Ace, 1/11. Telsen HF chokes, 1/11.

BBRITISH RADIOPHONE straight line wavelength scale, 2/11. Centralab pots, all sizes, 1/6; switched, 2/-.

UTILITY 2-gang unlknob and dial, 3/11; 1,500-volt tubular condensers, all sizes, 6d.

ELECTROLYTICS 500-volt 8 mf., 1/6; 4 mf., 1/6; 4 x 4, 1/11; 8 x 8, 3/6; 25 mf., 2s. v., 1/-, etc.

SMOOTHING chokes, 20 hy. 120 ma., 3/11; 100 ma., 2/11; 40 ma., 1/11.

PUSHBACK Wire, 6yds., 6d., heavy 9d. Resincore solder, 6ft. 6d.; tubular glass fuses, 2d.

ROLA 7in. PM speakers, 15/6; KB, 1,500-ohm 7in. MC speakers, less transformers, 4/11.

SPECIAL OFFER Class B valve, driver transformer and valveholder, new, lot 5/-.

TRADERS' monster bargain parcels, value £4/10/-, for 10/-; also 5/- parcels.

FAMOUS Continental A.C. valves, 4/6; American Duotron, etc., all types, 3/6; battery from 2/3.

UTILITY 8/6, microdisc dials, 3/11; Radiophone, 0.00016 short-wave condensers, 3/6; series gap, twin, 3/9.

CERAMIC all brass microvariables, 15 mmfd., 1/4; 40 mmfd., 1/7; 100 mmfd., 1/10; short-wave H.F.C., 9d.

CLEARANCE catalogue 11d. Goods over 5/- post free. All enquirers must send stamp. Branches: 19, John Bright Street, 44, Dale End. Mail Orders, 44, Holloway Head, Birmingham. Telephone: MID 3254.

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

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

ALL lines advertised last week still available.

RADIO CLEARANCE, 63, HIGH HOLBORN, W.C.1. Tel.: Holborn 4631.

BANKRUPT Bargains. List free. All new goods. 1937 Decca 6v. A.C. Radiograms, 12 gns. 1937 Decca A.C. 6v. Superhets, £6/10/0. Burndept midget battery portables, listed £5/18/6, for £3/17/6. Battery 3v. All-waver M.C. speaker and valves, £3/10/6. Lotus 4v. AC-DC, 75/-, Pilot, Ferguson and Truphonic all-wavers, 1937 models. Trade supplied. Large stock valves, speakers and components. Keenest prices.—Butlin, 6, Stanford Avenue, Brighton.

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All goods guaranteed perfect; carr. paid over 5/-; under 5/- postage 6d. extra.

ALL POST ORDERS TO JUBILEE WORKS, 167, LOWER CLAPTON RD., LONDON, E.5. 'Phone: Amherst 4723.

CALLERS, AS USUAL, TO 165 & 165a, FLEET ST., E.C.4 (Next door to Anderson's Hotel). Central 2833. New Branch: 50, HIGH ST., CLAPHAM, S.W.4j (Macaulay 2381).

Have you had our GIANT ILLUSTRATED CATALOGUE AND VALVE LIST? Send 4d. IN STAMPS FOR THIS BARGAIN LIST.

SHORT-WAVE COILS, 4- and 6-pn types, 13-99, 22-47, 47-94, 78-170 metres, 1/9 each, with circuit. Special set of 3 R.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 2-band S.W. Coil, 11-25, 19-43, 33-86 metres. Simplified S.W. receiver construction, suitable any type circuit, 2/6. **COIL FORMERS**, in finest plastic material, 11in. low-loss ribbed, 4- or 6-pn, 1/- each.

SUPER CERAMIC CONDENSERS, S. L. P., .00016, .0001, 2/9 each; double-spaced, .00003, .000025, .000015, 3/- each. All brass with integral slow motion, .00015 tuning, 3/9; .00016 reaction, 2/9. S.W. H.F. CHOKES, 9d.

MAINS VALVES, famous Europa 4 v. A.C. types, 4/6 each. H.L.L., L., S.G., Var.-Mu-S.G., H.F. Pens., Var.-Mu-H.F. Pens., 1; 3 and 4-watt A.C. directly heated output Pentodes. Full-wave rectifiers, 250 v. 60 m.a. A.C./D.C. types, 20-volt, .18 amp. S.G., Var.-Mu-S.G., H. H.L.L., Power and Pen. Following types all 5/6 each. Full-wave rectifiers, 350 v. 120 m.a. and 500 v. 120 m.a. 2½ watt indirectly-heated Pentodes, Octodes, Frequency Changers.

BATTERY VALVES, 2 volts. H.F., L.F., 2/3. Power, Super-Power, 2/9. S.G., Var.-Mu-S.G., 4- or 5-pn Pentodes, H.F. Pens., V.-Mu-H.F. Pens., 5/- Class B, 3/6.

AMERICAN VALVES. Genuine American HYTRON and TRIAD first-grade valves. 3 months' guarantee. All types in stock, 5/6 each. 210 and 250, 8/6 each. New Metal-Glass Valves, all types, 6/8 each. Genuine American DUOTRON Valves, all types, 2/6 each. Valve holders for all above types, 6d. each. Metal bases, 9d. each.

3-WATT A.C. AMPLIFIER, 2-stage for mike or pick-up. Complete kit of parts with 3 valves, 40/-.

7-WATT A.C./D.C. AMPLIFIER, 3-stage high-gain, push-pull output. Complete kit of parts with 5 specially matched valves, 24 4s.

COSMOCORD PICK-UPS, with tonearm and volume control, 10/6 each. **PICK-UP HEADS** only, 4/6 each.

PREMIER MAINS TRANSFORMERS, wire-end type with screened primaries, tapped 200-250 v. Centre-tapped Pilaments. Guaranteed one year. H.T. 8 & 9 or H.T. 10 with 4 v. A.C. CT. and 4 v. 1a. C.T., 8/6. 250-250 v. 60 m.a., 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 8/6. 350-350 v. 120 m.a. 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 10/6. Any of these transformers with engraved panel and N.P. terminals 1/6 extra. 500-500 v. 150 m.a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 2-3 a., all C.T., 17/6. **SPECIAL OFFER PHILIPS MAINS TRANSFORMERS**, 200-250 v. or 300-350 v. at 80 m.a., 4 v. 2 a., C.T., 4 v. 1 a. Tapped Primary 100-250 volts, 6/11. 450-450 v. at 150 m.a. or 500-500 v. 100 m.a., 4 v. 4 a. C.T., 4 v. 4 a. and 4 v. 3 a. Screened Primary. Tapped input 100-250 v., 12/6. **AUTO TRANSFORMERS**, step up or down, 60 watts, 7/8; 100 watts, 10/-. **SMOOTHING CHOKES**, 25 m.a., 2/9; 40 m.a., 4/-; 60 m.a., 5/6; 150 m.a., 10/6. 2,500 ohms, 60 m.a. Speaker Replacement Chokes, 5/6.

Electric SOLDERING IRONS, 200-250 v., A.C./D.C., 2/3. **SPECIAL OFFER. LISSEN TWO-GANG SCREENED ALL-WAVE COILS**, 12 to 2,000 Metres, complete with switching and wiring diagrams, 8/11 per set.

TELSEN Multi-meters, 50 and 300 m.a., 6, 10 and 240 v., 3/6 each. Reads A.C. and D.C.

MAGNAVOX. Mains energized M.C. Speakers. '154', 7in. cone, 2,500 ohms, 12/6; '152', 9in. cone, 2,500 ohms, 17/6; '153' Magna', 7in. cone, 2,500 ohms, 37/6. Magnavox P.M.s.—'254', 7in. cone, 18/6; '252', 9in. cone, 22/6.

Special Offer ETH Engraved Moving Coils, 10 1/2in. diam. 1,650 ohms field. Power or Pentode transformer (state which), 14/6.

ROLA latest type P.M.s. 15s. **GOODMANS'** 8in. mains energized 1,600 ohm field, 10/6 each; Jensen P.M.s., 10/6. New Celestion Universal Giant P.M. 8 1/2in. diam. Switch to suit any set, 29/6.

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Super Quality lightweight HEADPHONES, 3/9 pair.

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COILS.—Telsen Iron core, W349 (Midget sets), 4/-; type W478 (twin), 9/- pair; type W477 (triple), 16/- per set; type W476 (triple superhet, selector and oscillator), 16/- per set. Telsen short-wave coils, matched set of three, 4-pn bases, 12-26, 22-47, 41-94 metres, 5/- per set; Telsen dual range H.F. transformer and aerial coils, type W154, 3/- each; all ganged coils complete on base with switch; Telsen I.F. transformer coils, 110 kc/s, 5/-; Telsen dual range coils, with aerial series condenser incorporated, type W76, 4/-; Telsen aerial condensers, with shorting switch, 2/-; all Telsen components brand new, in sealed cartons.

AMERICAN Valves.—A full range of valves for all American receivers; 6/- each.

MISCELLANEOUS Bargains.—All brand new, in original sealed cartons: Telsen A.C./D.C. millimeters, test anything, radio or electrical, 8/6; Telsen 2-range voltmeters, 3/-; 3-range meters, including milliamps, 4/-; Ace (P.O.) microphones, with transformer, ready for use with any receiver, 4/6; Bell transformers, 200-250 volts input, 3, 5, or 8 volts output, 3/6; Morse signal units, incorporating buzzer, tapper and flash, with international code, complete with batteries and bulb, 3/9 each; Marconi 24 and Q type valves, useful for short-wave experiments, 1/8; lightweight headphones, double-pole, 4,000 ohms each earpiece, 3/- pair.

REGENTONE Eliminators, A.C. 200-250 volts, type W5a, with trickle charger, 37/6.

SOUTHERN RADIO.—Branches at 271-275, High Rd., Willesden Green, N.W.10; 46, Lisle St., London, W.C.2. All mail orders to 323, Euston Rd., London, N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). 'Phone: Euston 3775.

VAUXHALL.—Polar Midget 3-gang condensers, straight or superhet, 8/0; Polar full vision, horizontal or Arcuate dial and drive, 5/-.

VAUXHALL.—Plat. sheet aluminium, hard rolled 18-gauge, 12in. x 12in., 3/-; 18 x 18, 5/6; other sizes proportionate.

VAUXHALL.—Polar station named scales, for horizontal dials, latest settings; 1/9 each.

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VAUXHALL.—Set manufacturers' surplus, skeleton type Westinghouse rectifiers, H.T.S. 9/6; H.T.9, H.T.10, 10/-; complete with fixing brackets.

VAUXHALL.—Clx valveholders, terminals, 5-pn, 7d.; 7-pn, 9d.; baseboard mounting, 5-pn, 4½d., 7-pn, 1/-.

VAUXHALL.—Pushback wire, four colours, 6 yds., 6d. 6BA screws or nuts, 4d. doz.

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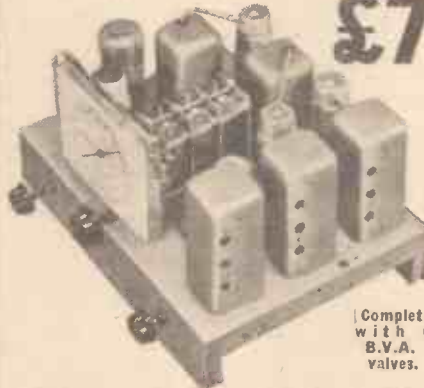
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MCCARTHY

NEW BATTERY ALL-WAVE SUPERHET

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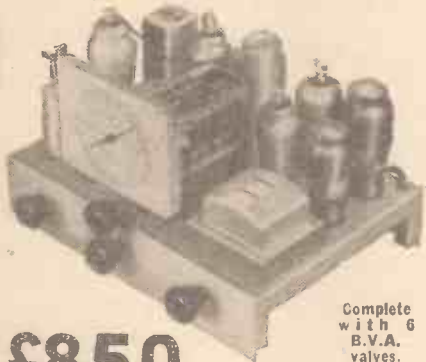


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CIRCUITS FOR PORTABLES—See Page 101

Practical and Amateur Wireless

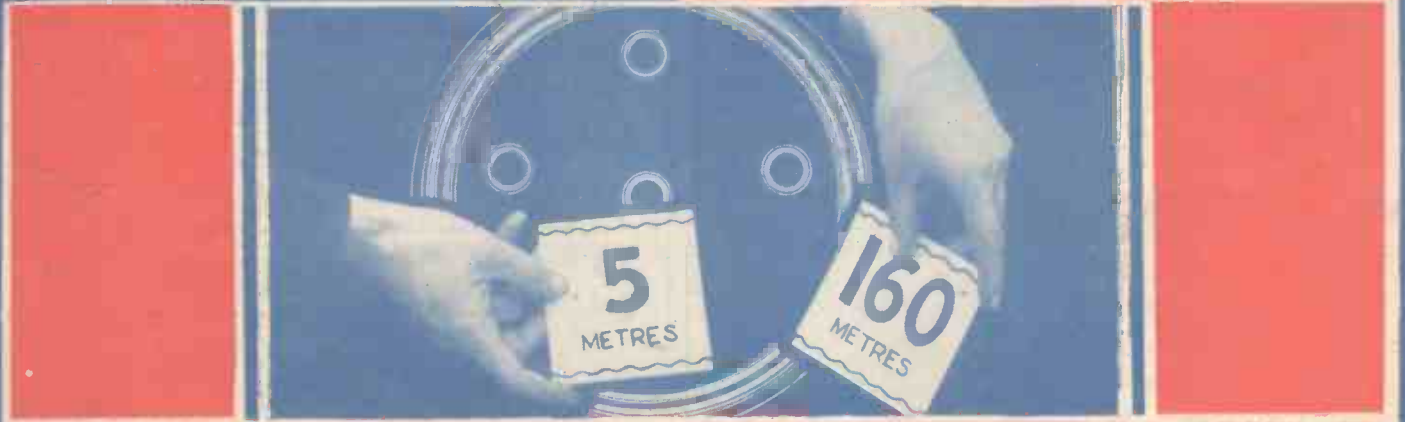
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EVERY
WEDNESDAY

Edited by F.J. CAMM

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Vol. 10. No. 239.
April 17th, 1937.

AND PRACTICAL TELEVISION



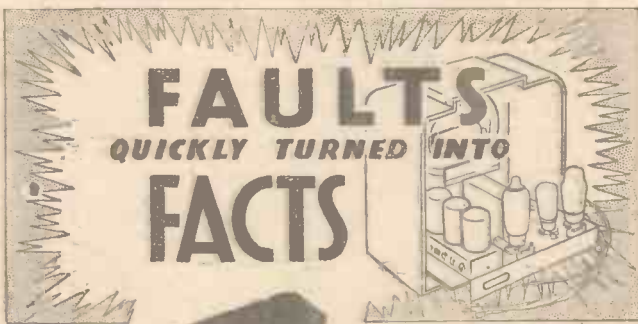
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NEWNES : LONDON

SIMPLIFYING REMOTE CONTROL

See page 99.



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. X. No. 239. April 17th, 1937.

ROUND *the* WORLD of WIRELESS

Summer Conditions

ALTHOUGH it may appear premature to refer to summer conditions in April, there is nevertheless a considerable lengthening of the hours of daylight which may be considered in conjunction with the increasing temperatures of the summer months. The clock will be put forward one hour on Sunday next, and to many listeners this will mean that some of the long-distance stations which they have been hearing will now be more difficult to tune in. This is due to the effects of daylight on certain short-wave signals, and also to the accompaniment of atmospheric which, of course, are not so troublesome during the hours of darkness. When a simple receiver has been in use for the past season, the easiest way out of the difficulty is to build an additional H.F. unit for insertion between the aerial and the set, or a converter as described in our short-wave section this week. With the aid of a unit of this nature, the standard simple set will be rendered as efficient, if not more efficient, than it has been during the winter months, and it possesses the added advantage that it will tune down sufficiently low in the frequency range to enable the B.B.C. television signals to be tuned in, if they are within range. This latter point is of considerable interest, and reports received from various districts show that the originally-estimated range of 25 miles is being exceeded daily, and no matter in what part of the country you reside, you should make some attempt to pick up these signals. There is a wide field of experiment available not only in the receiver itself, but in the aerial systems which may be employed.

Coronation and Rediffusion

IN a recent issue we announced that the B.B.C. had waived the copyright clause on its transmissions during the Coronation ceremony. The B.B.C. is also authorised to make the same statement on behalf of the Earl Marshal and the Performing Right Society. It should be noted, however, that this general permission does not apply to rediffusion along the route by which the Royal Processions will pass on Coronation Day. A further announcement is to be made about this later. It is also interesting to note that no recording of

any kind may be made of the Coronation ceremonies, except by permission of the Earl Marshal.

An Automatic Sorter

THE Erie Resistor Company have just installed an ingenious machine at their Hendon works. This remarkable piece of apparatus is fed with resistors as they come from the manufacturing department, and it automatically sorts them out according to their value and delivers them into appropriate troughs for packing. It is adjustable so that

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various tolerances may be adopted according to the work in hand.

New York Radio Show

THE first exhibition of the Radio Parts Manufacturers' National Radio Show takes place this year from June 10th to 13th at the Stevens Hotel in Chicago. Radio appears to be gaining in popularity in the U.S.A., and it is announced that over 100 booths have already been reserved, and it is now anticipated that the hall may prove inadequate to accommodate all those who desire to exhibit their products.

In a Gondola

TO replace the popular feature entitled "The Table under the Tree," the B.B.C. are commencing in June a feature entitled "In a Gondola." The programme is described as an outside broadcast, and the artists are to journey along the Venetian canals in a mythical gondola. Bill Hanson is producing the programme and Wilfrid Rooke Ley is writing the book.

Legislation and Interference

AS we go to press we are informed that the P.M.G. may announce in the House of Commons shortly the proposal to introduce legislation to compel users of interfering apparatus to fit suppression devices. This suggestion has already been made in these pages, and it is now becoming such a serious problem that something has got to be done to ensure that listeners can use their receivers at all hours without interference.

Finedon Old Band

THIS well-known Northamptonshire Band, which first broadcast in 1935, will revisit the Midland studio on April 19th, when A. Remington will conduct a popular programme. Finedon Old Band has won County Championships in Northamptonshire and Bedfordshire, and also the Leicester Challenge Shield; it is over 60 years old. In the interludes Noel Hutchcroft (baritone), will sing.

Concert from Bath

THE Bath Pump Room Orchestra, led by Norman Rouse, and conducted by Maurice Miles, will broadcast a concert from the Pump Room, Bath, on April 18th.

Peru Heard in London

Correspondents report hearing broadcasts from OAX4G, Lima, previously on 50 m. (6 mc/s), now on 49.34 m. (6.08 mc/s). The station relays the regular programme of OAX41 in the Peruvian capital. Transmissions have been picked up clearly between G.M.T. 03.00-03.45, but the studio is on the air daily from 00.00-04.30. Announcements are made in both Spanish and English. All reports should be sent to Radio Internacional S.A., Radiodifusora OAX4G, Avenida Abancay, 915, Lima (Peru).

ROUND the WORLD of WIRELESS (Continued)

Seasoning Wood by Wireless Waves

HITHERTO, attempts at rapid drying of wood by ordinary methods have been unsuccessful owing to the interior moisture being imprisoned by the quick drying, and the hardening of the outer skin of the woods. A Russian scientist has now, however, made use of radio-diathermy, using a wavelength of between 5 and 6 metres, which has the effect of driving the interior moisture quickly towards the surface of the wood. This process is so rapid and satisfactory that it is said that an oak board of 5 centimetres thick, which normally would require four to six weeks' air drying, can be seasoned in half an hour, and, moreover, there is not the slightest trace of warping.

Band of H.M. Royal Marines

THE Plymouth Division of the Band of His Majesty's Royal Marines (by permission of Brigadier H. G. Grant), conducted by Captain F. J. Ricketts (Kenneth Alford), Director of Music of the Royal Marines, will broadcast from the Abbey Hall, Plymouth, on April 22nd. The vocalist will be (soprano), who broadcasts for the first time.



The Four Aces, the popular harmonists, who are well known on the stage, screen and radio as the nearest opponents to the famous Mills Brothers. They have recently completed a film with Buddy Rogers for British International Pictures called "The Radio Parade of 1937."

Concert from Torquay

ANOTHER popular concert by the Torquay Municipal Orchestra will be broadcast from the Pavilion, Torquay, on April 20th. Victoria Sladen (soprano), will be the vocalist.

Travelling Radio Stations for Soviet Farmers

FOR the convenience of collective farmers and workers on the State farms during the spring sowing season, the Commissariat of Communications of the U.S.S.R. is

INTERESTING and TOPICAL NEWS and NOTES

organising a system of travelling post offices and radio stations. The fields of the Kharkov Province, in the Ukraine, will be served by 600 travelling radio stations, the Krivoi Rog by ten. Telephone systems have been installed to enable persons working in the fields to communicate with their collective farms and the village Soviets. Forty travelling post offices are already operating in the Dniepropetrovsk Province with regular postal delivery services to the fields.

Variety from Plymouth

A VARIETY programme to be broadcast from Plymouth, on April 21st, will include: "Hutch" (Leslie A. Hutchinson), in songs at the piano; Payne and Hilliard in burlesque episodes; Edwin Lawrence, the comic orator; and Dennis Gilbert, the boy xylophonist.

Musical Biography of Mozart

CONTINUING the series giving a musical biography of Mozart, Eric Blom will present a programme from the Midland Regional, on April 20th, which he and Leslie Heward have arranged; illustrating Mozart's life and work in Salzburg between the ages of 22 and 25. The artists will be Stiles Allen (soprano); Patrick Cory and Ivan Cousins (pianists), for the finale of the concerto for two pianos; and the B.B.C. Midland Orchestra, with Mr. Heward conducting. One movement of the Symphony in C (K. 338) will be included in the programme.

Scottish Radio Cartoon

THE fourth edition of Scottish Radio Cartoon will be broadcast on April 16th. Radio Cartoon is described as an up-to-date sound strip compiled and arranged at the eleventh hour by a battery of writers and musicians, presenting a series of light-hearted commentaries.

Music Items of the Week

THERE will be no more public Symphony Concerts after the visit of the B.B.C. Symphony Orchestra to Leeds on April 14th, until the series is resumed again in the Autumn at the Queen's Hall, and on April 18th the last Sunday Orchestral Concert of the season will take place (Regional). Sir Adrian Boult will conduct

and the programme, an all-British one, will consist of Elgar's violin concerto, with Jean Pougnet as soloist, John Ireland's "London" overture, and Holst's ballet music "The Perfect Fool."

Another programme of British music will be broadcast to the Empire on April 21st (Regional), when Eric Fogg will conduct the Empire Orchestra, and Cyril Smith will play the solo part in Gordon Jacobs' concerto for pianoforte and strings.



One of the new Ferranti six-guinea battery receivers (model 637B) in a homely setting.

SOLVE THIS!

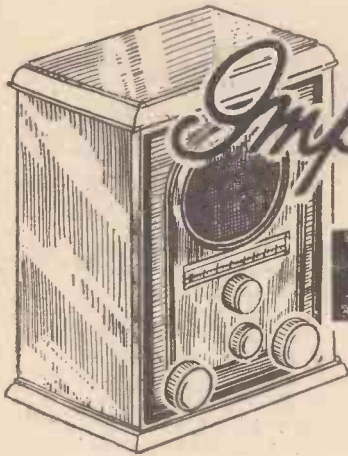
PROBLEM No. 239

Jones built a modern metal-chassis type mains receiver, having a push-pull output stage using two indirectly heated triodes with separate cathode bias resistances. Results were not satisfactory when the set was switched on, and when tests were made it was found that the consumption of the outside push-pull valve was excessive. The valves were transposed with the same result, and the bias resistance and condenser were found to be in order. Finally the two valves were submitted to the manufacturers for test and were both certified to be in order. What was the fault? Three books will be awarded for the first three correct solutions opened. Address your solutions 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. 239 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, April 19th, 1937.

Solution to Problem No. 238

Julian had forgotten to lock the tuning drive to the spindle of the gang condenser, with the result that the condenser vanes did not rotate when the tuning control was operated.

The following three readers successfully solved Problem No. 237 and books are accordingly being forwarded to them: P. Rutherford, 16, Douglas Road, Hawick; J. D. Dearlove, 50, Windmill Road, Gillingham; J. Coulson, 76, Anlaby Park Road North, Hull.



Improving and Stabilising REMOTE CONTROL

In Concluding this Article We Give Details of Some Commercial Relays which May Be Used in Connection with the Schemes Outlined Last Week



FROM the details given last week, it now becomes apparent that a large selection of programmes will necessitate a proportionally large number of relays, and as this factor increases so there is a greater demand on the valve V_1 , and the desire for, say, ten stations with an anode current maximum of 30 milliamperes would mean that a multiple of 3 mA would be required to progressively operate these 10 relays in steps of, say, 3, 6, 9, 12 mA, etc., and in the event of a super-heterodyne receiver of wide range being used, it would be prohibitive from the point of view of bulk and cost, but the principles embodied do certainly prove interesting.

two other movements which have appeared on the market from time to time.

Movements

(a) A very simple but efficient form of armature locking was shown in Fig. 4, from which it will be seen that a groove in one armature engages the end of the other armature holding same until again released by the attraction of the former armature on the energisation of its coils.

(b) This movement constitutes the ratchet and pawl principle, and one button only is necessary in the employment of this type of relay. As will be seen on referring to Fig. 5, an impulse energises the electromagnet, the pawl of which engages with the ratchet and two contacts are made over a cam. Another impulse over the same circuit again energises the coil, and the ratchet again revolves another step causing the two contacts to break.

Either of these relays may satisfactorily be employed in the types of circuit previously outlined.

(c) A very attractive and highly efficient relay is incorporated in the "W.B." Remote Control Long Arm unit, and the many duties which can safely be entrusted to this unit are handled with precision and reliability. pictorial representation of one of these units is shown in Fig. 6.

receiver on and off, extension speaker, etc., and may be used for both battery and mains-operated receivers, and again they may be employed for wave-change operating systems using the capacity adding system.

Restoring

The next impulse causes the spring to disengage from the locking detent and the contacts open.

Volume Control

This model is fitted to an extension speaker, and has eight positions, giving adequate control. The push button incor-

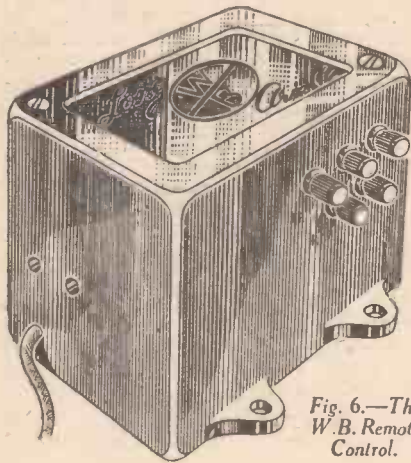


Fig. 6.—The W.B. Remote Control.

Control Unit

Before leaving this type of distant switching, a word on the actual control unit. Considerable scope results in the adaptation of the relay method of control, since either buttons or rotary impulse switches may be utilised befitting one's own requirements. For example, a novel design of portable button control unit would be in the adaptation of a wooden pedestal type ash-tray with the buttons and bulbs mounted on a piece of three-ply wood which is fixed into the position normally utilised by the ash-tray.

Commercial Systems

A rotary impulse switch doing the work of a number of buttons may easily be constructed out of an unused volume control, the element contacting spiral wire being utilised for the individual contacts after splitting into the number of sections required.

Owing to space, it will only be possible to outline three commercial relays, and include

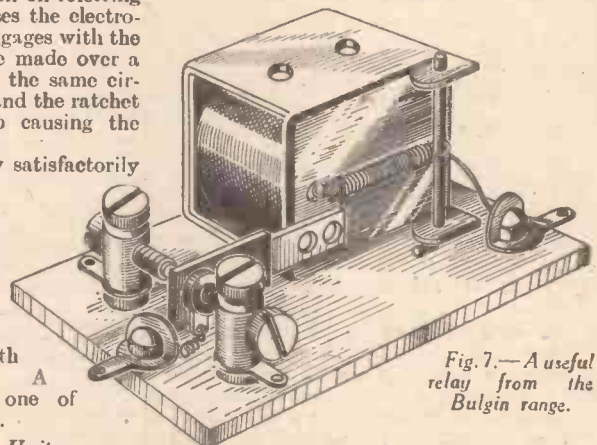


Fig. 7.—A useful relay from the Bulgian range.

Data of "W.B." Unit

Relay Size : 3 1/2 in. x 3 1/2 in. x 2 1/2 in.

Construction : Bakelite case.

Operating E.M.F. : 4 1/2 volts. Supplied by the average torch battery.

Price : 15s. 6d.

Volume controls incorporating press-button and incorporated in the unit, for use with W.B. extension speakers, 5s. 6d. each.

Operation : An electro-magnet attracts a pivoted arm at the free end of which is a flexible spring which engages with a catch, on operation, and a pair of contacts are closed. These contacts may be employed for the switching of a

porated will not operate the R.C. unit unless the volume control is at the minimum position, thus preventing the speaker operating when not required, in the event of the receiver being switched on from another point. The volume control is restored to the "off" position when the speaker is not required, but this does not affect other extension speakers being used, and located in different positions in the building, since the receiver can only be switched off by either the control button, or at the receiver end by the R.C. unit button, which constitutes part of the unit.

The relay is required to work in an upright position owing to the design of the movement.

(d) A sensitive relay with an operating current of from 7 to 10 milliamperes is marketed by Messrs. Bulgian and Co., and catalogued at 6s. (see Fig. 7). This unit is admirable for telephonic work where voice-operated systems are being used, and is particularly suitable for use with radio valve controlled circuits, and may be, for example, included in a valve anode circuit for remote

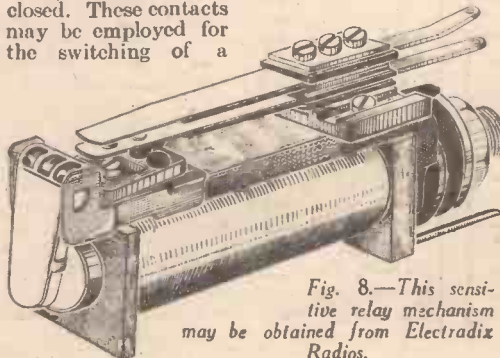


Fig. 8.—This sensitive relay mechanism may be obtained from Electradix Radios.

(Continued on next page.)

IMPROVING AND STABILISING REMOTE CONTROL

(Continued from previous page.)

controlling of a number of predetermined wavelengths or, again, the switching-in of the receiver speaker when the heaters have warmed up (Fig. 8).

(e) This relay as illustrated, was originally purchased from Electradix Radios, Ltd., Upper Thames St., for experimental stages in the design of circuits on the basis of that illustrated in Fig. 3, and similar models have an operating current of approximately 6 milliamperes with a required E.M.F. of about 20 v. They may satisfactorily be employed in anode circuits, and are designed to a very critical degree warranted by positive make and break contacts under sensitive operating conditions.

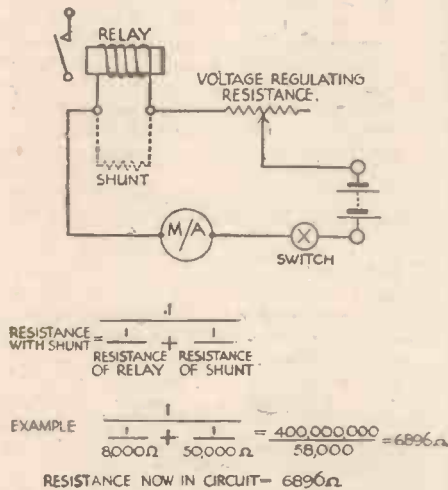


Fig. 9.—Diagram and example of method of calculating voltage regulating resistance.

In conclusion, it would be as well to include a little advice on progressive relay operation, or voice-operated systems of control.

The employment of a standard operating relay, say, of 5 mA, for 50 v., sometimes necessitates the inclusion of shunt resistances (see Fig. 3, dotted resistances) for exacting operating conditions, and these are best ascertained by a "rig-up" circuit as shown in Fig. 9. As will be realised, a resistance across the relay will result in a variation in operating voltage, thus a sequence of conditions may be arranged as required.

However, for the home constructor, the principles embodied in Fig. 1 would be preferable when constructing a remote control system, and the employment of, say, the W.B. Long Arm unit, would go a long way to attaining stability and efficiency.

To Track That Fault—To learn how a wireless receiver works, obtain

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By F. J. CAMM

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An Automatic Radio Alarm

A Device which Should be Invaluable to Ships at Sea

RADIO science has just made available to American shipowners a new radio device for the protection of life at sea that listens, thinks, and acts without human attendance. The device is known as an automatic radio alarm, and is intended for shipboard service in "standing watch" for emergency calls from other vessels at all times when the radio operator may be off duty.

Charles J. Pannill, President of the Radiomarine Corporation of America, said that the new alarm had received the approval of the Federal Communications Commission, and that the company would be ready to commence equipping ships as soon as a few minor changes specified by the Commission had been made. This approval was granted after the equipment had received a rigid 60-day test, both in the Bureau of Standards laboratories and in a practical test conducted by the engineers of the F.C.C. in the Sandy Hook Stations of the U.S. Coast Guard.

"We call it an automatic radio alarm," said Mr. Pannill, "but a device which listens, thinks and acts almost deserves a name like Christopher Columbus. Consider some of the specifications for its performance.

Emergency Signals

"Upon completion of his watch at the radio, the operator turns on the automatic alarm and leaves the cabin. Thereupon the alarm begins its work of listening for the telegraphic characters of the international emergency signal from other vessels. It is contrived to receive not only the 600 metres distress call wavelength but a small band on either side as well, so that it may not be deaf to a ship which may be a little off the calling wave. It

is set to "recognise" a series of dashes, each of four seconds duration, separated by an interval of one second. It is also endowed with the discretion of recognising a dash which may be a trifle less or a trifle more than four seconds in length. It has an electrical memory that will retain four such dashes in sequence, after which it will ring bells and turn on warning lights in the radio operators' sleeping quarters and on the bridge.

"But this is not all that is required of the new device. It must let the deck officer on watch and radio operator know immediately if it should become incapacitated for assigned duties while on watch. Accordingly, if a battery fails, or a valve burns out, or if it develops other 'pains in its sawdust,' it will operate the same alarm, bringing human intelligence on the run to its assistance."

The Convention of Safety of Life at Sea was ratified last June by the U.S. Senate and promptly signed by the President, after which it was deposited at London. It became applicable to American ships on November 7th, 1936, except as to the continuous watch requirement. Under the terms of the Convention, a signatory nation may grant to its ships an exemption from the continuous watch requirement for a period not exceeding one year from the effective date of the Convention. The F.C.C. has extended this period of exemption under the continuous watch requirement to and including August 6th, 1937.

Under the law the new device will not be recognised on American passenger ships as a substitute for radio operators, but may be used on cargo vessels of 5,500 gross tons or over employing only one radio operator, in order that a continuous watch may be maintained.

Important Broadcasts of the Week

NATIONAL

Wednesday, April 14th.—B.B.C. Symphony Orchestra visits Leeds: A Concert in the Town Hall.
 Thursday, April 15th.—His Father's Sword, an episode in the life of Napoleon, by Anthony Ellis.
 Friday, April 16th.—The Ratcliff Highway: a dramatic reconstruction.
 Saturday, April 17th.—Variety programme.

REGIONAL

Wednesday, April 14th.—Variety programme.
 Thursday, April 15th.—A commentary on the World Featherweight Boxing Championship, from Haringay.
 Friday, April 16th.—Orchestral concert.
 Saturday, April 17th.—"Blue Beard's Castle," a one-act opera by Bela Bartok.

MIDLAND

Wednesday, April 14th.—"... a Young Man's Fancy," a musical melange.
 Thursday, April 15th.—Midland Organs and Organists: a description of the organ, followed by a recital from Blenheim Palace, Woodstock.
 Friday, April 16th.—Choral programme of Folk Songs.
 Saturday, April 17th.—Gilbert and Sullivan programme.

WESTERN

Wednesday, April 14th.—Speeches at the Opening of the Welsh Industries Fair, from the Greyfriars Hall, Cardiff.
 Thursday, April 15th.—Welsh Variety programme.
 Friday, April 16th.—A Ballad of 1400: A romantic story of Owen Glyndwr.
 Saturday, April 17th.—Sporting Dogs: a talk.

NORTHERN

Wednesday, April 14th.—"Weeds," a radio play by J. S. N. Sewell.
 Thursday, April 15th.—Yorkshire Pudding: a programme of sketch and verse from the East of the Pennines.
 Friday, April 16th.—A Concert by School Children.
 Saturday, April 17th.—Choral programme, from the Guildhall, Hull.

SCOTTISH

Wednesday, April 14th.—Variety programme, from the Theatre Royal, Edinburgh.
 Thursday, April 15th.—Men and Matters: National Parks and Open Spaces: a talk.
 Friday, April 16th.—Variety programme.
 Saturday, April 17th.—Orchestral Concert.

Circuits for Portables

Some Suggestions for those Constructors who Wish to Design Their Own Receivers Instead of Following Published Blueprints - - - By FRANK PRESTON

MANY complete designs for portable sets of various types have been published in these pages, and blueprints are available for most of them. Those readers who have had comparatively little experience of constructional work are strongly advised to follow one of these detailed designs when it is proposed to build a portable for the coming summer months. There are, however, many readers who would prefer to make a receiver to their own general design, using components that are on hand, and building the set to

is employed it will generally be necessary to experiment rather carefully in order to determine the most suitable number of turns for the frame aerial. Normally, however, the frame aerial can be made by using 75ft. of 24-gauge D.C.C. wire for medium waves, and 210ft. of 30-gauge D.C.C. for long waves. This assumes a frame having a total perimeter of between 4ft. and 6ft. A suitable form of construction for the frame is shown in Fig. 2, where it is assumed that the set is built into the frame, and made easily detachable from the carrying

giving good reception of two or three transmissions in any part of the country. Even if separate variable condensers are employed, tuning will not be difficult, since the tuning of the frame will not generally be very critical. Thus, if the tuned-anode condenser is used for "main" tuning, the other can be adjusted for maximum signal strength. It will be appreciated that the directional properties of the frame must be used to the full if really good results are to be obtained. This means that when a carrier wave has been picked up—in the form of a whistle—the frame must be turned until it is brought up to good strength. Thus, with the form of construction suggested, it is best to mount the set on a turntable, of which there is at least one well-known model on the market.

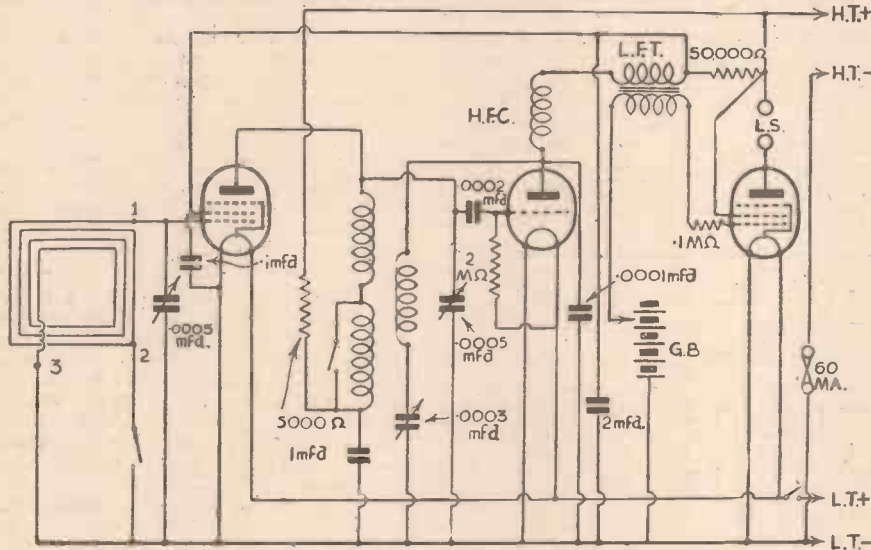


Fig. 1.—One of the simplest types of portable-set circuit.

fit into an available case or cabinet. It is to these that the circuits to be described will prove of most interest. But it should be made perfectly clear that complete constructional details and wiring plans are not, and will not, be obtainable.

A Popular Circuit

One of the most popular circuit arrangements for a portable is that shown in Fig. 1. It comprises an H.F. pentode, followed by a triode detector and a pentode output valve. As is customary, a frame aerial is employed, and this replaces the input tuning coil used in other than portable sets. Tuned-anode coupling is used between the high-frequency amplifier and the detector, and reaction is applied in the usual manner. The detector anode circuit is decoupled, and a small L.F. transformer—about 1 to 5 ratio—is used to feed the output pentode. Although "straight" transformer coupling is employed, the component can be quite small and light, for the current passed through the primary will be less than 1 mA in most cases, if a high-impedance valve (such as a Cossor 210 H.L.) is used in the detector position.

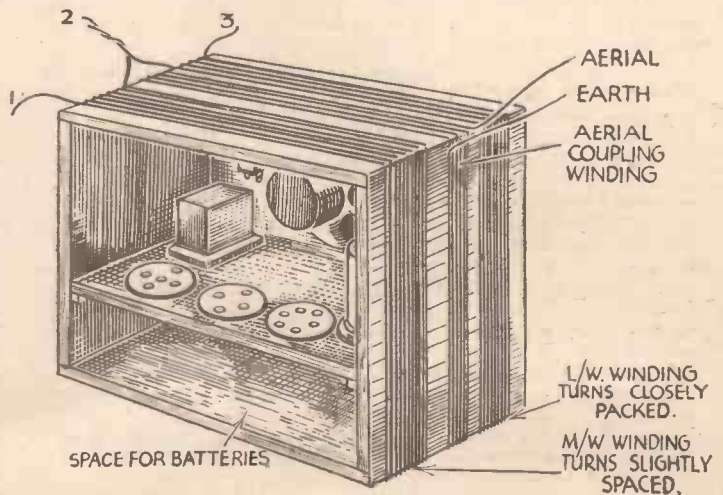
There are few "refinements," because simplicity is aimed at, both with regard to construction and operation. Two separate .0005-mfd. tuning condensers are indicated, but these may be replaced by a midget two-gang condenser having an external trimmer control. When the latter type of condenser

is employed it will generally be necessary to experiment rather carefully in order to determine the most suitable number of turns for the frame aerial; this consists of approximately 20ft. of 24-gauge D.C.C. wire.

Directional Properties

The circuit calls for little further comment, but it should be mentioned that when used with a frame of not less than 4ft. perimeter, the set should be capable of

Fig. 2.—A suggested form of construction, using a five-ply frame with three-ply front panel. Dimensions are according to the size of the carrying case.



"One-knob" Four-valve

A modification of the circuit already dealt with is shown in Fig. 3, but in this case there are four valves, two of which are L.F. amplifiers. The output valve can be a high-efficiency triode, such as a 220PA., and the first L.F. valve might be of the ordinary L.F. type. Although having four valves, a receiver using this circuit will not produce very much better results than the previous one, since there is no reaction, and the coupling between the first two valves is untuned. The main advantage is that of simplicity in operation and construction.

The first two valves are H.F. pentodes of the non-variable-mu type, and can be of any standard make. That used as detector will operate very effectively if care is taken to adjust the voltage applied to its screening grid, by means of the separate H.T.+ tapping. Actually, although there is no reaction control, it will be found that there is a tendency for the valve to oscillate, and its nearness to the oscillation point can be regulated by controlling the S.G. voltage.

It will be noticed that resistance-capacity coupling is used between the detector and first-L.F. valves, although a transformer is used to feed the output stage. This combination works very nicely

(Continued overleaf)

CIRCUITS FOR PORTABLES

(Continued from previous page)

in practice, there being sufficient amplification with little likelihood of low-frequency instability.

Components

Of the two H.F. chokes, the first should be a really good one, with high inductance rating, whilst the other can be of the usual low-priced "reaction" type. It is preferable that both should be screened. None of the other components is critical, and provided that they are of the values indicated in the diagram the make is unimportant. In most cases readers will prefer to use a midget-type tuning condenser, but this should have a slow-motion drive; it might be of the solid-dielectric pattern, but this is not quite as good as an air-dielectric condenser, since it causes a restriction in the tuning range, and is slightly less efficient electrically. The frame aerial can be as shown in Fig. 2.

It should be mentioned that the two circuits already dealt with can be modified quite satisfactorily, and features of the two combined. Thus, two L.F. stages could be used in place of the pentode in Fig. 1, or a tuned-anode circuit, with or without reaction, could be used in place of the choke-coupling in Fig. 3. Again, an H.F. pentode detector could be used instead of the triode in Fig. 1. It would not be very

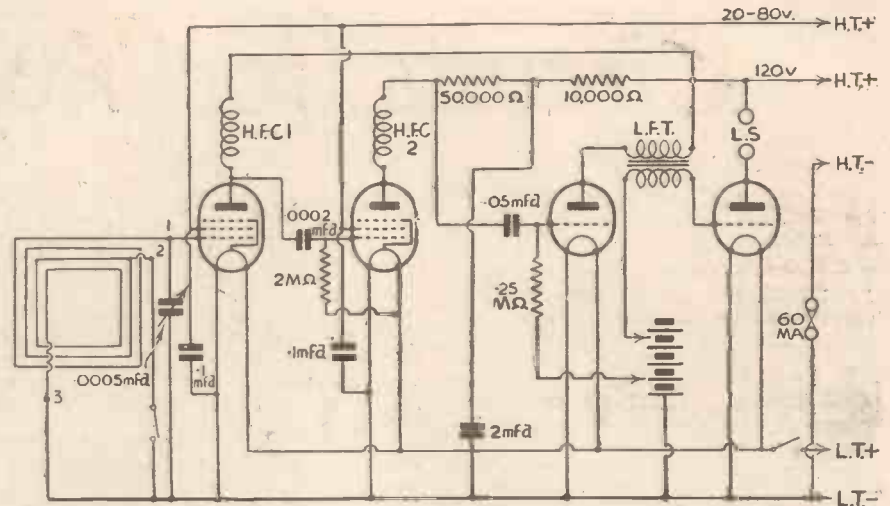


Fig. 3.—Circuit for a four-valve portable with H.F. pentode detector and untuned H.F. coupling.

with that section of the gang condenser used to tune it. In any event, tuning will not prove difficult, because it can be carried out almost entirely in the oscillator circuit, the second condenser being used to increase signal strength after a station has been picked up. The circuit is on straight-forward lines, and is of simple form for a superhet. It should provide good reception

(a 5in. diameter midget type is most convenient).

There is room below the set for batteries, and components are arranged round the speaker unit. Care should be taken to see that the leads to the speaker are well away from those from the frame, while it is often desirable to screen the speaker leads. Similarly, leads from coils and H.F. components should be kept away from the speaker, and it is helpful to "earth" the speaker frame by connecting it to L.T.—

A two-pole, change-over switch can be used as combined on-off and wave-change switch if desired, and this simplifies operation. When there are two wave-change switches—one for the frame, and another for the coil—these can generally be replaced by one double-pole on-off switch provided that the leads are fairly short and spaced from each other. It is sometimes found better to screen the lead to the coil to avoid feed-back into the aerial circuit, which would cause uncontrollable oscillation.

Batteries must, of necessity, be small in a portable set, but it is most economical to use the largest which can be accommodated without increasing the weight to too great an extent.

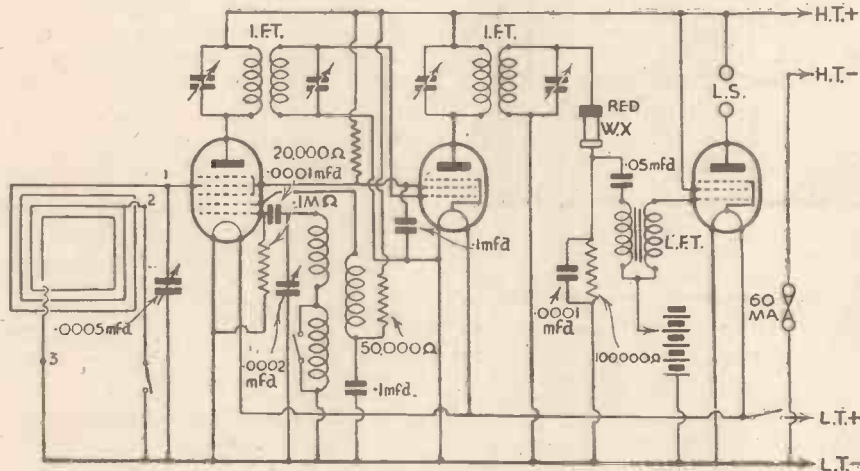


Fig. 4.—A three-valve superhet circuit which has interesting possibilities.

satisfactory to use a single L.F. stage when using untuned H.F. or when dispensing with reaction, and single-circuit tuning would not give sufficient selectivity when using the receiver within about 12 miles of the nearest transmitter.

Three-valve Superhet

A more ambitious circuit is shown in Fig. 4, where the superhet principle is adopted. A frame aerial similar to that mentioned above is used to feed into a pentagrid frequency changer, and there is a 465 kc/s oscillator coil, tuned by a .0002-mfd. variable condenser connected in the oscillator section of the pentagrid. There are two 465-kc/s intermediate-frequency transformers used to couple the frequency changer to the H.F. pentode I.F. valve, and to couple the latter to the type W.X. "Westector" used as second detector.

As shown, separate tuning condensers are used for the frame aerial and oscillator coil, although it is possible to use a superhet gang condenser if the size of the frame aerial is reduced by about 20 per cent., and a .0001-mfd. trimmer is connected in parallel

of a fair number of stations in most parts of the country, and will be sufficiently selective for most purposes if full use is made of the directional properties of the frame.

Practical Aspects

It is not proposed to deal at any length with the constructional aspect, but a few of the most important points should be explained. One form of construction is that suggested in Fig. 2, where it may be seen that the receiver components are mounted above and below a shelf fitted within the framework of the aerial. The shelf acts as a chassis, for components and wiring are arranged both above and below it. If the outer framework is built up of five-ply wood, a front panel of three-ply can be screwed to it, so that the controls can be fitted to this. Then the complete set can easily be removed from the carrying case for adjustment and initial experiment. When this is done, it is best to pass screws through the three-ply into the front of the carrying case, so that there is a sufficiently rigid baffle for the moving-coil speaker

RELAY TELEVISION SYSTEMS

THE distribution of television signals to each flat in a large block of buildings is now being undertaken by several of the television companies. Tenants taking advantage of this service do not have to pay quite as much for their television receivers as certain of the chassis units are simplified, owing to the land-line connections. Special feeder cable has to be employed to handle the television signal frequencies, and at each receiving point the same signal strength is obtained as that which would be derived from a separate and distinct aerial system of normal character. The amenities of flat life are thus added to, and as a natural development it is now learned that attempts are being made to use systems of a similar character for the installation in hospital wards. The benefits of ordinary radio to the sick and suffering are almost incalculable, but if in this way it is possible to add sight to sound the patients will be provided with yet another way of taking their mind off bodily pain. Naturally, cost is a very prime factor, but schemes are being tried with the express idea of cheapening the initial outlay, so that in each ward there will be at least one picture screen.

On Your Wavelength

BY THERMION

Kingston and District Amateur Radio Society

Our membership includes most of the well-known local amateur transmitters, and a special 5-metre Group holds fortnightly meetings which are always well supported. I shall be pleased to send a schedule card of 5-metre transmissions to any interested reader, on receipt of a stamp to cover postage.

"If this letter should meet the eyes of any S.W. enthusiast in an adjoining district, who is desirous of forming a radio society in his area, I would like to say that this Society is always open to support such a movement, and to join forces for the ultimate benefit of our hobby. I congratulate you on the support which you always offer to the amateur."

The Tap-dancing Cat

FOR once we are one up on the Yanks who can always be relied upon to invent some fantastic yarn and claim it as a record. The recent story which "broke" in the newspapers about the singing mouse has called forth the expected reply from America, for I learn that American listeners are shortly to have the extreme pleasure of listening to the footsteps of a tap-dancing cat. I learn also that the cat will be placed on a table near a microphone and so will thrill the listening world with its precocity. It is said that this tap-dancing tabby has been specially trained for the purpose. This, if it is true, is an item which must be seen to be enjoyed, not merely heard. Also it must be seen to be believed. In any case, broadcast noises are an absurdity, since they can be reproduced by the "noises off" department, and no one knows the difference. These are items for television.

You Won't Listen to the Band!

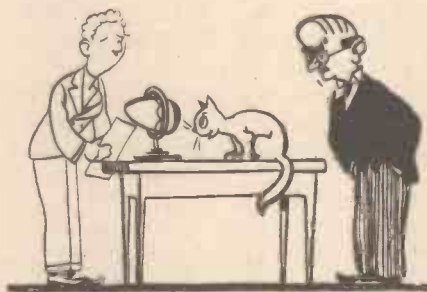
ANOTHER item of news is that the Council of a Northern seaside resort has decided that it will not engage a band for the bandstand this summer. Instead it will use loudspeakers for the entertainment of the visitors. Listen to the strange reason. They state that



Another Howler

K. B., of Hull, sends me another Schoolboy Howler. At least he says it is a howler, but the joke has not yet penetrated my cranium. I do not know whether there is a different brand of humour in the North which lends support to the old joke about surgical operation being necessary, so perhaps you can help me. Here is the howler. "I set my watch daily at the exact second of the 10 a.m. time signal, but I find it invariably a few seconds slow by the evening signal, especially on the short winter days. I attribute this to the known fact that wireless waves travel faster in darkness." K. B., of Hull, thinks this is excruciatingly funny, apparently. He ends his letter with a Parthian shot. "This gentleman had the decency to sign the name and address to his letter. I can't stand people who air their ideals in the Press and then screen their identity behind a *nom. de plume*, such as Thermion!" As I have pointed out before, if my real name was Thermion it would convey as much to the average reader as my real name. K. B., of Hull, would not be any the wiser if I signed my articles John Smith, or William Brown. If he cannot "stand" such things, I recommend him to try sitting, or lying down, even remaining completely dormant! I would also remind him that there are certain things that contributors *do not* stand, and one of them is a scurrilous and impertinent letter such as his. I see that he is a member of a well-known short-wave league, and letters such as this hardly bring credit upon the members of that Society. In fact, one of the things which other readers cannot stand is inane views of inane people. This reader is apparently not in any position to "stand" anything, for he seems particularly bad-tempered.

REGARDING my recent notes about wireless clubs, I have received the following letter from Mr. Richard K. Sheargold, of "Reculver," Manor Lane, Sunbury-



The tap-dancing tabby.

on-Thames, who is the Secretary of the above Club. He says:—

"With reference to your remarks in a recent issue regarding radio societies, I think you will be interested to know that an extremely enthusiastic society is in existence in this area, known as the Kingston and District Amateur Radio Society, of which I am the Hon. Secretary. I note with interest that PRACTICAL AND AMATEUR WIRELESS is anxious to do everything possible to increase the public interest in these societies, and I shall in future have pleasure in sending reports of our activities.

"We hold monthly meetings at the "Three Fishes" Hotel, Richmond Road, Kingston, where visitors are always welcome. Field days are very popular with our members, and a large number of these outings have been arranged for the coming summer. Incidentally, I would mention our annual Convention, which is held in September, usually on the south coast, where we are joined by a number of fellow enthusiasts from that district.

"The annual subscription is 3s. 6d., and we have a junior section for members under 16 years of age, the subscription in this case being 2s.

with wireless loudspeakers and talkies, the public has become so used to mechanical music that it is no longer interested in the real thing. Furthermore, they have even found that the strangeness of listening to the music of a real brass band is jarring to their nerves, and not nearly so soothing as the music from records of the same



Listening to the band!

band after it has been modulated. I agree that some items sound better through a P.A. outfit, particularly crooners' voices—if you can call them voices—but a band is better heard in the raw.

Fewer Wireless Dealers?

I BELIEVE if a new census were taken, that there would be hundreds less dealers than there were five years ago. According to the B.B.C. we must shortly envisage absorption point in the number of wireless licences. When that time is reached we must consider whether absorption point has not also been reached in the demand for wireless receivers. The licence figures have been steadily climbing for a number of years, but they cannot do so indefinitely. What will happen? Will firms go out of business? Shall we see the terrible slump which we have seen in other industries? The bicycle, motor-cycle, and motor-car industries have all suffered slumps, and firms have gone into bankruptcy or liquidation. But to-day they are selling more bicycles and motor-cars than ever before. You do not reach absorption point and then rely merely upon the replacement market. People have become accustomed to purchasing a new article every year or so according to its nature. They do not buy heirlooms. Absorption point in the tailoring trade was reached 50 years ago, but because everyone must still have new clothes, the same number of suits are being sold.

Television Progress

I AM informed that about 900 television programme items covering a period of 240 hours have already been transmitted by the B.B.C. since the official service was opened in November. A wide



Vitesse Coil Unit

SOME readers seem to have experienced difficulty in wiring the coil unit of the Vitesse All-waver. A diagram showing the disposition of the connecting leads should be enclosed with each unit, however, and if the numbered leads shown on this diagram are wired as shown on the blueprint, no trouble should be experienced. The actual positions of the leads are not quite clear on the blueprint, of course, as the elevation cannot be shown, but the leads are clearly numbered, and these numbered leads coincide with those shown on the manufacturer's leaflet. The units are carefully trimmed before leaving the factory and therefore in most cases no readjustment of the end trimmers will be necessary. It is advisable not to touch these three trimmers until the I.F. transformer and gang-condenser trimmers have been carefully adjusted. When good reception has been obtained a slight final adjustment of the coil unit trimmers may be tried.

Add-on Superhet Unit

WE have recently received a few enquiries concerning the use of a double-diode valve as detector in the Add-on Superhet Unit in place of the Westector. This alteration is permissible and will probably provide a slight increase in sensitivity. If a further increase in sensitivity is desired, a double-diode-triode may be employed in this position. If this type of valve is used, however, the L.F. amplifier should be resistance-coupled and the output valve should be of the triode or low-sensitivity pentode type. If a high-sensitivity pentode, such as the 42 M.P. Pen., is used it is probable that a double-diode would prove more satisfactory than a double-diode-triode.

Variable- μ Potentiometer

IN order to make full use of a variable- μ H.F. valve, a potentiometer volume control should be employed so that the bias on the grid can be varied in accordance with the strength of the input signal. Sets using the old type S.G. valve are not fitted with this type of control, however, and therefore when a modern H.F. pentode is substituted for an S.G. valve the control potentiometer should be added. The actual wiring alterations are very simple, but some constructors overlook the fact that a continuous leakage occurs from the G.B. battery through the potentiometer unless the former is switched off when the set is not in use. Switching off may be effected by means of a three-point on-off switch.

range of subjects has been covered, and viewers are again to be asked to pass judgment on the programmes, so that the Alexandra Palace staff may be further guided in the selection and distribution of subjects. This is all to the good, and apart from the increasing sales of home sets, public interest in this latest radio development is evidenced by the vast number of people who are daily attending demonstrations.

Up till a few days ago more than 65,000 visitors had viewed programmes in the showrooms of the G.E.C. and their dealers alone since the B.B.C. service began. At Magnet House, Kingsway, where free daily shows are given, more than 5,000 persons have attended. Very keen interest is shown by women visitors, but it is noteworthy that although the demonstrations occur during business hours, 90 per cent. of the visitors are men. Upwards of 990 items have already been transmitted, 326 of which have been devoted to variety, drama, ballet and other stage entertainment covering 103 hours, or 43 per cent. of the total. Next in time with 61 hours, or 25 per cent., were 191 talks on general, topical and special subjects including show exhibits and personalities. There were 302 film items over 52 hours, or 22 per cent. of the total time. These film transmissions have been slightly reduced in the last two months. Fifty-one items covering 15 hours (6 per cent.) have been given to women's special interests, while the remaining 22 items were devoted to art topics.

In India

HAVE you ever thought of the difficulty of introducing radio to the natives of remote parts such as India and other Eastern countries? I have just received a most interesting note regarding an ingenious set which has been designed for use in the villages of India and which is being produced by the Research Department of All-India Radio. So far as is humanly possible, the set has been designed to dispense entirely with the need for human attention. A time switch is fitted, and brings the set into action, and switches it off at the end of the village programme. It is entirely battery-operated, and the whole mechanism is housed in a metal box fitted with a padlock—which is cheap and effective, and keeps idle fingers out of the works. The time switch was apparently forced into action owing to the native in charge of the village set going to bed and forgetting to switch off.

Practical Television

April 17, 1937. Vol. 3. No. 46.

LOOKING-IN TO THE BEST ADVANTAGE

Some Hints on the Adjustments Which Are Often Necessary in the Modern Television Receiver

THE pleasure associated with watching high-definition television pictures on any modern receiving set, whether a home-constructed or a commercial model, is dependent upon many important factors. First of all, the "atmosphere" or room environment must be conducive to concentration on the picture screen. Any disturbance is sure to upset the possible measure of pleasure, and it is preferable to have the room darkened, or ensure that any lighting that is present does not throw direct rays on the screen and so give an apparent diminution in screen brilliance. Secondly, the viewing distance must be right. This is generally given as six to eight feet from the screen itself, but a lot will depend on the number looking in at one time, and also to a certain extent on personal taste.

As is well known, the picture is built up from a series of horizontal lines, the light intensity of which is a continuous variation

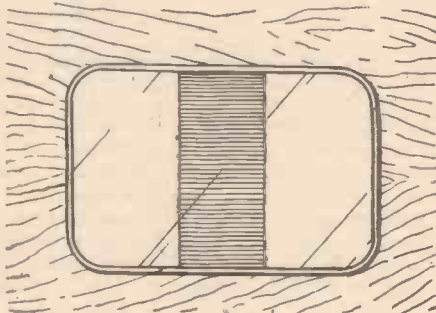


Fig. 1.—The effect produced with insufficient line amplitude.

along the length in conformity to the television signal generated at the studio end. The viewing distance should be such that the lines which compose the picture are not apparent. In this way the screen gives the appearance of a completely-lit picture and so bears comparison with a cinema picture in miniature. The level of sound from the loudspeaker should be adjusted to give the correct illusion of the miniature figures on the screen actually speaking or singing, as the case may be.

A Transmission Effect

Assuming that all these factors have had the consideration given to them, which they undoubtedly merit for the best results, reception will be upset completely unless the picture itself is free from all flaws or blemishes which can give rise to irritation, and so tend to bring about a measure of criticism for the service, when in the majority of cases the faults are located in the receiver itself and can be cured by the person operating the set. It is admitted that the transmissions are at this stage by no means blameless, but the receiver should in every case be cleared of all suspicion.

There is one particular difficulty which at the moment is not necessarily connected with the receiver and that is reflected or "ghost" images. This arises from the reflections of the ultra-short-wave television signals from the electrified air layers discovered by Watson Watt. The direct and indirect signals arrive at the aerial with a slight time lag between them, and according to

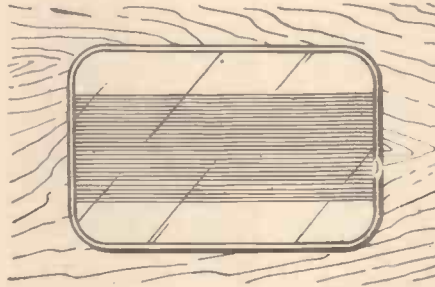


Fig. 2.—Insufficient frame amplitude produces a raster this shape.

the fraction of a second which exists between these two so a secondary image is formed to the right of the main picture outline. This effect is certainly disconcerting when it does happen, but luckily reports of its occurrence are not numerous, and furthermore do not show any consistency. That is to say, while ghost images may be seen at a certain

point on one occasion they do not persist. It gives the appearance of a "plastic" image like letters or figures standing out in relief, but if the time lag is comparatively large then the secondary picture can be as much as three inches to the right of the main picture, while its intensity is, of course, dependent upon the strength of the reflected signal. As mentioned earlier, however, this trouble is luckily rather rare and should not be confused with any receiver fault. No doubt, research will

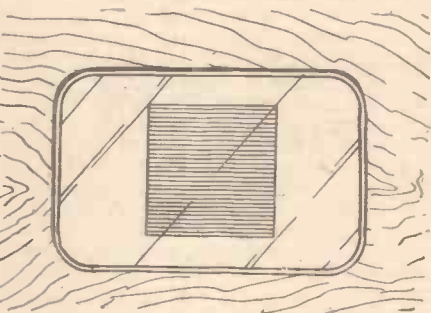


Fig. 3.—A combination of Figs. 1 and 2 reduces the overall size of the picture area.

produce a cure, but at the moment it is just an established fact associated with the ultra-short-wave radio link which is essential for the conveyance of the picture signal with its wide frequency band.

Lack of Synchronism

Coming now to a consideration of a few of the possible picture defects associated with the receiver itself, some are, of course, immediately suggestive of the seat of the trouble. Insufficient line or frame amplitudes will show as reduced width or height, or a combination of both, as shown in Figs. 1, 2 and 3. The adjustments for these will be found in the time-base generator control assembly, which varies in position according to the make of set. In any case, the knobs are nearly always plainly labelled and careful rotation in either direction should produce a picture scan that just fills the masked area of the cathode-ray tube

(Continued overleaf)



A corner of the television exhibition staged at Messrs. Selfridge's London Store.

LOOKING-IN TO THE BEST ADVANTAGE

(Continued from previous page)

screen. Incidentally, these same controls enable the user to secure the correct picture ratio, for if this is not done then the figures or captions on the screen will be distorted, and if this is "exaggerated," the picture will be reminiscent of the reflections seen in the hall of distorted mirrors.

If it is found that adjusting these controls produces no response in the scan, then the trouble has, no doubt, been brought about by a defective valve, or, in some cases, the H.T. feed may be below normal. In either case, the remedy is self obvious. If the line or frame scan generator units are at fault only a single line will appear on the screen, and if there is no open circuit, then once more the respective valves may have broken down and need replacement. Sometimes as a result of transport, the valves may work up out of their sockets and not make proper contact. On installation, therefore, or even after moving the set to different positions in the room it is advisable to see that each valve is pushed well home in its holder.

A Reversal

Another effect which may happen is a reversal of the line or frame scan. In the case of the former, the effect will be shown at once since the picture is upside down, but a reversal of the line scan will not necessarily evidence itself until a lettered caption is transmitted. A changeover in the leads to the deflector plates or coils will rectify matters. In the case of indirectly viewed pictures, where the image is seen as a reflection in a mirror inclined at an angle of 45 degrees to the vertically-mounted cathode-ray tube, reversals are purposely incorporated when compared to the picture built up for direct observation on the screen. If the picture is noted on the horizontal screen of the tube in these sets the picture is upside down and the line

scan reversed. This ensures that the reflected picture as observed will be traced out in the right order; that is, line scan from left to right and frame scan from top to bottom.

Hum

One of the most objectionable defects which can be produced is the direct outcome of the A.C. mains hum. If this gets on to the modulator electrode of the cathode-ray tube it will evidence itself as a horizontal black bar which should remain stationary

Snooker Broadcast

Horace Lindrum, runner-up in the English Snooker Championship, will appear with Willie Smith, a former champion, in a televised display of snooker in the afternoon programme on April 14th, and the evening programme on April 16th. The marker will be Alec Brown, who is also a well-known snooker player.

They will use a standard 6ft. 3ins. table with balls of proportionate size. The display will last ten minutes and it is expected that, as a number of cameras will be used, viewers will see the game from all angles.

right across the screen. The depth of the bar will be a measure of the intensity of the hum, and may be due to direct mains pick-up in the leads passing to the modulator electrode. Effective screening should cure this. On the other hand, there may be insufficient smoothing in the mains unit, or the decoupling components may be wrong. In any case, an immediate examination of the possible seat of the trouble is called for as the picture is marred by its presence. Again, if hum gets into the time-base generator the normal vertical edging of

the picture scan will resemble a sine wave formation. Picture verticals become wavy and the pictorial value of the scene being presented is destroyed. Here, again, faulty smoothing may be causing the effect, and an immediate remedy is called for. A careful shielding of the vital leads and the use of metal chassis, coupled with a proper layout and positioning of the respective chassis in the complete receiver, will do much to ensure that some of the more obvious picture defects are eradicated. Whereas the ear can quite soon become accustomed to a hum in the loudspeaker, the eye will not so readily adapt itself, and it is better to remove the offence than attempt to condone its presence.

Other Hints

Be sure to avoid any form of picture over-modulation. The half-tone grading in the picture will be destroyed, and, in addition, if the set gain control is advanced too far, the whole picture may go negative or disappear altogether due to overloading. When the picture shows a tendency to slip either vertically or horizontally, advance the frame or line "lock" controls. This increases the magnitude of the synchronising signal applied to the grids of the respective valves in the time-base generator and so locks the picture in position quite rigidly. At the same time, of course, see that the line and frame speeds are at the proper setting, so as not to throw too great a "strain" on the lock controls, otherwise the picture will tend to jump at frequent intervals due to the synchronising pulse being just insufficient to pull the scanning generator right into step in the dual direction. In the case of a magnetically-operated cathode-ray tube, these same speed controls provide a measure of picture shift and the settings should be made with the due care that they merit if one is to look in for the whole hour's period to the very best advantage.

TELEVISION NOTES

Teachers' Interest in Television

ON Wednesday, March 17th, about sixty members of the London Teachers Circle of the Electrical Association for Women, which includes lecturers from Domestic Science Colleges and others concerned with the propagation of electrical knowledge from a domestic point of view, attended at the Ponders End works of the Edison Swan Electric Co., Ltd., for a television lecture and demonstration by Mr. G. Parr and Mr. T. W. Price. After a brief survey of the principles of television the party went through the company's television laboratory where they saw the Ediswan cathode ray tubes in operation. The accompanying picture shows the audience at the demonstration.

A Final Decision

IN the House of Commons the other day, when the financial estimates for Coronation preparations were being dealt with, Mr. John Colville, Financial Secretary to the Treasury, announced that there would be no television transmission from Westminster Abbey. This decision is very unfortunate, for if by chance something did go wrong with the equipment, or the radiated picture was found to be of inferior quality, it would have been a very easy matter to fade out the signal. However, efforts will now be concentrated on tele-

vising sections of the actual procession with the aid of the mobile units now being built, and this alone is certain to give a welcome stimulus to the whole television service. In anticipation of this and as a present attraction to clients, many hotels, clubs,

inns, etc., are installing television receivers on their premises. By all accounts this is proving a very profitable investment, for there is still a widespread novelty appeal in watching television pictures, and proprietors have not been slow to realise this.



Members of the London Teachers Circle of the Electrical Association at a Television demonstration.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

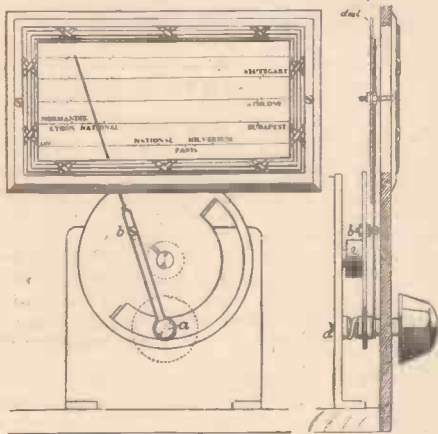
READERS WRINKLES

THE HALF-GUINEA PAGE

A Full-vision Tuning Dial

POSSESSING a tuning condenser with disc drive attached, and being somewhat tired of haphazard peephole tuning, I decided to convert to full-vision station identification tuning in the following manner.

The celluloid scale was first removed from



Front and sectional views of a neat full-vision tuning dial.

the driving disc. A hole was drilled and a 6B.A. bolt fixed to this disc about 1/4 in. from the spindle and dead centre (b). A piece of thin, hard wire was then bent to the shape indicated to serve as a pointer to travel on the small bolt with the tuning knob spindle as the axis (a).

The escutcheon, or window, was made from a two-hole flush switch plate, obtainable at most electrical stores in brown bakelite, price sixpence. The centre panel of this is quite thin and was easily removed with a fretsaw. Two holes were drilled at the edges for mounting bolts, and a hole was then cut in the panel of the set the size of the window aperture. The dial was a sheet of card ruled with a number of horizontal lines, and held in position by the escutcheon fixing bolts.

When in position, stations were tuned in and identified and dots made above or below the lines. The appropriate names were then cut from the pages of the radio programme and pasted on.—J. H. BROOKS (Walworth).

A Coloured Indicator for Waveband Selection

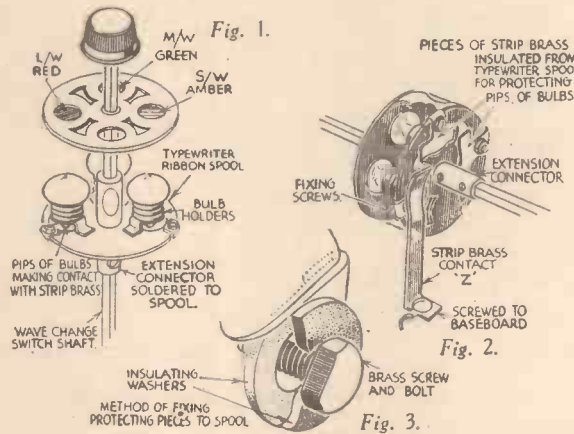
OWING to my receiver not being equipped with a visual indication of change in the waveband, I made the device outlined in the accompanying illustrations, which, I hope, will be sufficiently explanatory.

Fig. 1 shows the preliminary assembly, which consists of a length of brass rod to which is fixed a coupling shaft for attachment to the wave-change switch control spindle.

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.

On to the coupling and brass rod is soldered a typewriter ribbon spool. The next consideration is the fixing of the bulbs, and in my case I constructed three holders out of sheet tin; these are clearly indicated in the drawing. The tips of the bulbs must protrude through the holes already provided by the spool, and great care should be exercised in the alignment



Details of a novel coloured indicator for waveband-selection.

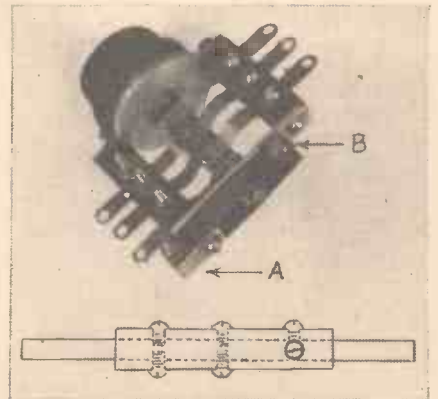
of the bulbs to see that their tips, i.e., tip contacts, do not foul the metal work, and to prevent wearing of these tips by the wiper contact "Z" (Fig. 2) a protective piece of brass strip for each bulb is included in the assembly, and is detailed in Fig. 3. The wiper contact piece is constructed from a strip of light gauge brass and assembled in the manner shown.

Wiring should be made to the completed "unit" in the manner shown, and it will be seen that the framework of the whole construction is at earth potential, and in this case L.T.—the only other wire, must go to "Z" contact, the L.T. circuit, of course, being completed by way of the ordinary switch in order that the current to the bulbs is not on the whole time. The colouring is accomplished by either painting, or by using coloured Cellophane. Fitment to panel is, of course, dependable on the type of panel employed. In my case small holes drilled in the panel was all that was necessary.—A. E. T. MAPLESTONE (Hull).

A Multi-contact Switch

THE switch herein described was constructed mainly from scrap materials. The two end plates are cut from aluminium, about 2ins. long, and are bolted on to two pieces of ebonite measuring 3/4 in. by 3/4 in. by 1 1/2 ins. The ends of these ebonite pieces are tapped 6B.A. to enable the aluminium plates to be bolted on. Three holes are drilled in each piece of ebonite to take the contact strips, which are cut from springy brass and bent so that they make good contact. A brass bush, taken from an old variable condenser, is fixed in the larger of the aluminium end plates, and in it is journaled a brass rod which protrudes through the other end plate, having fixed to it a block of brass 1/2 in. square. Two pieces of spring are bolted on to a piece of brass (A) so that they press on the brass block fixed on the end of the rod. These pieces of spring (cut from an old hack-saw blade) give a positive "snap"

action each time the rod is turned, the tension on the springs being governed by the bolt (B). On the rod is fixed a piece of ebonite 1/4 in. square and 1 1/2 in. long. This piece of ebonite is drilled with holes according to the number and position of the contacts required, and corresponding holes are drilled in the brass rod and tapped 6B.A. The ebonite block is assembled on the axle and 6B.A. bolts passed through the holes and screwed into the rod, as shown in the sketch, the heads of these bolts forming the contact studs. It will be seen that when the studs are in contact with the brass strips the latter will be connected to the frame which can be



A general view of a multi-contact switch, and a detail of the spindle.

earthed. The number and position of the studs and contacts can be arranged to suit whatever circuit in which the switch is to be incorporated.—J. BREDL (Fulham).

THE previous articles in this series have described the addition of an L.F. stage and the conversion of the original crystal detector to a valve. The next stage in the development of this receiver is to add an H.F. amplifier in order to give increased range of reception, and also to increase the selectivity obtained with the original coil. An H.F. amplifier may be added to the receiver in any form; that is, to the simple crystal set, to the crystal plus L.F. stage, to the single valve set, or to the two-valve set, and in every case exactly the same procedure would be adopted for connecting and operating it. The theoretical diagram is shown in Fig. 2 where it will be seen that a tuned circuit of exactly the same type as is used in the original receiver is required, plus an H.F. choke. In addition, of course, an H.F. valve is required. The tuned circuit is connected across the grid-filament circuit of the valve, and the anode is joined to the H.F. choke. The other end of the choke is connected to H.T.+, and the anode of the valve is then joined to the aerial terminal on the original receiver through a small condenser.

Alternative Arrangements

The beginner will find a unit of this type offers unlimited scope for experimental work, and there are several alternative schemes which may be introduced. Firstly, the coil which is used in the aerial circuit of the crystal receiver is of the simple type, and results will be improved if this is converted into an H.F. transformer. For this purpose another winding will have to be incorporated, as explained later. Secondly,

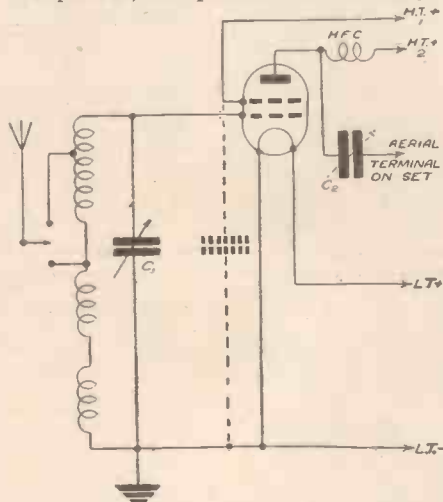


Fig. 2.—Theoretical diagram of the H.F. Amplifying Stage.

the condenser marked C2 in Fig. 2 (which is used to couple the H.F. and detector units) may be of the simple fixed type, or a small variable or pre-set component may be

FOR THE BEGINNER.

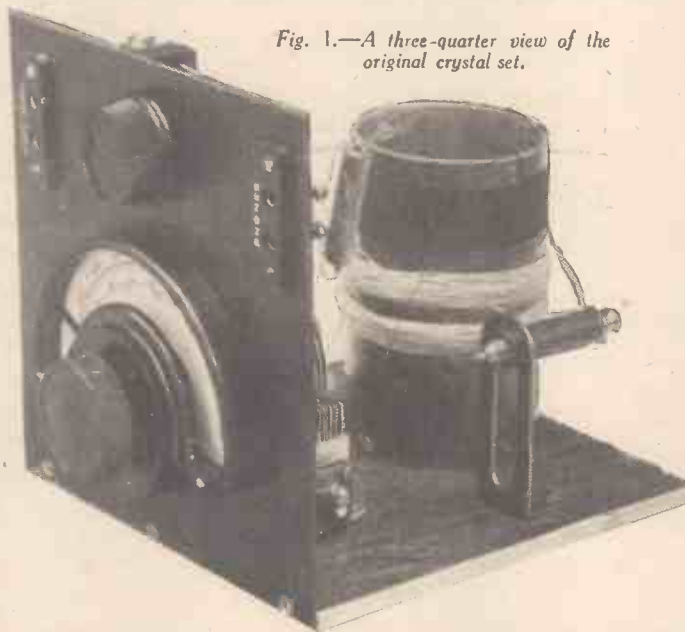
The 1937 Crystal Receiver

A Simple H.F. Amplifier With 1937 Crystal Receiver in Converted Form

fitted so that experiments may be carried out to ascertain the various effects of different capacities in this position. Thirdly, the valve used in the H.F. stage may be of the S.G. or H.F. pentode type, and each of these valves may be obtained in two distinct forms—the straight valves or the variable- μ type. The latter, of course, enables the volume to be controlled by varying the bias applied to the valve. In general, it may be stated that the H.F.

and these connections will also apply if a 4-pin H.F. pentode is used. If, however, the 7-pin type of valve is to be used, the connections are modified as shown in Fig. 5. To use the variable- μ type of valve (either S.G. or pentode) a fixed condenser and grid-leak are connected in the grid circuit, and a potentiometer is joined across

Fig. 1.—A three-quarter view of the original crystal set.



PARTS LIST.

- One paxolin panel, 6in. by 6in. (Peto Scott).
- One wooden baseboard, 6in. by 6in. by 3/4in. (Peto Scott).
- One paxolin former, 2 1/2in. by 4in. (Peto Scott).
- One Formo slow-motion condenser with Mystic dial, type SU5. (Formo Products, Ltd.).
- One rotary 3-point switch, type S 86 (Bulgin).
- One terminal socket strip (Belling-Lee).
- One condenser, fixed or pre-set (See Text).
- Quantity 22 D.C.C. wire.
- One valveholder (see Text) (Benjamin).
- One H.F. Choke, type H.F.12 (Bulgin).
- Connecting wire, flex, screws, etc.

pentode will provide greater amplification and the variable- μ valve will only be needed if the valve detector and an L.F. stage is employed, as in this case there may be a risk of overloading the output valve on signals from the local station. To provide for all of these alternatives the necessary connections are shown in the accompanying illustrations.

The Layout

The arrangement of the parts is shown opposite, and it will be noted that a single pole double-throw switch is required.

If desired, this switch may be dispensed with and a simple push-pull on/off switch employed for wave-change purposes. In this case, the aerial lead will be joined to the tapping permanently, but selectivity on the long waves will not be so good. As, however, there will now be two tuned circuits in operation, this may not be of great importance, except for those listeners living in close proximity to the Droitwich transmitter. Even in this case, however, the difficulty may be removed by fitting the Droitwich suppressor mentioned in the original article. In Fig. 2 the connections for a straight type S.G. valve are given,

a G.B. battery. The voltage of this battery will be determined by the valve which is obtained, and the valve-makers' recommendations should be followed in this respect. Preferably one of the valves known as a "short base" type should be employed, and in that case a 9-volt battery will be used. The value of the potentiometer should be 50,000 ohms, and it should be mounted on the panel on the right-hand side, to balance the wave-change switch which is mounted on the opposite side of the tuning condenser. The grid condenser may have a value between .0001 mfd. and .0005 mfd. and the grid leak may be either 1 or 2 megohms. In practice these values are not found critical, and thus any components you may have on hand may be employed. The unit may be constructed exactly on the same lines as the previous two, the same size of baseboard and panel being employed. No screening is required

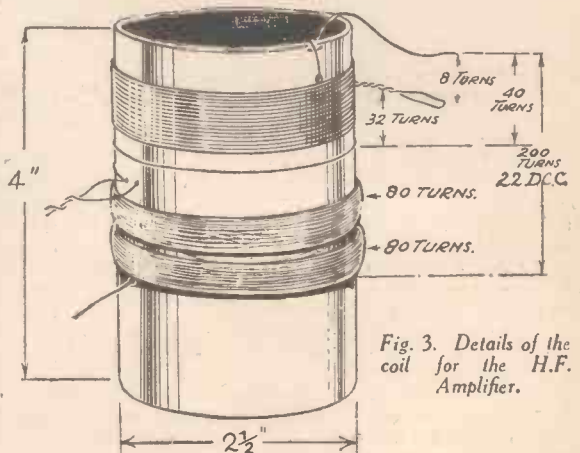


Fig. 3. Details of the coil for the H.F. Amplifier.

Crystal Set H.F. Stage

Which May Be Added to the Original or the
By W. J. DELANEY

round the coil, but if the two units are placed very close together it may be found desirable to place a thin sheet of aluminium or copper foil along the side of the cabinet in which the H.F. stage is incorporated. If, however, a single baseboard is used for all three units, or the three small baseboards are placed close together for

this is only a degree or so on the dial, but if this adjustment is not made the station will probably be reduced in strength as the reaction control is turned up. It will soon be found how far the adjustment has to be carried in order to keep the condensers in step or in tune, and the operation is very simple. A common H.T. battery will, of course, suffice to feed all of the valves, and the lead marked H.T.2 in the H.F. unit may be joined to the H.T. maximum tapping, as used for the L.F. unit. If this is not being used, then the voltage at this point should be between 100 and 120 volts. The H.T.1 tapping will be inserted into the battery at some point between 40 and 80 volts, again being guided by the valve in use and the makers' recommendations.

Making the H.F. Transformer

To convert the tuning coil fitted in the detector stage into an H.F. transformer a primary winding will have to be overwound. This may easily be done by cutting some thin strips of wood, say, one-eighth of an inch square section. These should be attached to the wire now wound on the former, ordinary sealing wax being a good method of affixing them. Six or eight strips may be used, and they should be placed so that an equal amount overlaps both the medium-wave and the long-wave winding. On these spacing strips 45 turns of a fine gauge wire (say, 28 or 30 D.C.C.) should be wound, commencing the winding about 1/4 in. from the junction point of the M.W. and L.W. windings. The commencement of this primary should be joined to the coupling condenser in the H.F. unit, and the other end should be joined to earth. Again, this winding offers field for experiment in so far as

its position, the number of turns, and spacing from the secondary windings is concerned.

Combined Leads

If the receiver is now to be built as a multi-valve set a single baseboard may take the place of the small separate units, and the battery leads may be combined. All of the points in the units marked L.T.—, L.T.+, etc., may be connected together on the baseboard, connecting together, of course, only those points which bear the same designation. The leads out to the batteries may then be taken from the end valveholder and switch, so that one switch will operate all valves and the battery leads will be reduced to the minimum and the receiver thereby standardised.

WIRING DIAGRAM

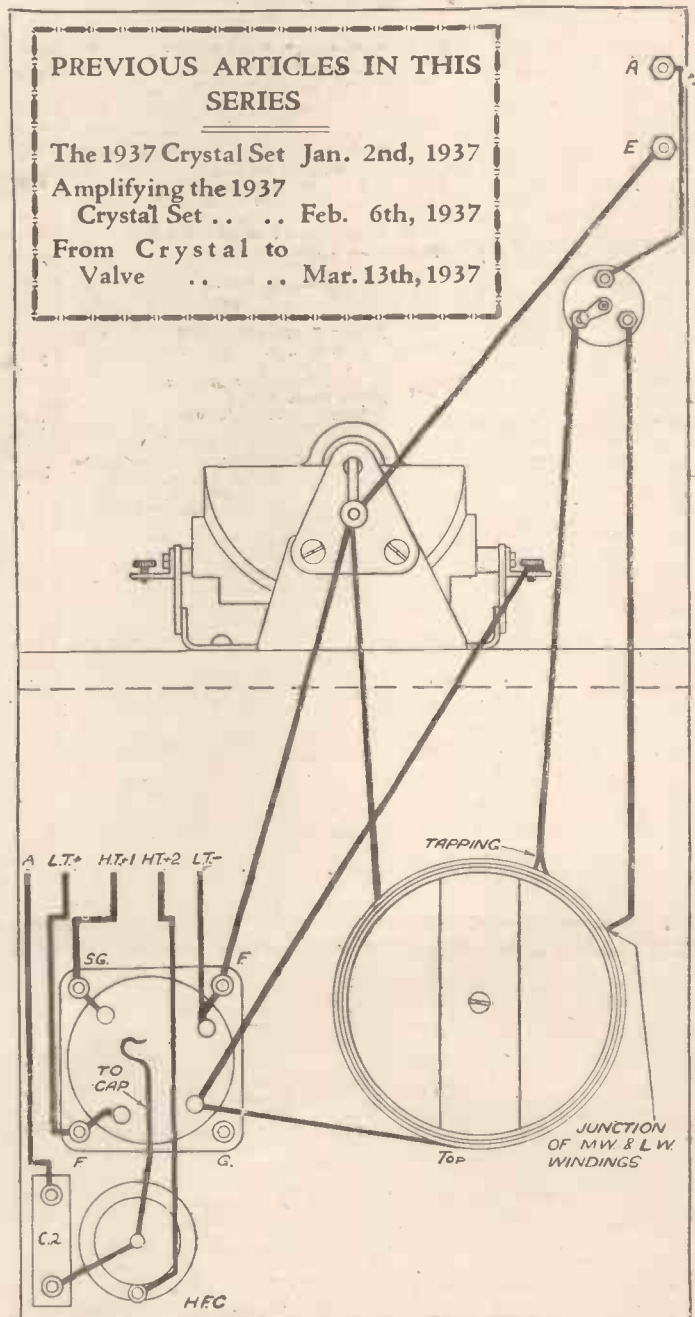


Fig. 4.—Modification for the use of a variable-mu H.F. Valve.

clusion in a single cabinet, then a vertical screen of aluminium should be attached to the baseboard to separate the H.F. and detector stages. The screen must, of course, be connected to earth to render it effective.

Operation

The operation of the complete receiver is then quite simple. The two tuning con-

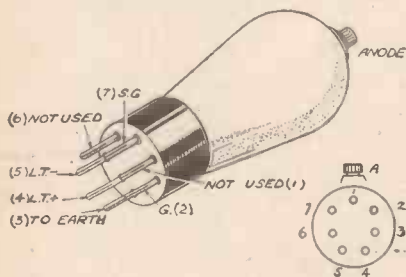


Fig. 5.—If you use a 7-pin H.F. Valve, these are the connecting points to be followed.

trols should be operated together, and it will be found that the two condensers will keep practically in step, if the coils have been wound in a similar manner. The H.F. condenser will be found to tune rather flatly, and, therefore, it should be turned slowly when searching for stations, whilst the condenser tuning the detector stage should be "swung" backwards and forwards a few degrees on either side of the setting of the H.F. condenser. The setting of reaction will modify the tuning slightly, and, therefore, if a station is located, and the reaction control is then adjusted, the detector-tuning condenser will require to be tuned to a slightly lower setting. Usually

"Practical and Amateur Wireless" Directory of Radio Clubs and Societies

So far as is known, this is the most complete Directory of Radio Clubs yet published. It is not claimed to be complete, and we shall be glad to receive the missing details as indicated, as well as details of Clubs not included here.

A
Anglo-American Radio and Television S.W. Club (Uxbridge),
11, Hawthorn Drive,
Willowbank, Uxbridge.

B
Bradford Short-wave Club,
Hon. Sec., G. Walker (2BWR),
33, Napier Road,
Thornbury, Bradford.
Bideford and District Short-wave Society,
Hon. Sec., E. K. Jensen,
5, Furzebeam Terrace,
Bideford.

British Short-wave League,
Hon. Sec., F. A. Beane,
Ridgewell,
Halstead, Essex.
British Sound Recording Assoc.,
Act. Sec., C. L. Appelby,
29, Valley Road,
Shortlands, Kent.

Battersea and District Radio Society,
Hon. Sec., S. F. Harris,
93, Salcott Road,
Battersea, S.W.11.

Bec Radio Society,
9, West Way,
Grand Drive,
Raynes Park.

Bournville Radio Society,
Hon. Sec., C. L. Bastock,
c/o Messrs. Cadbury Bros.,
Bournville.

Bradford Experimental Radio Society,
Hon. Sec., E. P. Burgess,
23, Baslow Grove,
Heaton,
Bradford.

Blackpool Short-wave Club.
Names and addresses of Secretary and officials required.

Bristol Radio Club.
Names and addresses of Secretary and officials required.

Blackwood Radio and Television Club.
Names and addresses of Secretary and officials required.

Brentwood Amateur Radio Society,
Hon. Sec., N. K. Read,
Netherton,
Herington Grove,
Hutton Mount,
Brentwood.

C
Croydon Radio Society,
Hon. Pub. Sec., E. L. Cumbers,
Maycourt,
14, Campden Road,
S. Croydon.

Cardiff and District Short-wave Club,
Hon. Sec., H. H. Phillips,
132, Clare Road,
Cardiff.

Croydon Wireless and Physical Society,
Hon. Sec., H. J. P. Gee,
c/o Messrs. Gee & Co.,
Staple House,
Chancery Lane, W.C.1.

Coventry Short-wave Club.
Names and addresses of Secretary and officials required.

City of Belfast Y.M.C.A. Radio Club.
Names and addresses of Secretary and officials required.

Chadwell Heath and District Radio Society.
Names and addresses of Secretary and officials required.

City and Guilds Eng. College Radio Society,
Hon. Sec., R. H. Tanner,
South Kensington,
London, S.W.1.

The Clackmannanshire Short-wave Club,
Hon. Sec., W. Davidson,
12a, Friskine Street,
Alloa, Scotland.

D
Deptford Men's Institute Short-wave Radio Society,
Hon. Sec., J. T. Parker,
48, Nigeria Road,
Charlton, S.E.17.

E
Exeter and District Wireless Society,
Hon. Sec., W. J. Ching,
9, Sivell Place,
Heavitree, Exeter.

Eastbourne Town and District Radio Society,
Hon. Sec., G. H. Thorpe,
Hampden Park,
Eastbourne.

Empire Amateur Radio League,
Hon. Sec., E. N. Adcock (G2DV),
206, Atlantic Road,
Erdington,
Birmingham.

F
Folkestone Radio Amateurs,
Hon. Sec., S. W. Thompson,
70, Sandgate Road,
Folkestone.

G
Golders Green and Hendon Radio Scientific Society,
Hon. Sec., Col. H. Ashley Scarlett,
60, Pattison Road,
Hampstead.
Glasgow and District Radio Club,
Hon. Sec., J. Hair,
42, Maryland Drive,
Glasgow, S.W.2.

H
Halifax Experimental Radio Society,
Hon. Sec., J. B. Bedford,
Oak House,
Triangle, Nr. Halifax.

Marco Radio Club,
Hon. Sec., C. W. Kemp,
124, River Way,
Greenwich, S.E.10.

Hastings and St. Leonards Radio Society,
Names and addresses of Secretary and officials required.

Heathfield Radio and Television Society,
Hon. Sec., R. J. Lee,
9, Theobalds Green,
Heathfield, Sussex.

Hackney and District Wireless Club,
District Rep., E. Penrose,
2, Coopersale Road,
Homerton, E.9.

I
International Short-wave Club (London),
Hon. Sec., Arthur E. Bear,
100, Adams Gardens Estate,
London, S.E.16.

Ipswich and District Amateur Radio Society,
Hon. Sec., D. H. Barbrook (G8AN),
Radio House,
St. Peter's Street,
Ipswich.

International Short-wave Club (St. Peter's Port).
Names and addresses of Secretary and officials required.

International Short-wave Club (Brighton).
Names and addresses of Secretary and officials required.

International Short-wave Club (Manchester),
Hon. Sec., R. Lawton,
10, Dalton Avenue,
Thatch Leach Lane,
Whitefield.

K
Kentish Town and District Radio Society,
46, Lady Margaret Road,
Kentish Town, N.W.5.

Kew Ministry of Labour Radio Society,
Ministry of Labour,
Ruskin Avenue, Kew.

Kidderminster and District Radio Club,
Hon. Sec., H. A. Brown,
12, Stourport Road,
Kidderminster.

Kingston and District Amateur Radio Society,
Hon. Sec., R. K. Sheargold,
Reculver,
Manor Lane,
Sunbury-on-Thames.

L
Leeds and District Radio Society,
Hon. Sec., J. Kavanagh,
63, Dawlish Avenue,
Leeds.

Lambda Radio Society,
4, Howley Street,
York Road, S.F.1.
Leicester Amateur Radio Society,
Lutterworth,
Leicester.

M
Medway Amateur Transmitters Society,
117A, Trafalgar Road,
Gillingham, Kent.
Midland Amateur Radio Society,
Names and addresses of Secretary and officials required.

Merchant Taylors' School Radio and Television Society,
Hon. Sec., R. B. Gardner,
91, Clarence Gate Gardens,
London, N.W.1.

Morpeth Amateur Radio Society,
Hon. Sec., O. L. Towers,
2, Edward Street,
Morpeth.

N
Newbury and District Short-wave Society,
Hon. Sec., L. B. King,
12, Northfield Avenue,
Newbury.

Newark News Radio Club,
215, Market Street,
Newark, New Jersey.

North Manchester Radio Society,
Hon. Sec., E. Lawton,
10, Dalton Avenue,
Thatch Leach Lane,
Whitefield.

New Eltham Ratepayers Ass. (Radio Section),
Hon. Sec., E. A. Gillborn,
87, Montbelle Road,
New Eltham, S.E.9.

New Zealand DX Radio Association,
Hon. Sec., E. Watson,
37, Chancellor Street,
Christchurch, N.Z.

Nelson and District Radio Club,
Names and addresses of Secretary and officials required.

Newport and District Radio Club,
Names and addresses of Secretary and officials required.

Northern Ireland Radio Society,
Hon. Sec., F. A. Robb,
46, Victoria Avenue,
Sydenham, Belfast.

Newtownards Amateur Radio Club (N. Ireland),
Hon. Sec., T. L. Kirk,
Chapel View,
Newtownards, Ulster.

O
Oxford Short-wave Radio Club,
Hon. Sec., E. G. Arthurs,
13, Walton Well Road,
Oxford.

P
Portsmouth and District Wireless and Television Society,
Hon. Sec., Harold Leigh,
20, King Street, Southsea.
Peterborough Short-wave Club,
Names and addresses of Secretary and officials required.

Prestatyn Short-wave Club,
Hon. Sec., E. L. Stelling,
Romer,
Victoria Road, Prestatyn.

R
Radio, Physical and Television Society,
Hon. Sec., Mr. V. R. Walker,
49, Fitz-James Avenue,
London, W.14.

Reading Short-wave Club,
Names and addresses of Secretary and officials required.

S
Southall Radio Society,
Hon. Sec., H. F. Reeve,
26, Green Drive,
Southall.
Swindon and District Short-wave Society,
Hon. Sec., W. C. Barnes (2BWR),
7, Surrey Road, Swindon.

Sutton-in-Ashfield Society,
Hon. Sec., A. W. Fowler,
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Hon. Sec., J. T. Webber,
368, Brigstock Road,
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Southend and District Radio and Scientific Society,
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S.T.C. Radio Experimental Society,
Names and addresses of Secretary and officials required.

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Tottenham Wireless Society,
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Tottenham, N.17.

Tottenham Short-wave Club,
Names and addresses of Secretary and officials required.

Thames Valley Amateur Radio and Television Society,
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Torrington and District Short-wave Club,
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1, Halston Road,
Torrington, N. Devon.

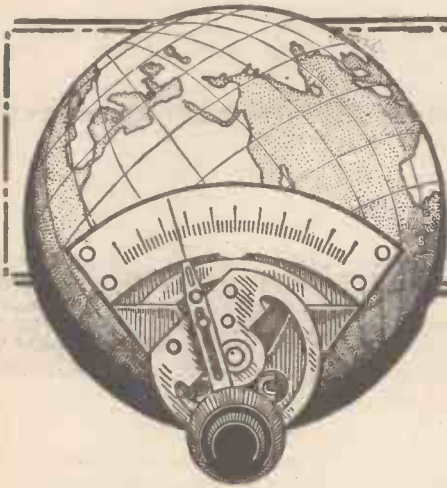
W
Wellingborough and District Radio Society,
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SHORT WAVE SECTION

AN EXPERIMENTAL ADAPTER FOR 5-160 METRES

Constructional Details of a Plug-in Adapter Using Suitable Components on Hand, are Given in This Article = = = - By A. W. MANN

Appreciating the advantages of wave-change switching, many short-wave enthusiasts incorporate dual-range coil units or tuners in their short-wave receivers.

The maximum and minimum tuning ranges of a dual-range coil when used in conjunction with the recommended tuning capacity, are definitely limited, but in most instances cover the short-wave broadcast, and two or three amateur bands.

Experimenters who favour the use of plug-in coils, do not suffer the disadvantage of range restriction, because suitable coils are available which enable them to tune higher or lower in frequency at will, providing that a suitable receiving circuit is used. Rapid progress is being made in the ultra-short-wave field, and whilst almost everyone is keenly watching developments, practical experimenters are in the minority.

The average experimenter works under difficulties, and for various reasons his equipment is limited. This also applies to short-wave experiments generally, and incidentally is the reason for the growing popularity of short-wave adapter and converter units.

Some time ago the writer decided to build an experimental ultra-short-wave adapter incorporating various components on hand which were of suitable design and construction. Requirements were governed by the limited time available, which meant that the adapter must function when completed without a lot of adjustment and experiment.

The idea was to have apparatus suitable for 10 metre reception available when this band opened up again, and which could be used for 5 metre reception whenever local transmissions on that band were available. The only snag, however, appeared to be concerned with the necessity of uncoupling the adapter when it was desired to listen over the usual short-wave broadcast and amateur bands. The obvious solution was to build an adapter unit which could be

tuned from 5 metres up to 160 metres, which appeared at first to be rather a tall order.

Whilst it is possible to get down to the ultra-short waves using a standard receiver of good design, results cannot be regarded other than as a compromise, and whilst commendable in order to obtain a working knowledge, cannot compare with the use of apparatus specially designed for the purpose.

Other things being equal, it occurred to

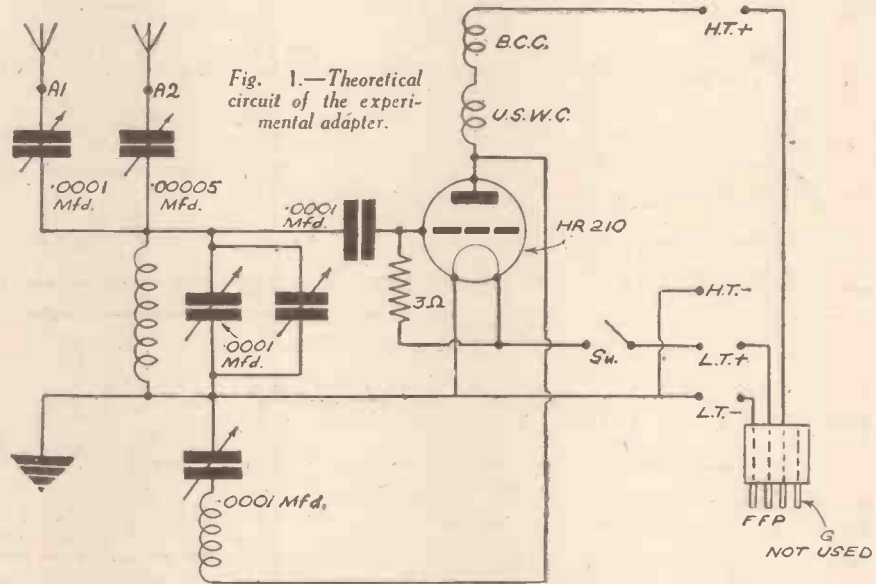


Fig. 1.—Theoretical circuit of the experimental adapter.

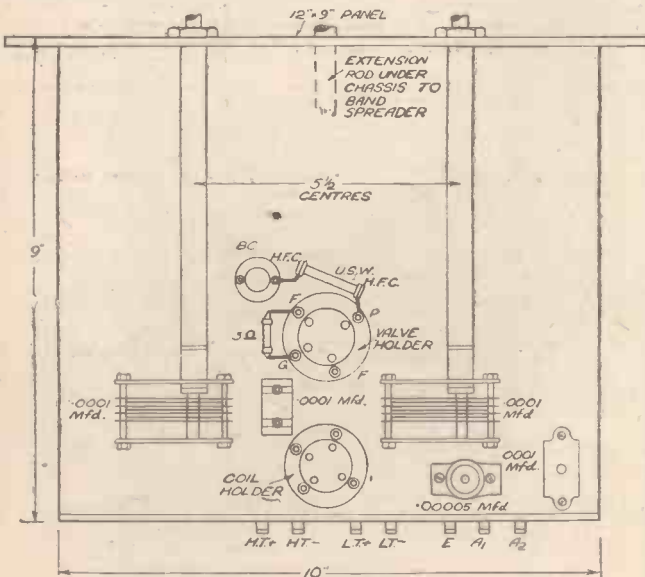


Fig. 2.—This layout diagram shows the best method of arranging the parts for this unit. The chassis is constructed from plywood, with side runners 2 1/2 in. deep. A plywood panel is employed.

the writer that an efficient ultra-short-wave adapter could, with slight modification, be used for reception over the higher wavebands, if a suitable circuit and plug-in coils were used.

It was decided, however, to tackle the problem from the ultra-short-wave standpoint, and along predetermined lines, and the first consideration was the choice of a suitable circuit.

The Reinartz Circuit

Fig. 1 shows in theoretical form the circuit chosen, which is a modified Reinartz. Stability and ease of control, together with good sensitivity, are its salient features.

A good circuit theoretically, if it is to come up to expectations in the practical sense, must be combined with a suitable layout, and whilst cramping must be avoided, the layout must be compact in the interests of short and direct wiring; also, excessive damping must, in the interests of sensitivity, be avoided.

Fig. 2 shows the general layout. A 10in. by 9in. by 2 1/2in. chassis is used, together with a 12in. by 9in. by 1/2in. panel, both of plywood.

(Continued overleaf)

SHORT-WAVE SECTION

(Continued from previous page)

wood construction. It should be noted, incidentally, that neither chassis nor panel is foil lined, or screened in any way, and that all components other than the band-spreading condenser, but including the tuning and reaction condensers, are mounted directly on the chassis. Mooring clips may be used if found necessary.

Aerial Tuning

It will be noted that two separate aerial terminals, together with their associated series tuning condensers of the pre-set or semi-variable type, are shown, and a little explanation will no doubt make matters clear.

The respective aerial series condenser values are as follows: A1=.0001 mfd.; A2=.00005 mfd.

For reception on the ultra-short range and 16 metres-50 metres range, the .00005 mfd. condenser is quite satisfactory. Above the latter wavelength, however, the .0001 mfd. condenser should be used.

A short-wave adapter, converter or receiver, will prove to be inefficient if an unsuitable H.F. choke is used. Experimenters sometimes overlook this fact, which is undoubtedly responsible in many instances for unsatisfactory results above 80 metres.

If when a particular wavelength in the tuning range is reached it is found that reaction is obtainable either side of the dial reading, and decreasing regeneration produces a terrific howl, it is apparent that the point of maximum choking efficiency has been exceeded.

The writer used a small unshielded H.F. choke guaranteed to function efficiently below 10 metres and up to 100 metres, and wired in series with it a broadcast type H.F. choke known to func-

tion satisfactorily from well below 200 metres.

Tests proved this combination to function efficiently from 5 metres to 160 metres.

Reverting to Fig. 2 it will be noticed that a third extension rod (shown broken off and in dotted lines) is mounted under the chassis and central in relation to the tuning and reaction condensers. This extension rod is coupled to the band-spreading condenser, which is mounted beneath the chassis on a wooden bracket.

This method of construction enables the wiring between the respective condensers to be kept comparatively short, and as the band-spread tuning control is below the chassis centre line, gives a comfortable tuning position.

Band-spreading

As the main tuning condenser is of .0001 mfd. capacity, and the ultra-short-wave ranges are to be covered, band-spread tuning is not only desirable, but necessary. The .0001 mfd. condenser being used as the tank or band-setting condenser.

To incorporate any small capacity variable condenser, or even standardised band-spread condensers, may or may not give the desired amount of band-spreading, and in the present instance, a certain amount of experiment was thought desirable.

A Raymart 15 mmfd. band-spreading condenser was used during the initial experiments. It was later decided to modify it in order to increase the spread. The fixed plate and associated soldering tag were removed. The soldering tag and a washer of equal thickness were then fitted to act as additional spacing washers, and the fixed plate refitted.

It is important to remember when using the parallel system of band-spreading, that the spread is not constant over all bands, therefore, it is necessary to strike

a compromise, and in this instance to keep ultra-short-wave requirements in mind.

With reference to the construction of ultra-short-wave coils, circuit and component differences may have a marked effect as to the number of turns required, and the relations existing between the windings. In order to obtain an approximate idea as to individual requirements, an experimental four-pin former is advisable.

The following data, however, will help and require little, if any, modification.

10 METRE COIL

24 gauge copper enamelled wire,
3 turns grid.
3 turns reaction.
Spaced $\frac{1}{8}$ inch between turns.
Distance between coils $\frac{1}{8}$ inch.

5 METRE COIL

1 $\frac{1}{2}$ turns grid, 2 turns reaction.
Spaced $\frac{1}{8}$ inch between turns.
Spacing between coils $\frac{1}{8}$ inch.
Formers 1 $\frac{1}{4}$ inches diameter.

Using an HR 210 valve as the detector, it is possible to obtain smooth regeneration over all bands. The plate voltage, however, must be increased to between 90 volts and 115 volts for best results.

Standard four-pin plug-in coils such as Eddystone, B.T.S., etc., are in common use nowadays, and there is no reason why coils of the above, or any other makes, should not function efficiently when used in conjunction with an adapter of this type.

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Leaves From a Short-Wave Log

Tunis Testing

SOME confusion has been caused by the fact that on fairly neighbouring channels listeners have picked up experimental broadcasts from both Bizerta and Tunis. The truth is that the new short-wave transmitter now operating on 48.68 m. (6.163 mc/s), following tests made around 49 metres, is actually situated at Bizerta (Tunisia). The call, as a rule is *Poste Bizertin experimental*, and tests are usually made at about G.M.T. 20.30. It is shortly proposed to give regular broadcasts twice daily, namely, from G.M.T. 13.30-14.00 and again between G.M.T. 21.00-22.00. The interval signal consists of one stroke on a gong reminiscent of Radio-Toulouse. The broadcasts are also well heard on the half-wave, 24.34 m. (12.325 mc/s), and this has led listeners to believe that the station is using two channels. Reception reports should be sent to *Poste Bizertin, Boite Postale, 72, Bizerta, Tunisia (North Africa)*.

A Lesser-heard Transmitter

With luck you may occasionally pick up the call: *Hello! This is Johannesburg*, followed by an announcement in Afrikaans (Cape Dutch). The wavelength, although advertised as 49.2 m. (6.097 mc/s) appears to be slightly higher or about 49.25 m. (6.091 mc/s). As a daily schedule the station

has adopted: G.M.T. 04.45-07.30; 08.15-12.00; 14.00-16.30 and 19.00-20.00. For reception in the United Kingdom the channel does not seem a favourable one, although the distance separating Johannesburg from London is not much more than 5,500 miles; yet, JZH, Tokio, on approximately the same wavelength, and somewhat farther away, is very well heard.

Try for Panama

Another distant station which is worth your while to log is HP5K, Colon, on 49.96 m. (6.005 mc/s), styling itself—as do many others—*La voz de la Victor*. Three broadcasts are carried out daily, namely: G.M.T. 12.30-14.00; 17.00-18.00 and 23.00-02.00 with both Spanish and English used

in announcements. The address is: Apartado Postal, 33, Colon, Republic of Panama.

On the same wavelength at G.M.T. 08.30-09.45 and 12.00-18.00 you may find FIQA, the French station at Antananarivo (Madagascar), which has now resumed its transmissions. It opens with the playing of that erstwhile popular melody *Ramona*, and closes down with the *Marseillaise*. Address: Poste d'émission, FIQA, Hôtel des Postes, Place Colbert, Tananarive (Madagascar).



The Swindon and District S.W. Society seen during their recent QRK Cup competition. Photo by courtesy of the Swindon Evening Advertiser.

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IMPRESSIONS ON THE WAX

By
T. Onearm

Panachord

JACK NORTH and his Orchestra have recorded "There's a Small Hotel," from the film "On Your Toes," and "The World is Mine Tonight," from "The Gay Desperado," on *Panachord* 25902, whilst **Bradley Kincaid** gives a vocal rendering of "The True and Trembling Brake-man" and "The Lightning Express" on *Panachord* 25901.

H.M.V.

THE LONDON PALLADIUM ORCHESTRA play a selection from "The Vagabond King," which is now being revived at the London Coliseum, on *H.M.V. C* 2895. A particularly clever record is a symphonic arrangement of ragtime tunes called "Ragging the Rag," arranged by **George Walter** on *H.M.V. C* 2896. Coupled with it is "The Whirl of the Waltz."

There is also a selection from the great West End success "Balalaika" by the same orchestra on *H.M.V. C* 2894.

Anton and the **Paramount Theatre Orchestra**, London, with **Al. Bollington** at the organ, offer a selection from two of the new films "Banjo on my Knee" and "Champagne Waltz" on *H.M.V. BD* 415, while **Louis Levy** and his **Gaumont-British Symphony** are represented by "Taking a Stroll Around the Park" from the film "Variety Parade" and "Turning the Town Upside Down," from the film "O.H.M.S." on *H.M.V. BD* 416. **Reginald Foort** has chosen a selection from "The Mikado" as his second record on the new **B.B.C.** theatre organ, and **Sullivan's** haunting melodies suit this medium very well—*H.M.V. BD* 418. "Fats" **Waller**, the American swing pianist and band leader, plays two of his own compositions as piano solos, "Smashing Thirds" and "African Ripples"—*H.M.V. B* 8546. **Barnabas Von Geczy** and his Orchestra play two favourites very daintily, **Toselli's** "Serenade" and the **Serenade** from "Les Millions d'Arlequin"—*H.M.V. B* 8551.

Popular Favourites

PETER DAWSON is robust as usual in "The Fleet's Not in Port Very Long," from the film "O-Kay for Sound," and "The Rivetter" which was one of the winners in the recent **B.B.C.** "Songs You Might Never Have Heard" feature—*H.M.V. B* 8554.

Stuart Robertson also chooses film songs—"Watching the Stars" and "Flying High," both from "Splinters in the Air"—*H.M.V. B* 8552. **June Knight**, a newcomer to these lists, sings songs from the "Lilac Domino" film, the "Waltz Song" and "My Heart will be Dancing," on *H.M.V. B* 8555, and **Connie Russell**, the 16-year-old American swing vocalist has recorded two popular numbers in "Harbour Lights" and "There's Frost on the Moon" on *H.M.V. BD* 414.

Max Miller is inimitable in two of his **Millerisms**, "Why Should the Dustman Get It All" and "You Can't Blame Me for That"—*H.M.V. BD* 417.

Brunswick and Decca

GRACE MOORE, the star of "One Night of Love," has recorded this month for **Brunswick** four songs from her latest film "The King Steps Out." They are "The End Begins" coupled with "What Shall Remain" on *Brunswick* 02233 and "Stars in My Eyes" and "Learn How to Lose" on *Brunswick* 02234.

Brunswick 02367 is the number of the latest **Mills Bros.** record, which is one of the best they have made. The tunes they have chosen are "Pennies from Heaven," from the new **Crosby** film of the same name, and "Swing for Sale"—in swing style—which adds a pleasant variety to the record.

From the Films

AMBROSE and his Orchestra have made a number of new recordings this month. The first record, *Decca F* 6339, offers two tunes that have already been leading hits in America. They are "Good-night, My Love," from the new **Shirley Temple** film "Stowaway," and "The Night is Young and You're so Beautiful," from the film "And On We Go." On *Decca F* 6328 he has recorded two hits from the English film "London Melody"—"Jingle of the Jungle" and "The Eyes of the World Are on You." The former tune gives ample opportunity to the brass section of the band. His other records include all the most popular tunes of the moment.

Jack Jackson and his Band make their first *Decca* records this month with "Timber" coupled with "There's Frost on the Moon" on *Decca F* 6315 and "Turning the Town Upside Down" from the film "O.H.M.S." and "Baby, Watcha Gonna Do To-night?" from the amusing **Will Hay** film "Good Morning, Boys," on *Decca F* 6326.

An old **Brunswick** favourite, **Chick Webb**, offers a couple of popular tunes on *Brunswick* 02381. Something new in **Chick Webb's** recordings is the vocal trio (Ella Fitzgerald—**Louis Jordan**—**Charles Linton**) who take the chorus in "There's Frost on the Moon." On the reverse is "Love Marches On."

Decca Polydor

AN interesting operatic record this month is *Decca Polydor DE* 7070, which features three of Europe's greatest opera stars. On one side is **Erna Bergner** (soprano) and **Heinrich Schlusnus** (baritone) singing "Reich' Mir Die Hand Mein Leben" (Give Me Thy Hand, O Fairest), from "Don Juan," and **Erna Bergner** appears with **Viorica Ursuleac** on the other side singing "The Letter Duet," Act 3 (from "The Marriage of Figaro").

Another interesting record is *Decca Polydor CA* 8268, on which the **Berlin State Opera Orchestra** record some of the most sparkling music from the greatest of all modern comic operas "Der Rosenkavalier."

BRIEF RADIO BIOGRAPHIES—6

By RUTH MASCHWITZ

Anona Winn

WHEN Anona Winn left school she decided that she would like to be a barrister, but her father firmly put down his foot and forbade any such thing. Always a good mimic, Anona turned her thoughts to the stage and then to music. An Australian, she was lucky in having the opportunity to study with Melba.

At their first interview the prima donna asked her name and when the timid answer was "Anona Wilkins" she frowned heavily. "Do you suppose you can sing with a name like that?" she asked. Change it to Anona Winn and I'll teach you, but not unless!"

Anona was anxious to get a job, and before her training was completed she ran away to join the chorus of a touring company of "The Merry Widow." After that engagements of all sorts followed thick and fast in "straight" plays, musical comedy, pantomime, revue and concert party.

Her outstanding qualities are her persistence and thoroughness. Early in her career in Australia she combined the rôles of heroine in melodrama and stage manager. Just to leave nothing to chance, with her own hands she painted blood-curdling posters on the theatre walls at dead of night!

She tells an amusing story of an incident that happened when she was touring in India. An admirer presented her with a case of chianti, and because it seemed a pity to undo the case to take out one bottle at a time, she travelled with it for hundreds of miles, paying immense sums for carriage and porters. Eventually at a party in Karachi the case was opened with great ceremony. Not a drop of wine was left! The natives had helped themselves and refilled the bottles with water!

Had it not been for her persistence we might never have heard Anona on the air. She became famous as a radio star in Australia and India, but that was not enough—London called. Over she came and applied for an audition at Savoy Hill. Strange to say the official who heard her was not impressed, and she was refused a date. However, she was not to be deterred and turned up the following week with new material. She was given an engagement at once!

Mantovani

Born in Venice, Mantovani was brought to England by his parents when he was four years old. From an early age he was taught the violin by his father who was a musician. His great ambition was to lead his own orchestra, and at the age of eighteen he was leading and conducting the Salon Orchestra at the Metropole and at the same time appearing on various concert platforms. At the Monseigneur he organised his Tipica Orchestra, and after a while was engaged by the Café de Paris. He has subsequently played at the Hollywood Club and the San Marco.

There is an interesting story about Mantovani's violin. One night when he was playing at Monte Carlo Mantovani senior was summoned by one of the audience—a Russian princess—who criticised

the tone of his violin. She then offered him a magnificent instrument two hundred years old, but warned him of its evil reputation. The original owner, a young Russian of royal blood was thrown from his horse and savaged to death a few weeks after buying the violin. His brother, who had it next, lent it to a musician at a palace ball—and died just after dancing to its strains, from heart failure. The young man's aunt was given the fiddle as a keepsake, and passed away two months later. Her son, who played at her request by her sick-bed, was assassinated shortly afterwards! So its history continued.

However, Mantovani was undismayed and promised it to his son when he could perform Paganini's Concerto without a mistake. This he did at the age of sixteen

and for the last thirteen years it has brought him nothing but success.

To his great embarrassment on one occasion his playing so enchanted a young woman that she rushed into his dressing room, fell into his arms and announced that she loved him! His manager came to the rescue and gently broke the news that Mantovani already had a wife!

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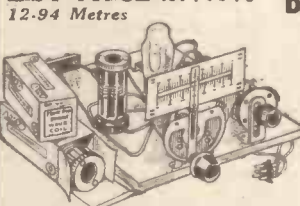
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LETTERS FROM READERS

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).

Broadcast from Spanish Fighting Line

SIR,—I note in a recent issue of your journal, under the heading "Leaves from a Short-Wave Log," that mention is made of a broadcast that "appears to come direct from the fighting line." I have some information upon this broadcast that may be of general interest.

On February 19th I picked up a broadcast on 20 metres. The station called itself "EARR, the official station in the service of General Franco in front-line trenches of Madrid."

He went on to say that he had only adopted 20 metres the previous day. This station then contacted G5ZJ. I reported this transmission to San Sebastian and received a QSL card, which had printed on it in red lettering: EAJ8, Radio Requetè. The design in the centre of the card is a double eagle (black) wings a-spread, surmounted with a black crown. In the centre of the eagles is a shield with some device in red that I have not been able to decipher. On the back of the card is printed a note of thanks for "Your report of our broadcast from EARR—General Franco's trenches in front of Madrid." For the benefit of those who wish to report these transmissions I give the address and wavelength:

Address reports: Radio Requetè, Avenida 27, San Sebastian, Spain.

Radio Requetè, Madrid front, 41.5 m., 7,229 kc/s, 1 kW.

Radio Requetè, Malaga, 42.26 m., 7,099 kc/s, 1 kW.

The above wavelengths are taken from a leaflet received with the QSL card.—F. C. SMITH (Barry Dock).

Logged on a One-valver

SIR,—I have just started listening on the short waves after leaving wireless alone for nearly nine years. I started off by using an old set dragged out of the junk box with swing coil reaction, and managed to log a few G stations. Decidedly, this was not good enough, so I made up the America one-valver (*Amateur Wireless*, March 31st, 1934), adding pentode output, and started using it from February 7th. I have already logged over eighty G stations, but I give below a list of stations received on this little set on March 20th, 1937, from 5.10 p.m. to 7.5 p.m. on 40 m.: G5QC, G5GJ, G6NA, EI6F, G5PH and G8BX. On 30 m. 11.20 p.m. to 1.10 a.m. March 21st: EAQ, 2RO and W2AXF. On 20 m., from 1.30 a.m. to 3.15 a.m.: W1BLO, W4BY, W2GFA, W2ACB, W4CRA, W9AYJ, W2DSB, W3FIH, W8HZU, LU7AY, XE1AX, SV1KE and VT9V or BT9V. 8 a.m. to 9.25 a.m.: W4AH, H8AM, W9APW, ON4ZA, PANVS, ON4FL, LAIG and PAZVV. On 40 m., 1 p.m. to 7.15 p.m.: G5PH, G8CS, G5QC, G6AG, G2FM, G8BA, G15WD, G5YV, G6ML,

GM6RV, GM6UU, G8LX, G8IH, G8GA, EI6F, G6TZ, and G6ZA. 7.40 p.m. to 10.45 p.m.: SM5SV, W3DLL, W8QQG, N1F1, W1BLO, W3GFH and W3EMM. All these stations, except those logged between 1 p.m. and 7.15 p.m. on the 21st, were working in a DX competition.—J. E. BOWDEN (Paignton, Devon).

S.W. Station EAQ2 (Madrid)

SIR,—I wish to report reception of a new official Madrid short-wave station the details of which are as follows:—

Wavelength: 31.65 metres.

Power: 20 kilowatts.

Call: "The Voice of Spain," EAQ number 2.

English news: Daily (except Monday) 7.30 p.m., 11.30 p.m. and 12.30 a.m., G.M.T. Monday: 12.30 a.m. G.M.T. only.

Reports are requested and should be addressed to Madrid EAQ2, Box 951, Madrid, Spain.—A. P. L. CASLING (Hale, Cheshire).

A 10-metre Log from Lancashire

SIR,—No doubt you will be interested to see a ten-metre "phone" report from Lancashire, so I herewith enclose mine. W1WA, W1AAK, W1WC, W1CQQ, W1JZA, W1IAO, W1WV, W1DQK, W2KAX, W2AMN, W2HFS, W2DKJ, W2GFH, W3FKK, W3GO, W3GPM,

CUT THIS OUT EACH WEEK.

Do you know

—THAT the colour-coding scheme is applied to fuses as well as to resistors.

—THAT a new aerial is being erected on top of the present television aerial array for use with mobile transmitters.

—THAT camera lenses as in ordinary cinema work are employed for television broadcasts.

—THAT H.F. chokes will remove interference via main leads, but must be capable of carrying the current supplied to the receiver.

—THAT care should be exercised to prevent alkaline solutions from coming into contact with aluminium radio parts.

—THAT similarly, acids should be kept clear of copper and other wires in a receiver.

—THAT the aerial lead should not be allowed to pass close to the loudspeaker leads, and if this is unavoidable, a right-angle crossing should be formed.

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 Newman, 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.

W3FIU, W3GHS, W3EYS, W3ZX, W3EBC, W4EDF, W4EBM, W4CY, W5DSH, W5END, W6KEI, W6DWR, W8HSP, W8CFV, W8CFD, W8FC, W8DW, W8ANO, W9PTH, W9WMT, W9BHT, W9EKD, W9TTD, W9MXW, VE2KX, and G5ML who was in QSO with W2GFH.

These stations were heard at various times from February 27th to March 25th. My receiver is an 0-v-2 using standard plug-in coils, one of which covers 13-26 metres. I have taken off a couple of windings so as to get down to the required band.

The antenna consists of one 8ft. length of seven-stranded insulated copper wire and pointing due east.

My earth lead is about 10ft., and is joined to a water tap.—BERNARD TOOTELL (Bolton).

The All-wave "Unipen"

SIR,—I notice in PRACTICAL AND AMATEUR WIRELESS dated March 20th a letter from G. T. (Barrow-in-Furness) in which he wants to know how he can use a B.G. Tuner, and you advised the "All-wave Unipen. I am using this fine little set, and if this should catch his eye I can let him have the constructive issue if he requires it.—G. W. CLAYTON (Romford).

On the 14mc. Amateur Band: Correspondent Wanted

SIR,—In view of the fact that conditions on the 14 mc. amateur band have been almost perfect for the last month I enclose a log of some stations heard here recently. My receiver is an 0-v-Pen with a 75ft. outside aerial, 28ft high, and pointing north-east. As I listen in bed between 07.30-09.00 and 22.45-23.30, my earth lead is about 30ft. long. I have been a regular reader of both PRACTICAL WIRELESS and *Amateur Wireless* since 1932, and have been listening on all short-wave amateur bands (56 mc.-1.7 mc.) since 1933.

I shall be pleased to correspond with any S.W.L. of my own age (17½ years) in any part of the world in French or English. Thanking you for many hours of pleasant reading.—EDWARD SUTCLIFFE (4, Hydes Brow, Rainford, St. Helens, Lancs).

[We are very interested in your log, which, however, was much too long to publish.—ED.]

Back Numbers Wanted

WE have a request for copies of PRACTICAL WIRELESS dated October 27th, and November 3rd, 1934. Any reader having these copies to spare is asked to send them along to our office at Tower House, Southampton Street, Strand, London, W.C.2.

A 10-metre Log from Cheltenham

SIR,—Having seen several 10 m. DX reports in your paper, I thought that mine might interest readers. These stations were logged on the 21st March, 1937, from 15.28 to 20.26 G.M.T. All W districts were received, and the details are as follows: W1BCQ and CW; 7W2's including 2HIS and 2DNG; 6W3's; W4AC, DEY, PD; W5FWH, EIE, DDP; W6MPS, CAR, NLF, MTN; W7ALP; W8LAC, EMH, NSF, POL, CPN, DXK, CYT, HSP; W9LIX, EII; also VE3MB and YR5AA. My receiver is an 0-v-1, using an inverted-V antenna beamed on U.S.A. by half-wave antenna behind it. None of these were C.W. stations.—G. R. LEWIS (Cheltenham).



COMPONENTS TESTED IN OUR NEW LABORATORY

Tungram Octal Valves

THE Tungram Electric Lamp Company announce that they now include in their octal range of valves replacements or equivalents for the Marconi and Osram range of International Valves recently reviewed in these pages. In addition to these they include certain types of universal valve for superhet circuits. They also include a complete range of American-type equivalents, fitted with the octal base.

New Goltone Leads

A NEW lead of novel design is announced by Messrs. Ward and Goldstone. It is a flat flexible assembly consisting of two strands of either 14/36 or 23/36 wire with a thin rubber covering. This is in one piece, but is much thinner between the leads so that they may easily be separated for connection to any apparatus. The rubber covering is overlaid with art. silk or cotton fabric in various colours, and it is claimed that exceptionally high insulation and retention of shape are assured. The price for the thinner variety is 12s. 11d. and the heavier gauge 15s. 5d. per 100yds.

Bulgin Calibrated Resistor

SERVICE engineers and experimenters often find it necessary to ascertain some resistance value by trial, and some form of calibrated resistor is then of great value. To meet such cases Messrs. Bulgin have produced two models, one rated to carry 34 mA and one to carry 77 mA. The former has a total value of 50,000 ohms and the larger model has a resistance of 10,000 ohms. The resistance consists of a single layer of nickel-alloy wire wound on a refractory former, and, as may be seen from the accompanying illustration, a slider is mounted on a square section rod to travel along the top of the winding. A bent spring makes contact at two places on the slider bar and also on the wire, so that a definite contact may always be relied upon. The square slider has a hole in the upper surface and a line is scored across this and filled with white material to provide an indicating mark. The bar is engraved from 0 to 10 and thus as the slider is moved the markings may be inspected through the hole thus enabling various pre-arranged settings to be obtained, or the approximate value of the resistance in circuit to be calculated by the direct proportion of the figures and the total resistance value. The uses to which such a component may be put are legion, and we have carried out a number of tests with the component with complete success. In a "cold" state the wire appears to move with the slider, giving rise to overlapping of the turns, and some risk of breakage, but when a current is passed

through the wire it heats sufficiently to draw it tight and thus avoid any risk of trouble. The price of either model is 10s. 6d. and the reference numbers are MV.14 and MV.15.

Kingsway Recorders

A NEW model of the Simpson synchronous turntable is now available from Kingsway Electricals, Ltd., and is designed especially for recording.

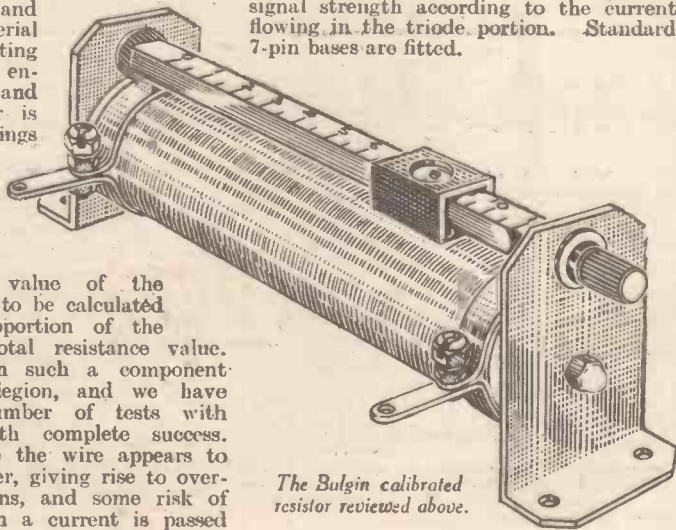
As mentioned in the article on the subject recently, a reliable and heavy-duty type of motor is required to ensure even torque and regular and ample power. This motor costs 5 gns. The firm can also supply a cutting head and complete tracking gear, and it is proposed shortly to market a complete home-recording radiogram. We understand that they also intend to manufacture recording blanks for amateur use consisting of the acetate coated zinc type. No prices or other details are yet available.

Milnes Test Equipment

MILNES RADIO, LTD., are now able to supply test equipment for service engineers and experimenters. This includes an L.F. oscillator for speaker-coil centring and similar purposes; an H.F. oscillator for ganging and adjusting superhet receivers; and voltmeters and milliammeters. The entire assembly is self-contained and designed for A.C. mains operation, the price being 12 gns.

Mazda Tuning Indicators

THE Edison Swan Electric Company announces the introduction of two new tuning indicators of the electron-stream, or cathode-ray tube, type. One of these is designed for A.C. operation and the other for Universal (A.C./D.C.) receivers. The former is to be known as type A.C./M.E., and will cost 10s. 6d., whilst the other is type ME920, and will cost 12s. 6d. The A.C. model has a standard four-volt heater operation at 1.5 amps, and the latter a 9-volt .2 amp heater. The usual green fluorescence is provided at the top of these indicators and provides an indication of signal strength according to the current flowing in the triode portion. Standard 7-pin bases are fitted.



The Bulgin calibrated resistor reviewed above.

ELECTRADIX RADIOS

COIL TURN COUNTERS for checking the number of turns up to 9,999 on dial. Scaled, 1/3 each.
BELL SETS. Best British Trembler, 2/- each. Porcelain super-grade Pushes, 2/6 line for 6d. Brass Plange, 1/6. Door Barrel, all brass, 2/6. Twin lead-covered wire, 4d. per yd. Indoor Bell 100-v. A.C., 2/6; 240/40 A.C., 3/6.
COMPLETE OLDHAM 240 v. H. T. Accumulator 5 m/μ capacity in 4 crates. An 8-guinea job for 45/-, with acid and charged.
GAMBRELL NOVOTONE TYPE J. Tone Compensator for any pickups. Last three guineas, sale 25/-.
GARRARD AUTO RECORD-CHANGER. 7 records, 100/250 v. A.C. as new, list ten pounds, sale £4/17/6.
BLUE FLYER ditto. 6 record @ 100/250 v. A.C. Good order 50/-.
FEW ONLY new 4-valve A.C. mains chassis sets. Band pass circuit, very selective. Complete less valves at the low clearance price of 30/- each. Lessfit free.
TWO RADIO-GRAM CABINETS. Vertical console type, nice condition mahog. and walnut, 22/8 each. Carriage and packing at cost.
2-VALVE METAL B. CHASSIS. Drilled and fitted 2 valve holders, transformer, coil, etc. 2/6 each.
SLOPE FRONT TEAK CABINETS. New, make fine instrument panel, 10 x 7 x 11. 3/- each.
H.M.V. Band pass, three coils on praxolin with long, short, and medium windings. 11in. x 8in. with brackets, 1/-.
PHILIPS. 30-1 transformers, makers type, 1/6. 3 Ratio Output transformers 15, 24 and 33 to 1, 2/6. West. Elec. HF Chokes 3in. x 2in. Fax for interference units, etc. 9d. 12in. Hot Plates for 110 v., 7/6. Electric Waistcoats 12v. wash-leather, 7/6. Fur Helmets, 2/6.
STUD SWITCHES. 7 Stud on sphonite with plug, 1/6. Vaxley wave change, 2-ong with knob, one hole, 1/2. Rayole Power Plug, 15 amp, shrouded panel wall, two pairs on iron box, unused, 10/-.
Transmitters, 10 amp. Sending Relays, 15/-.
LEDIX SELENIUM CELLS are light, sensitive with gold grids, moisture proof, 5/-.
Mounted in Bakelite Case, 7/6. Super-model in oxy-brass body, with window, 10/-.
Projector Lanterns, with flex and holder, 17/6.
PHOTO CELLS. Sensitive R.C.A. 867 for 25/-.
Holders 1/-. Hus. lenslet, Beck mounted prisms 5/6, F.C. Lens 3/6, L.C.A. Micro Adjusters 1/-.
MICROPHONES. 1-, 5/6, 12/6, 18/6, 50/-, and £8.
METERS. All ranges and sizes in stock. Laboratory precision apparatus, Bridges, Uni-pivots, Galvos, Micro-Ammeters, Wave-meters, etc. See Sale List.

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Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS.		No. of	A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	
Date of Issue.	Blueprint	Blueprint		
CRYSTAL SETS.				
Blueprint, 6d.			Mains Record All-Wave (HF Pen, D, Pen)	5.12.36 PW70
1937 Crystal Receiver	9.1.37	PW71	Four-valve: Blueprints, 1s. each.	PW20
STRAIGHT SETS. Battery Operated.				
One-valve: Blueprint, 1s.		PW31A	A.C. Fury Four (SG, SG, D, Pen)	PW34D
All-wave Unipen (Pentode)			A.C. Fury Four Super (SG, SG, D, Pen)	PW45
Two-valve: Blueprint, 1s.			A.C. Hall-Mark (HF, Pen, D, Push-Pull)	
Four-range Super Mug Two (D, Pen)	11.8.34	PW36B	Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35 PW47
Three-valve: Blueprints, 1s. each.			SUPERHETS.	
Selectone Battery Three (D, 2LF (Trans))		IW10	Battery Sets: Blueprints, 1s. each.	PW40
Sixty Shilling Three (D, 2LF (RC & Trans))		IW34A	£5 Superhet (Three Valve)	
Leader Three (SG, D, Pow)		PW35	F. J. Camm's 2-valve Superhet	13.7.35 PW52
Summit Three (HF Pen, D, Pen)	8.8.34	PW37	Two-Valve	PW53
All Pentode Three (HF Pen, D (Pen), Pen)	22.9.34	PW39	F. J. Camm's £4 Superhet	
Hall-Mark Three (SG, D, Pow)		PW41	F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37 PW75
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48	Mains Sets: Blueprints, 1s. each.	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW49	A.C. £5 Superhet (Three-valve)	PW43
Genet Midget (D, 2 LF (Trans))	June '35	PM1	D.C. £5 Superhet (Three-valve)	1.12.34 PW42
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51	Universal £5 Superhet (Three valve)	PW14
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53	F. J. Camm's A.C. £4 Superhet 4	PW69
Battery All-Wave Three (D, 2 LF (RC))		PW55	F. J. Camm's Universal £4 Superhet 4	PW60
The Monitor (HF Pen, D, Pen)		PW61	"Qualitone" Universal Four	16.1.37 PW73
The Tutor Three (HF Pen, D, Pen)	21.3.33	PW62	SHORT-WAVE SETS.	
The Centaur Three (SG, D, P)		PW64	Two-valve: Blueprint, 1s.	
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	29.8.30	PW66	Midget Short-Wave Two (D, Pen)	15.9.34 PW38A
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69	Three-valve: Blueprints, 1s. each.	
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36	IW72	Experimenter's Short-Wave Three (SG, D, Pow)	PW30A
Four-valve: Blueprints, 1s. each.			The Prefect 3 (D, 2 LF (RC and Trans))	PW63
Fury Four (2 SG, D, Pen)		PW11	The Bandsread S.W. Three (HF Pen, D (Pen), Pen)	29.8.36 PW68
Beta Universal Four (SG, D, LF, Cl. B)		PW17	"Tele-Cent" B.W.3 (SG, D(SG), Pen)	30.1.37 PW74
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B	PORTABLES.	
Fury Four Super (SG, SG, D, Pen)		PW34C	Three-valve: Blueprint, 1s.	
Battery Hall-Mark 4 (HF, Pen, D, Push-Pull)		IW46	F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36 PW65
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	20.9.36	PW67	Four-valve: Blueprint, 1s.	
MISCELLANEOUS.				
Two-valve: Blueprints, 1s. each.			Featherweight Portable Four (SG, D, LF, Cl. B)	PW12
A.C. Twin (D (Pen), Pen)	7.10.33	PW18	AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.	
A.C.-D.C. Two (SG, Pow)		PW31	Blueprints, 6d. each.	
Selectone A.C. Radiogram Two (D, Pow)		IW19	Four-station Crystal Set...	12.12.36 AW427
Three-valve: Blueprints, 1s. each.			1934 Crystal Set	AW444
Double-Diode-Triode Three (HF Pen, DDT, Pen)		PW23	150-mile Crystal Set	AW450
D.C. Ace (SG, D, Pen)		PW25	STRAIGHT SETS. Battery Operated.	
A.C. Leader (SG, D, Pen)	7.4.34	PW35C	One-valve: Blueprints, 1s. each.	
A.C. Three (SG, D, Pen)	31.3.34	PW35B	B.B.C. Special One-valver	AW387
A.C. Leader (HF Pen, D, Pow)	28.7.34	PW36A	Twenty-station Loudspeaker	AW449
D.C. Premier (HF Pen, D, Pen)			One-valver (Class B)	
Ubique (HF Pen, D (Pen), Pen)	18.8.34	IW38	Two-valve: Blueprints, 1s. each.	
Armada Mains Three (HF Pen, D, Pen)			Melody Ranger Two (D, Trans)	AW398
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	IW50	Full-volume Two (SG det. Pen)	AW392
"All-Wave" A.C. Three (D, 2 LF (RC))	17.8.35	PW54	B.B.C. National Two with Lucerne Coil (D, Trans)	AW377A
			Big-power Melody Two with Lucerne Coil (SG, Trans)	AW393A
			Lucerne Minor (D, Pen)	AW426
			A Modern Two-valver	July '36 WM409
			Three-valve: Blueprints, 1s. each.	
			Class B Three (D, Trans, Class B)	AW386
			New Britain's Favourite Three (D, Trans, Class B)	15.7.33 AW394
			Home-built Coil Three (SG, D, Trans)	AW404

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

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

The index letters which precede the Blueprint Number indicate the periodical in which the description appears: thus PW refers to PRACTICAL WIRELESS, AW to Amateur Wireless, PM to Practical Mechanics, WM to Wireless Magazine.

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

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1934 Ether Searcher; Baseboard Model (SG, D, Pen)		AW417
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Lucerne Ranger (SG, D, Trans)		AW422
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Mullard Master Three with Lucerne Coils		AW424
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Lucerne Straight Three (D, RC, Trans)		AW437
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1935 £6 6s. Battery Three (SG, D, Pen)		WM371
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"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2 SG, D, Pen)		AW421
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Lucerne Straight Four (SG, D, LF, Trans)		WM350
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The H.K. four (SG, SG, D, Pen)	Mar. '35	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	April '36	WM404
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New Class-B Five (2 SG, D, LF, Class B)	Nov. '33	WM340
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Consocetric Two (D, Pen) A.C.		AW403
Economy A.C. Two (D, Trans) A.C.		WM286
Unicorn A.C./D.C. Two (D, Pen)	Sept. '35	WM394



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QUERIES and ENQUIRIES

Intermediate Frequency

"I have a commercial superhet, which I believe is a Continental model. I want to retrack this and also to replace certain of the components, but I am uncertain regarding the intermediate-frequency which is used. The I.F. transformers look very poor, and I want to replace them with good English components, but cannot see how to ascertain the I.F. so that I can replace suitable transformers. Is there any way in which I can gauge the frequency which is employed in the I.F. stages? I have a fair collection of parts and meters."—W. R. A. (Wembley).

AS you are fairly close to the London transmitters there is a possibility that you are experiencing second-channel whistle interference, and, if so, this can be used in order to ascertain the intermediate-frequency employed in the circuit. Find the frequency of the transmission on which the interference occurs, and subtract that from the frequency of the local. A little care may be necessary to ascertain which local causes the whistle, although the figures obtained will give a guide in this respect. The answer is then divided by two, and this will be the intermediate frequency within a few kilocycles. For example, if you can obtain a whistle on the North Regional programme this will indicate an I.F. of 110 kc/s. The frequency of that station is 668 kc/s and London Regional is 877. The difference is 209, and this divided by 2 gives 104.5, which is sufficiently close to 110 to indicate that that is the I.F.

Intermittent Hum

"I have a six-valve all-wave set, A.C. mains operated, which has been giving excellent service. Of late, however, a terrific hum develops after about ten minutes' listening. This disappears on switching off and on again, only to re-commence after a short interval. I would be pleased if you could suggest where to look for the cause of the trouble."—T. A. C. (Brynmaur).

INTERMITTENT faults of this type can be caused in many ways and are the worst of troubles to locate. A very common cause is a condenser in which the insulation has broken down, and this provides excessive leakage when a certain current is passed. The leakage throws an additional strain upon the mains section and causes hum. An electrolytic condenser used as a bias smoothing component can also cause this trouble and will also lead to a damaged valve. Faulty insulation between heater and cathode can give rise to the trouble, and it may also be caused by a faulty component of any type which is placed close to a valve and thus becomes heated after a short time. A stage-by-stage test is the quickest method, including a milliammeter in each anode circuit. When the hum arises an increased or decreased current will be indicated in the stage in which the fault occurs, and then the actual component may

be located by the replacement process or each one tested individually.

Sixty-shilling Three

"I am interested in the Sixty-Shilling Three and would like to know the make of coil and where it could be purchased."—J. O. N. (Haltwhistle).

THE coil specified was the Goltone DW/8, which may still be obtained from Messrs. Ward and Goldstone, Pendleton, Manchester, price 5s. A blueprint for this receiver may still be obtained from this office, price 1s., and the number is PW34A.

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.

Please note also, that queries must be limited to two per reader, and 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 different department.

If a postal reply is desired, a stamped addressed envelope must be enclosed. 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.

Defective Earthing

"I have a commercial receiver of the 'all-metal' type and experience a trouble which I find impossible to cure. It takes the form of a weak crackling background, which does not vary in strength with the station received, neither does it seem to be increased or altered with vibration in the room. For this reason I have ruled out broken or faulty components or wiring, and should be pleased if you would suggest some source from which the trouble may arise. I do not want to take the set to pieces if I can help it, as it is so compact."—G. R. (Barnet).

AS the noise is constant, it is probably due to a faulty resistor or some component having a wire winding, such as an H.F. choke, transformer or coil. The simplest way to locate the trouble is to connect the grid to earth in each stage in turn, working from the output stage, and when the noise ceases you will know that the trouble arises in that stage, and can then localise the search for the defective part. It should also be remembered that a screening can which fails to make good contact with the holder or chassis can give rise to the trouble, although in that case it may generally be modified by banging the cabinet.

Four-station Crystal Set

"Will you please let me know if you have a back number of the paper with full constructional details of the four-station

crystal set. On the blueprint there are not details of the date of issue."—G. H. (Old Hill, Staffs).

THE issue of AMATEUR WIRELESS in which the receiver was originally described is now entirely out of print. In response to the request of many readers, however, all the essential details were reprinted in our issue dated December 12th last on page 423. This receiver is, of course, the same as the Schoolboy's Crystal Receiver, under which name it was originally published.

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.

S. G. (Glasgow). Coil construction details are beyond the scope of a reply, especially for a complete range such as mentioned in your letter. We refer you to the various articles which we have published on the subject.

E. A. L. (Birmingham 8). The trouble is undoubtedly due to H.F. instability, and as your diagram is substantially correct, this must be due to interaction between wiring. Modify the H.F. section slightly.

A. E. (Portmadoc). Higher gain with higher ratio is the main advantage, but this is sometimes offset by distortion due to the output or next valve being overloaded with the higher signal. For the set mentioned 5 to 1 would be quite suitable. The peculiarity is generally due to the aerial system, or the design of the first stage, instability being often experienced if an H.F. stage is not "tied down."

L. F. G. (Richmond). The oscillators were described in the Service Engineer series, February 29th and March 14th, 1936.

T. L. (Dun Laoghaire). At the moment the device is only available for 6 volt operation. Full details may be obtained from Messrs. Bulgin.

J. W. J. (Grange-town). Write to Messrs. Ward and Goldstone, of Pendleton, Manchester, for a leaflet giving the connections and circuit diagrams of the coils.

D. C. (Leicester). We are not quite clear regarding your point. Pin 1 is joined to the metallising and is therefore not used unless the valve is metallised, when this pin is joined to earth. There are seven connections to the valve without this, and you have apparently overlooked the anode, which is taken to the top of the valve.

G. T. (Sheffield). You do not state what voltage source you are using. A mains eliminator which is unsuitable could cause the trouble, but beyond this there is nothing wrong with your circuit.

J. C. H. (Dartmouth). We regret that there is nothing in our blueprint list which we can recommend for your purpose.

C. R. J. (Glasgow). We are shortly publishing an article on microphone technique which will no doubt answer your query more satisfactorily than a brief reply can. A transformer must be used.

E. C. B. (Mohill). You did not enclose a stamped addressed envelope and it would be beyond the scope of a reply to give you all the constructional data.

G. C. B. (Raynes Park). The condensers are continental and have values of .0001 and .001 mfd.

P. McC. (Belfast). We believe Premier Supply Stores, whose advertisement appears on another page, can supply you.

E. G. (New Earswick). A blueprint may be obtained for 1s. and back numbers for 4d. from this office.

E. W. M. (Sunderland). There is no blueprint which would enable you to use your eliminator. If you wish to build a quality radiogram on the lines mentioned, we recommend the A.C. or Universal Hail Mark Four.

G. F. (E.1). You need a good meter to measure the voltage on the detector anode and therefore your trouble is probably due to the use of an unsuitable meter.

G. McM. (Edinburgh, 10). If the paeul is effectively earthed it should prevent the trouble. Try a different earth as your present arrangement is undoubtedly ineffective.

G. S. (Glasgow). Aerial is joined to one end of three-turn coil, and the other end of this coil, as well as the lower end of the seven-turn coil are joined together and to earth. An Eddystone type 1010 choke will be admirable.

J. O'M. (Co. Donegal). You could not obtain the output mentioned from a battery amplifier. Your only solution is to obtain some form of generator.

The coupon on Cover iii must be attached to every query.

Miscellaneous Advertisements

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

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Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aerials, Class B amplifications, neutralizations, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free, 7jd. including catalogue.

1937 Short-wave Catalogue only (3 times enlarged) price 1jd., post free.

44, HOLLOWAY HEAD, BIRMINGHAM 1

BANKRUPT bargains. List free. All new goods. Burned midget battery portables 1937, 7/6. Burgoyne 5v. 1937 10gn. battery superhets, £4/17/6. Altham 3v. battery allwave with valves and MC speakers, 79/6. Decca 1937 5v. superhet AC radiograms, 12gn. Decca 6v. 1937 AC receivers, £6/5/0. Burgoyne 1937 AC 6v. superhet tablegram, £8/15/0. Mullard 6v. AC/DC MU35 superhets, £6/15/0. Tru-phonic 1937 AC/DC 5v. superhets, £6/5/0. Ditto allwave, £7/10/0. Halcyon 1937 AC 3 gns. short-wave converters with valve, 25/-. Large stock of American, mains and battery valves, MC speakers, components. Pilot and Ferguson 1937 allwaves at trade prices. Janette DC/AC converter with smoothing, 220v. DC-220v. AC, 70/-. Let me quote for anything radio.—Butlin, 6, Stanford Avenue, Brighton.

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DETECTION. Revolutionary theory, system, circuits, book, post anywhere, 1/1.—D'Arcy Ford, Gandy Street, Exeter.

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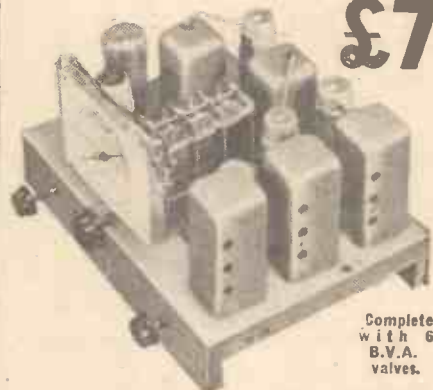
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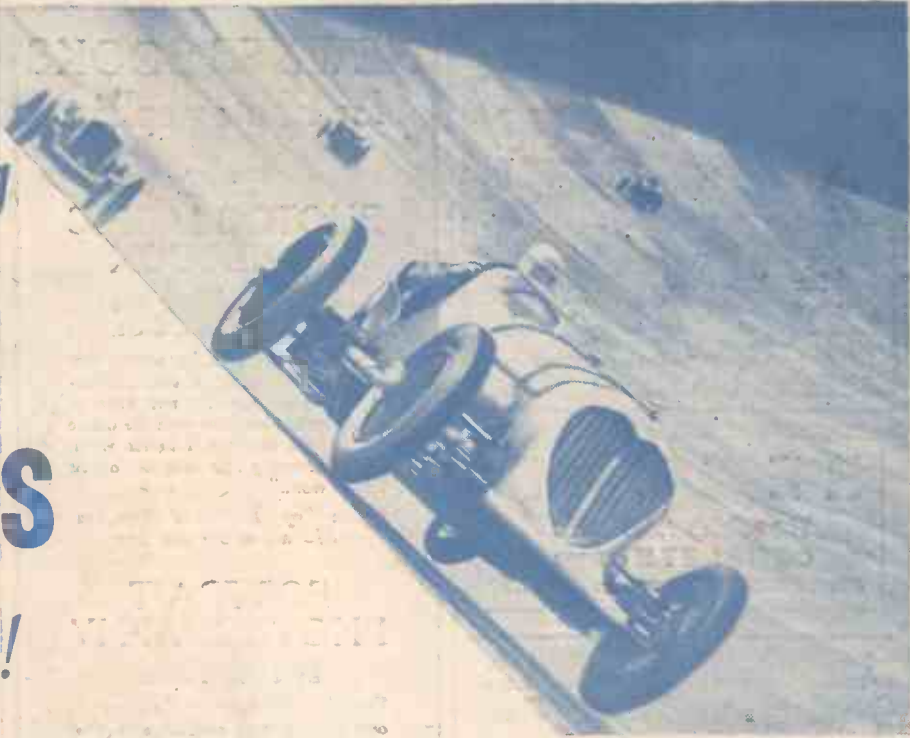
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The April

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125000
Practical and Amateur Wireless, April 24th, 1937.

A DOMESTIC P.A. SYSTEM—See Page 123

Practical and Amateur Wireless

3^D
EVERY
WEDNESDAY

Edited by F.J. CAMM

a GEORGE
NEWNES
Publication

Vol. 10, No. 240.
April 24th, 1937.

AND PRACTICAL TELEVISION

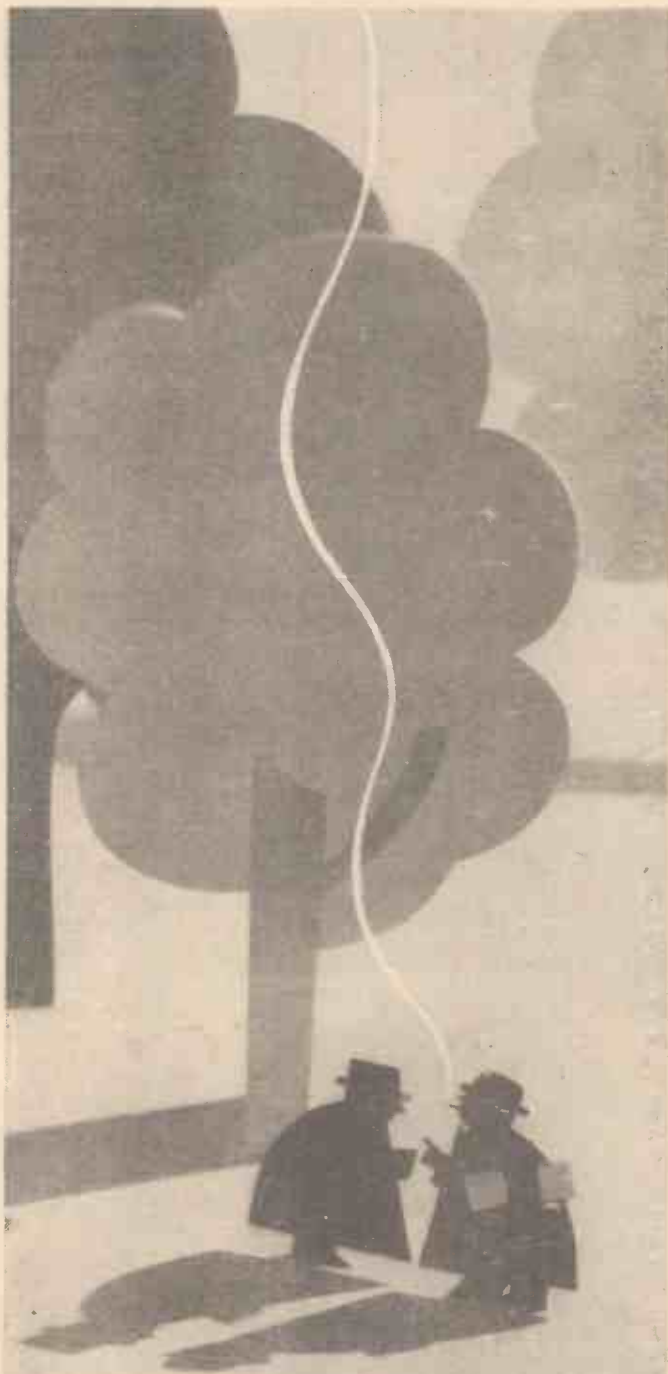
Microphone Methods *Made Plain*



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NEWNES

TRANSMITTING TOPICS

See Page 125.




Practical and Amateur Wireless

Edited by **F. J. CAMM**

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

VOL. X. No. 240. April 24th, 1937.

ROUND *the* WORLD *of* WIRELESS

Using a Microphone

MANY beginners experience difficulty when they try to use a simple microphone for home-broadcasting purposes. They find that the speech is distorted, or that bad feed-back occurs, giving rise to a howl which, apparently, cannot be prevented. Furthermore, a number of amateurs are now building small public-address equipments for relaying band programmes in dance halls, and find that the distribution of sound is very difficult. All of these points have been met with by those who are experienced in public-address work, and it has been found that there is a definite technique which has to be followed, not only in the circuit and wiring arrangements which are employed, but also in the method of arranging the accessories and of using them. In this issue, the whole subject is treated extensively, and with the aid of the details given no difficulty should be experienced either in arranging for a small home broadcast, or in relaying the performance of a dance band over a large hall. The different types of microphone are explained and circuits are given showing the method of connecting the mike and of arranging the various incidental circuits.

Reorganisation in Denmark

FROM the beginning of this month broadcasting in Denmark passed under the control of a new Director-General. He is Mr. F. E. Jensen, an ex-Government official who has been a popular figure for a long time in Danish broadcasting headquarters.

Six Stations for Norway

SIX 150-watt transmitters are to be erected on the coast of Norway, to operate on a wavelength between 80 and 200 metres. The stations are to be used for the benefit of shipping and will utilise both telephony and telegraphy. The contract for building these stations has been placed with Philips Radio.

Midday Television

IT is stated that the B.B.C. will shortly commence to radiate a television programme of one hour's duration commencing at 11 a.m. Representations have

been made to the Corporation by the Radio Manufacturers' Association in order that manufacturers and others may have additional programme matter with which to carry out tests and demonstrations.

Philco Balloons

WITH reference to the recent note concerning the release of balloons from the Philco factory, we are informed that cards are now being received by Philco from various parts of the world. The first to be received was from St. Albans, but they are slowly arriving from

The programme will run from 10.15 p.m. until 1 a.m., and will begin in London. After a quarter of an hour, listeners will be switched over to a band in another part of the country, then back to London, and so on throughout the session. Each of the bands will represent a part of the United Kingdom, and will be on the air for approximately a quarter of an hour.

Eric Maschwitz Back Soon

THE B.B.C. Director of Variety is expected to return next week after a visit to a Californian ranch, where he has been recuperating. His immediate concern when he returns will be the final preparations for the elaborate Coronation Variety programmes for which his department will be responsible. We hope to give the full details of these programmes next week.

Don Rico's Ladies' Band

THE main item in the Variety broadcast from the Coventry Hippodrome in the Midland programme on April 29th will be Don Rico and his Ladies' Band. Apart from its original tone colour, this is one of the very few bands composed entirely of the "weaker" sex touring the halls.

Shetland Islands and Radio Communication

LEITH ship-owners have complained to the Postmaster-General about the absence of communication with the Shetland Islands. They suggest that Lerwick should be brought into communication with the mainland by means of radio. Serious delays have been caused by the absence of communication during recent gales when steamers ran into Lerwick for shelter.

New Prague Podedbrady Call-signs

Make a note of the call-signs and wavelengths allotted to the Czech short-wave transmitters: OLR6A, 13.08 m. (22.94 mc/s); OLR5B, 19.58 m. (15.32 mc/s); OLR5A, 19.69 m. (15.23 mc/s); OLR5C, 19.79 m. (15.16 mc/s); OLR4D, 25.21 m. (11.90 mc/s); OLR4C, 25.26 m. (11.875 mc/s); OLR4A, 25.34 (11.84 mc/s); OLR4B, 25.51 m. (11.76 mc/s); OLR3A, 31.41 m. (9.55 mc/s); OLR3B, 31.57 m. (9.504 mc/s); OLR2B, 49.75 m. (6.03 mc/s); and OLR2C, 49.92 m. (6.01 mc/s).

ON OTHER PAGES.	
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various remote parts of England and the continent. So far, several have come from France and the Rhine Valley, and letters accompanying them describe the scenes of excitement which took place as the balloons descended in villages and hen coops. They also tell of children climbing trees in order to retrieve them.

Britain Dances

THE Dance Music on Coronation night will be played by Henry Hall and the B.B.C. Dance Orchestra and by a number of bands throughout the country.

ROUND the WORLD of WIRELESS (Continued)

Island Radio

RATHLIN ISLAND, which faces the Atlantic about six miles off the North Antrim coast, is now equipped with an up-to-date short-wave wireless installation working on a wavelength of 79 metres. There are about 400 inhabitants on the island, and before the radio was installed flares were the chief means of communicating with the mainland.

"Favourites" for Coronation Party

WE understand that Leonard Henry, Wynne Ajello, Davy Burnaby and Michael North will be among the artists taking part in the 75 minutes Coronation Party which Charles Brewer will produce on Coronation Night (May 12th). With Elsie and Doris Waters, Clapham and Dwyer, and The Two Leslies, who have already been announced as members of the show, they will re-create the hilarious atmosphere of the popular radio parties at Christmas in recent years.



Geo. Clarke, the well-known comedian, listens to a Yankee joke from Schenectady on his Pye receiver, model QAC3.

Television Bridge

A GAME of bridge will be played in television for the first time on April 24th, when Mr. Hubert Phillips, the well-known expert, will play a three-handed match with the television camera in the position of "dummy." Although the camera cannot transmit colour, the red cards will be easily distinguishable by their different tone value. As a concession to the small viewing screen specially large cards are being made for the occasion.

Midland Parliament

THE guest-speaker on April 22nd in Midland Parliament's discussion on "Modern Advertising and Industry" will be Sir Charles Higham, a well-known figure in publicity circles and author of several books on advertising and distribution. Sir Charles Mander will be in the chair. W. M. W. Thomas will speak for the

INTERESTING and TOPICAL NEWS and NOTES

employers' side and George Jones for Labour. Another speaker has yet to be chosen.

Concert from Bath

THE Bath Pump Room Orchestra, led by Norman Rouse and conducted by Maurice Miles, will broadcast a concert from the Pump Room, Bath, on April 22th.

Music-hall Music

ON April 30th William Pethers will conduct the Coventry Hippodrome Orchestra in an evening concert of music-hall music. This broadcast is arranged to illustrate various features such as acrobats, the Chinese conjuror, and dancers of various kinds.

Dance Interlude

In a Dance Interlude on April 26th, listeners to the Western programme will hear Reginald Williams and his "Futurists" Dance Band, with Francis Crayman, Leonard Elliott and the Three Majors.

African Natives to Hear Coronation Broadcasts

IT has just been announced in London that the General Electric Company has received orders for the installation of wireless equipment that will form a network over a very large part of British West Africa. It will be completed in time for hundreds of thousands of natives to hear the Coronation broadcasts. The chief feature of this installation will be a permanent radio relay service that will provide the British Government with a powerful means of propaganda among the native peoples.

The service will operate, through 5,250 loudspeakers, from seven centres. Installations at Lagos, Accra, Cape Coast, Sekondi

and Freetown have already been completed, and those at Koforidua and Kumasi, as well as other towns, are in course of construction.

Town Tour

JOHN BETJEMAN is revisiting Plymouth, and on April 26th, in the series entitled "Town Tour," he will broadcast from there his opinions about its architectural amenities.

Concert from Torquay

ANOTHER popular concert by the Torquay Municipal Orchestra will be broadcast from the Pavilion, Torquay, on April 27th. Laurence Holmes (baritone) will be the vocalist.



June Knight photographed whilst recording two new songs from the film "Lilac Domino" at the H.M.V. studios. The titles of the record are "Lilac Domino Waltz Song," and "My Heart will be Dancing" on H.M.V. B.8555.

Glyndebourne Opera Broadcasts

WE are informed that arrangements have been completed to broadcast the following operas of Mozart from Glyndebourne during the coming season:—

May 19th: *Don Giovanni* (Act 2).

May 27th: *The Magic Flute* (Act 1).

June 3rd: *Figaro* (Act 3).

Two further broadcasts from Glyndebourne will take place later in the season, details of which will be announced in due course.

Mendip Cave Crawl

AN interesting broadcast will be given in the Western programme on May 1st, when an attempt will be made to descend with microphones into Swildon's Hole.

Listeners will be taken through 400ft. of narrow tunnels and "squeezes" through which only a small man can pass, with occasional deep streams, waterfalls and caves, all hundreds of feet below ground. Besides being a thrilling sport, spelæology has its practical aspects for archaeologists in their search for caves which have been inhabited, and for those who follow the courses of streams.

SOLVE THIS!

PROBLEM No. 240

Temple built a simple 3-valver of the H.F. Pentode, Detector, Pentode type, using a 2-gang condenser and a 2-gang coil unit having a wave-change switch mounted in the base. Reception was satisfactory on the long-wave band, but only a weak signal from the local station could be picked up on the medium-wave band. What was the probable cause of the low M.W. sensitivity? Three books will be awarded for the first three correct solutions opened. Address your solutions 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. 240 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, April 26th, 1937.

Solution to Problem No. 239

The cathode socket of the outside valve-holder was touching the metal chassis, thereby short-circuiting the bias resistance.

The following three readers successfully solved Problem No. 238 and books are accordingly being forwarded to them: G. A. Dickinson, 102, Sidcup Hill, Sidcup, Kent; E. Broming, The Shrubbery, Totnes, S. Devon; A. E. Royle, 23, Mornington Road, Chingford, E.A.

A Domestic "P.A." System

Details of a Scheme which Enables Room-to-room Conversations to be Carried Out on a Standard Receiver By W. J. DELANEY

THE following arrangement was installed during the illness of one member of the family and was originally designed to avoid running backwards and forwards from the sick-room. The idea was developed and finally an interesting "public address" system was evolved which has since proved so useful that the details are given to enable others who may be interested to make use of the various ideas incorporated in the system. The first requirement is one or more extension listening points, and in my case there is such a point in each room. Ordinary 5-amp electric lighting sockets are mounted

to the extension listening points, a standard plug being fitted to the lead for the purpose. It will thus be seen that either the built-in or the extension speakers may be used singly or together, and to ensure correct matching the extension speakers are of the type provided with a ready-matching transformer.

Input Arrangements

On the input side, the pick-up terminals on the chassis are connected to a jack mounted on the motor-board of the receiver (which is, of course, of the radiogram type) and this jack is arranged close to the pick-up which is in normal use.

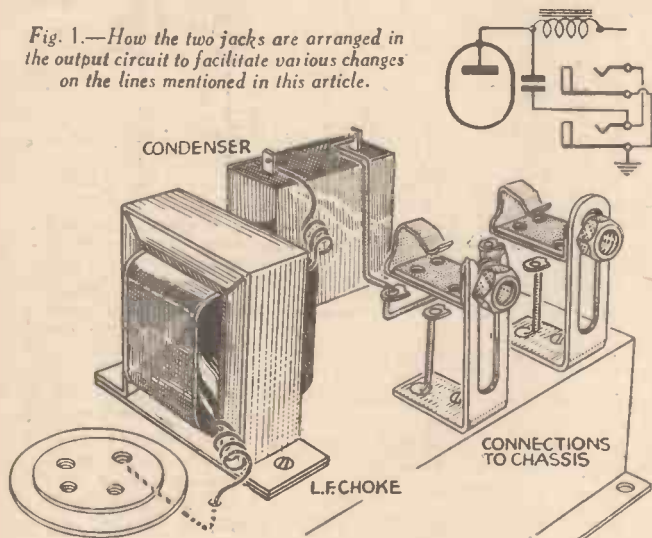
The jack employed in this position is one of the Igranic components which, unfortunately, is not now easily obtained, and is of the type in which opposite pairs of contacts are normally joined together, but the insertion of a plug opens these contacts and enables the component connected to the plug to be joined to one pair of contacts. The arrangement is shown in Fig. 2. It will thus be seen that when the plug is withdrawn from the jack the pick-up is connected to the receiver, but upon inserting the plug into the jack any other component may be joined in place of the pick-up. Alternative makes of jack of this pattern may, of course, be utilised.

without raising the voice, although naturally not of the very high quality associated with a properly-designed microphone. The extension plug at the receiver is therefore removed from the socket and changed with the mike plug on the motor-board, the leads being sufficiently long to permit of this and the change being carried out in a second. The person at the distant point naturally waits a moment or so before replying, although this slight defect could easily be obviated by fitting a double-pole change-over switch. I do not think this is necessary, however, and rely upon the simpler scheme of changing plugs. I have found this plug and jack arrangement possesses many other advantages, and have also employed it for the home-recording arrangements recently described in these pages. The pick-up plug is inserted into the extension speaker socket, leaving the existing speaker in circuit to act as a guide to the volume being obtained, and the microphone or an additional pick-up from another record being plugged into the pick-up jack. By connecting a mixer circuit one is thus able to blend speech with recorded music in making a record to any desired arrangement, and, additionally, the plug may be withdrawn, or the radiogram switch operated so that the radio programme may be recorded.

Advantages of the System

It will thus be seen that this simple arrangement has unlimited possibilities and is at the same time exceedingly simple to fit up. No unwanted or lengthy leads have to be accounted for (which would probably be the case if switches were employed for the various changes); rapid changes for test purposes may be made on the input or the output side; and the wiring to the receiver does not need altering for any of the tests, thus preventing difficulties which

Fig. 1.—How the two jacks are arranged in the output circuit to facilitate various changes on the lines mentioned in this article.



on the skirting board and wired between rooms with flat twin flex, and incidentally these are so arranged that when required they also carry the electric supply for the use of standard and other portable lamps, in cases where the existing room plug is in use or when lighting is required in an odd corner. Separate leads are employed for the extension loudspeakers to avoid confusion between lights and wireless, and standard 5-amp plugs are fitted to these. On the receiver chassis an output filter is employed, and it was not found in my case practicable to utilise a separate earth at each point and this accounts for the twin leads to each point.

Output Arrangements

Only two extension speakers are in use, and these are changed from one room to another when required, sufficient length of lead being provided on the cabinets to permit of plugging in the appropriate socket in each room. On the rear of the chassis carrying the amplifier stage of the receiver two brackets are mounted and these carry two Bulgin Single Open Circuit jacks. These are wired in parallel, one side being connected to earth and the other to the condenser. The arrangement is shown in theoretical and pictorial form in Fig. 1. The built-in loudspeakers (of the balanced pair type) are provided with a short lead to the end of which a standard plug is fitted and this is normally inserted into one of the jacks, the other being reserved for the lead

inserting the plug into the jack any other component may be joined in place of the pick-up. Alternative makes of jack of this pattern may, of course, be utilised.

How the Arrangement is Used

This plug and jack scheme permits of rapid changes of pick-ups to be made for test purposes and also enables a microphone to be used in place of the pick-up. For use in the room-to-room communication scheme, the microphone and associated battery are connected permanently to a plug and kept on the motor-board and when required the plug is inserted into the jack, with the result that one can speak via the extension leads to any room in which a speaker is connected. To reply, the speaker is employed as a microphone, and the sensitivity of the average moving-coil speaker is such that speech may be heard from the remotest corners of the room

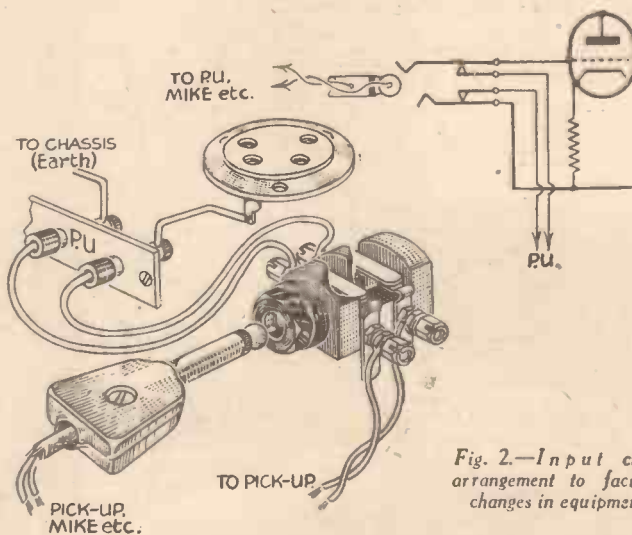


Fig. 2.—Input circuit arrangement to facilitate changes in equipment.

sometimes arise when connections are being continually changed or altered. No doubt further modifications to the basic scheme will occur to the keen experimenter.

Constructional Details of "Practical Wireless" Receivers-1

ONE of the first receivers described in this paper was the Long Range Express Three, and this was published in both a battery and a mains form. The circuit was the conventional H.F., Detector and Pentode arrangement, but the coils and switch mechanism which were specified are no longer on the market. Fortunately, however, the circuit lends itself to conversion for the use of modern and up-to-date coils, and the blueprint for the battery receiver which is still available will hold good for the modern components. The Bulgín type C.6 and C.8 coils will be found quite suitable, and two Bulgín baseboard toggle switches, type S.80B, with an appropriate shaft may be used for wavechanging. To accommodate the switches the wiring will require only slight modification, the original receiver utilising switches arranged side by side, and in the new form they will be one behind the other. The circuit diagram is attached, with terminal reference numbers for the coils, and also a sketch showing the wiring to the switches. These are operated by a rod which is also obtainable from Bulgín.

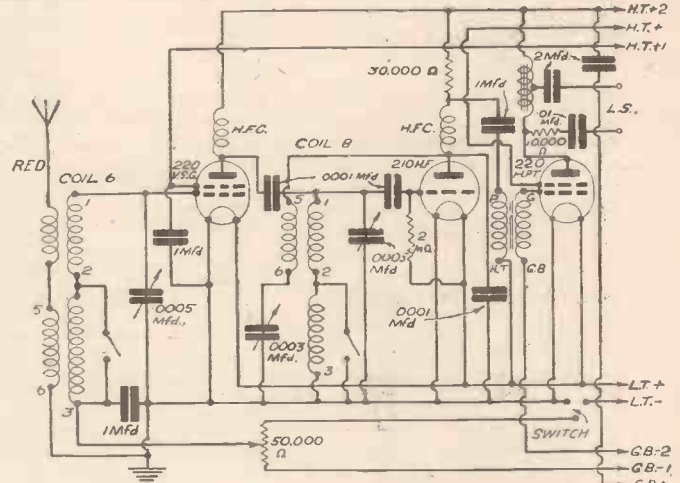
Constructional Notes

An all-steel chassis is specified and this may still be obtained from E. Paroussi, of 10, Featherstone Buildings, London, W.C.1. It is 12in. by 13in., and a metal panel 12in. by 8in. is also employed. The two parts are ready assembled when obtained from the maker, and if specified for this receiver will be supplied ready

Particulars of the Modifications Necessary in Order to Build Some of the Receivers Which Were Described in Issues of this Paper now Out of Print. Blueprints are Still Available

drilled. A standard metallised wooden chassis could be used if desired, with an ebonite or wooden panel. The standard Clix valveholders are employed and should be mounted first, after which the coils should be screwed to the chassis. Connection to these is simplified if lengths of flex are first soldered to the projecting tags on the bottom of these coils, and the holes in the chassis should be numbered or a

large hole drilled for clearance of all of the tags. The aerial coil is provided with a flexible red lead with a soldering tag at the end, and this is attached to the aerial terminal on the rear runner of the chassis. The remaining connections are shown on the attached sketch. It should be noted



Theoretical circuit of the Long Range Express Three.

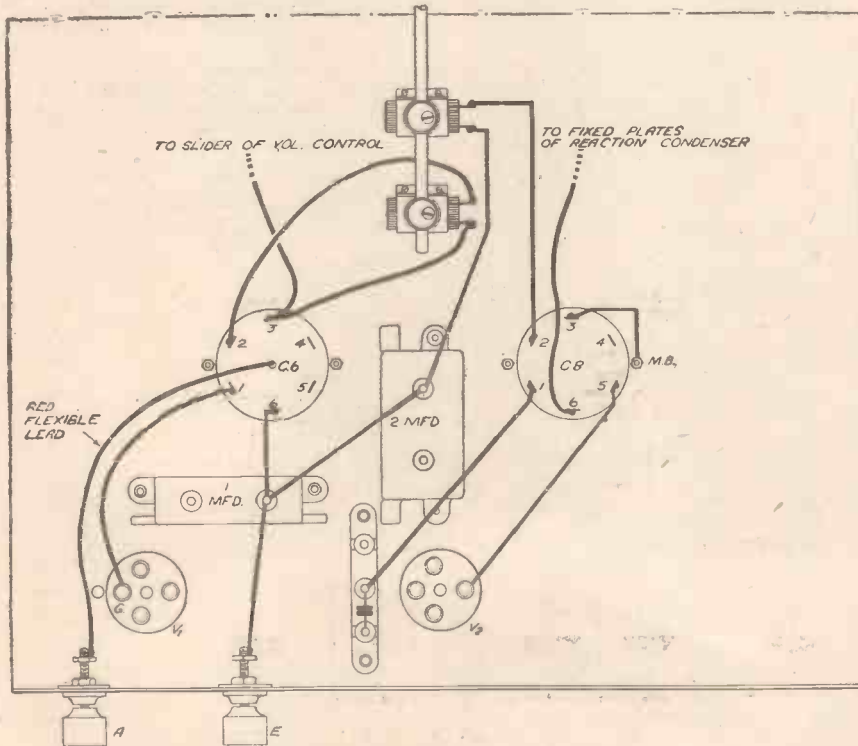
The Long Range Express Three

that a screened lead is employed to the grid of V1, and this is attached to the chassis by means of a small clip, or a lead may be soldered to it and attached to a convenient earth point.

A Precaution

Separate tuning condensers are employed

(Continued on page 137)



Wiring diagram, showing the modified connections to the switches and coils of the Long Range Express Three.

LIST OF COMPONENTS FOR THE LONG RANGE EXPRESS THREE

- Two .0005 mfd. variable condensers (Polar).
- One pair tuning coils, types C6 and C8 (Bulgín).
- 1 Standard screened H.F. choke (Wearite).
- 1 Special screened H.F. choke (Wearite).
- 2 .0001 mfd. type S fixed condensers (T.C.C.).
- 1 .01 type S ditto (T.C.C.).
- 1 2 mfd. fixed condenser (T.C.C.).
- 1 1 mfd. ditto (T.C.C.).
- 1 30,000 ohm 1 watt fixed resistor (Dubilier).
- 1 10,000 ohm ditto (Dubilier).
- 1 2 megohm grid leak (Dubilier).
- 2 4-pin chassis-mounting valveholders (Clix).
- 1 Nicore II L.F. transformer (Varley).
- 1 16 henry 15 mA L.F. choke (Wearite).
- 2 S.80B toggle switches, and operating rod (Bulgín).
- 1 .0003 mfd. reaction condenser (Polar).
- 1 3-point on-off switch (Wearite).
- 1 50,000 ohm potentiometer (Bulgín).
- 4 Terminals, Aerial, Earth, L.T.+ and L.T.— (Clix).
- 6 Wander plugs, G.B.—2, G.B.—1, H.T.—, H.T.—1, H.T.+2, G.B.+ (Clix).
- 1 16 gauge metal panel and chassis (see text) (Paroussi).
- 1 7-way battery cord (Bulgín).
- Connecting wire, bolts and nuts.

ACCESSORIES

- 1 W.B. Junior Loudspeaker.
- 1 Drydex 120 volt H.T. battery.
- 1 Drydex G.B. battery.
- 1 2 volt L.T. accumulator.
- 3 Cossor valves, 220 VSG (met.), 210 HF (met.), and 220 HPT.

TRANSMITTING TOPICS

In this Article the Operation of a 2½-W. Transmitter on A.C.; A Modified 7½-W. Transmitter; and a Headphone Monitor are dealt with

By L. ORMOND SPARKS

REPORTS received indicate that the 2½-watt transmitter, recently described in these pages, is proving highly satisfactory, and that it has been the means of many keen amateurs entering the transmitting sphere of radio. There are, however, many who wish to make up an A.C.-operated outfit, but they have come up against the difficulty of securing a B.V.M.A. valve suitable for the design; therefore, the details given below will be of some assistance.

If the range of American valves is examined it will be noted that the 6A6 and the 53 are of the "twin triode amplifier" types, otherwise known as Class B valves. The only difference between these is that the 6A6 has a 6 volt .3 amp. heater,

for a little experimenting, the application of bias, by the usual resistance in the cathode circuit arrangement, but it is not essential for operation though a slightly higher output efficiency can be obtained by applying a small bias. I would suggest 250 ohms and 500 ohms as suitable resistance values to try. While considering this part of the circuit, it should be noted that the grid resistance is much greater than in the original and, bearing in mind that a certain bias is applied by virtue of the

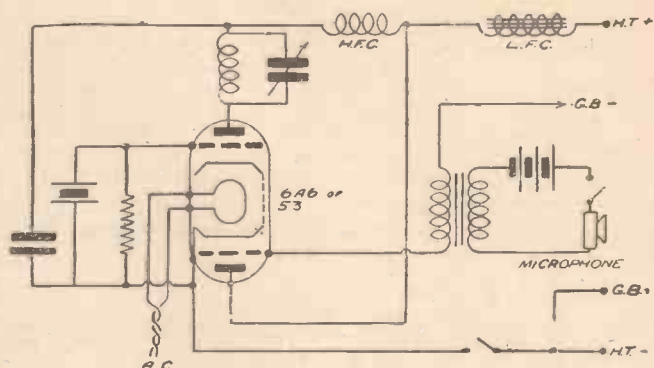


Fig. 2.—An A.C. mains version of the 2½-watt transmitter.

"mike" is used with the usual high-ratio step-up transformer.

Aerial

The simple "End-on Hertz" or the "Zepp" types are quite suitable, providing the details previously given are followed, and care taken in the measurements.

The 7½-watt Transmitter

Several constructors have raised the point about "frequency doubling" with the circuit I suggested for the above transmitter, to enable them to operate on more than one wavelength without the trouble or, rather, cost of additional crystals.

It will be remembered that two valves were specified in the transmitter section, a C.O. (crystal-oscillator) and a P.A. (power amplifier), and such an arrangement is not satisfactory, as it stands, for "doubling," so I give below the slight modification necessary.

The circuit shown in Fig. 3 is the original suggestion, while Fig. 4 shows the modified form, embodying another valve and simple switching arrangements to allow other wavebands to be covered.

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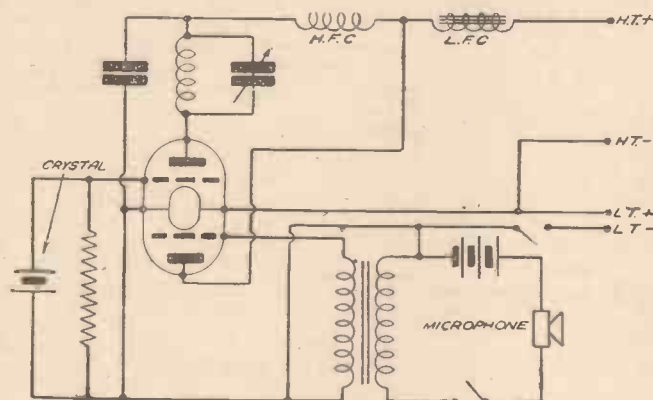


Fig. 1.—Circuit diagram of the 2½-watt battery transmitter recently described in these pages.

while the 53 requires 2.5 volts at 2 amps. The output, which is given as 8-10 watts, is identical in both cases.

The valves can be obtained in the normal manner from most large retailers, and as their cost is very low, compared with a similar B.V.M.A. type, the whole outfit comes out at a very reasonable figure. The circuit is shown in Fig. 2, while Fig. 1 shows the original battery-operated version, and it will be seen that very little alteration is necessary.

If the 6A6 is used, and I would suggest it in preference to the 53, a small filament transformer can be obtained for a few shillings, thus allowing a standard H.T. arrangement to be used. If a valve rectifier is embodied, 250/0/250 volts at 60 mA will be quite suitable, and as that is a widely used output, it is quite possible that the necessary components will be on hand in the spares box.

Batteries or a metal rectifier can, of course, be used according to individual requirements and gear available, but I would not advise batteries from the point of view of economy and falling source of supply.

Method of Keying

The keying circuit has not been shown, but that can be inserted in the same way, with filter, as for the original battery model. There is only one item which calls

grid current flowing through the resistance, various values should be tried.

In spite of the greater output, the 6A6 can be modulated quite satisfactorily with the one triode section if a sensitive carbon

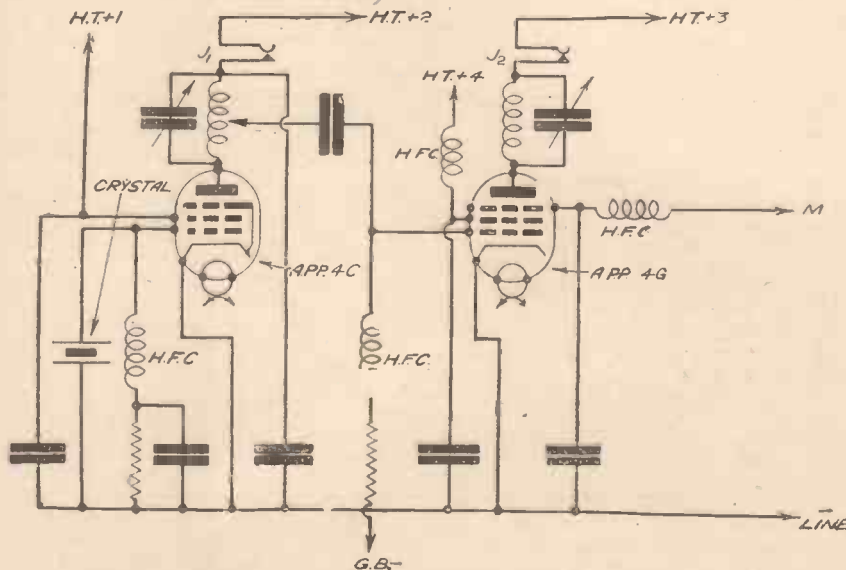


Fig. 3.—The crystal oscillator and power amplifier originally described.

TRANSMITTING TOPICS

(Continued from previous page)

Operation

If the input to the grid of a valve has sine-wave characteristics, and the valve is adjusted to operate on the straight part of its curve, a similar waveform will be produced in the anode circuit, or, in other words, no distortion will be introduced. Supposing, however, that the valve is so biased that it is operating on the bottom bend of its curve, then the anode variation curve will no longer be a true reproduction of the input; in fact, if the curves are compared, it will be found that the frequency

necessary drive is available. The additional bias can be provided by batteries, which have certain advantages in this type of circuit, or by using a rather high-resistance grid leak, for example, the leak should have a value of three to four times the value of that specified for normal operation of the type of valve concerned.

There is one point to watch with "grid-leak" bias arrangements. If the drive or excitation of the "doubler" fails, an excessive anode current will flow, sufficient, in fact, to cause harm to the doubler valve, especially if high anode voltages are being applied. With the battery system, this risk

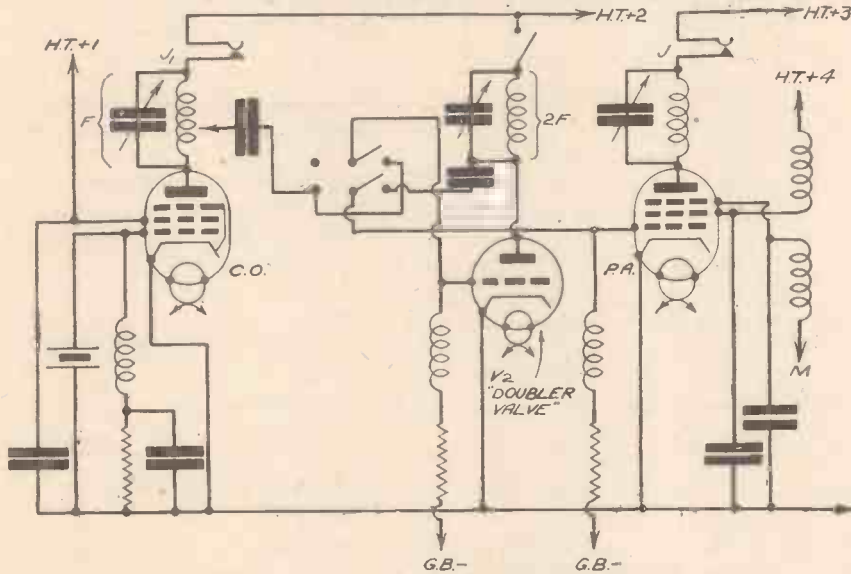


Fig. 4.—How to modify the C.O. and P.A. shown in Fig. 3.

of the anode curve represents a "harmonic," usually the second, of the input or fundamental frequency.

If, in the anode circuit, a coil with variable condenser in parallel is connected, and the arrangement tuned to double the input frequency, a barrier will be presented to the component at the higher frequency, and it will be possible to feed it into the P.A. stage via the usual inter-valve coupling.

It must be appreciated that a valve used for frequency doubling is really operating as a "generator of harmonics" and, as the anode circuit is tuned to a different frequency from that of the grid, it is not likely to act as an oscillator or become unstable, and, therefore, ordinary triodes are quite satisfactory.

Little Gain

While such an arrangement can be looked upon as a "straight amplifier," apart from actual operating conditions, it is not usual to obtain much gain from the stage, in fact, in many instances, no gain at all is obtained, the efficiency falling off as the higher harmonics are reached. For a simple "doubler," i.e., second harmonic, the "driving" power should be two or three times as great as that required for ordinary amplification. It will be obvious, in view of the nature of the circuit requirements, that it is not advisable to use valves in push-pull, owing to the freedom of the second harmonic content in their output; parallel arrangements are quite efficient.

To obtain a large harmonic output, it is necessary to bias the valve right down to the "cut-off" point of the anode current curve, in fact, it is quite usual to apply double the "cut-off" bias, providing the

is, of course, not present, and, therefore, as both methods have certain desirable features, it is quite common for a combination of the two to be used, i.e., bias applied from a battery to keep the anode current within safe limits, and a grid leak, connected in series with the battery, to provide the extra bias needed for operating conditions during normal excitation.

Regarding the anode or "tank" circuit, it is necessary to use a coil capable of tuning to double the input frequency with a variable condenser having rather a low capacity. It is advisable not to exceed, say, 50 micro microfarads, while the valve, for preference, should be of the high amplification factor type.

Headphone Monitor

One of the most essential pieces of apparatus for a transmitting station is some means of checking the transmission, and, while it is possible to make use of very elaborate gear, it is also possible to make very good use of the simple arrangement mentioned below. An examination of the circuit diagram, Fig. 5, will show that it is nothing more than a detector and L.F. amplifier, using a double diode triode across a plain tuned circuit. The headphones are connected between the output condenser and earth, no D.C. flowing in this circuit. It is essential that headphones are used, as feed-back into the "mike" circuit will be obtained if a loudspeaker is used. The tuned circuit can be formed with any suitable coil and condenser combination, providing the frequency of the transmitter comes within the tuning band.

It will be found that the arrangement is quite sensitive, and that ample output is provided to enable accurate checks to be made on the quality of transmission, modulation experiments, adjustments, hum, and other undesirable noises, while it will

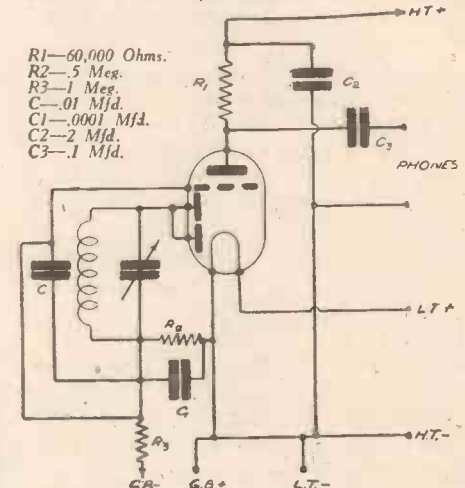


Fig. 5.—A simple headphone monitor.

also serve, providing the tuned circuit is properly designed, as a frequency check. The layout is not critical, but I would suggest that it is built as a self-contained unit, whether batteries or mains are used. Although batteries are looked upon by many as being rather troublesome, they do possess the advantage of dead silent operation, a rather valuable feature in a rig of this type.

TELEVISION AND BROADCAST WAVELENGTHS!

HITHERTO only those in possession of ultra-short-wave receiving sets within the service range have been able to tune in to the sound section of the Alexandra Palace transmissions. Plans are developing, however, and will materialise shortly, whereby the national and regional transmitters on the medium and long waves will radiate some of the television programmes. The best artists are used whenever possible for television, and although the prime factor is sight, with sound as an essential complement, listeners can enjoy the sound signals. Incidentally, this should prove a valuable advertisement for the television service, and is yet another angle whereby receiver sales may be stimulated. In addition, realising the extra quality

of the ultra-short-wave sound broadcasts because of the absence of sideband limitation, efforts are being made to radiate ordinary radio programmes on these bands. A low-powered transmitter is installed on the roof of Broadcasting House, and although only rated at 250 watts many special tests have been undertaken in conjunction with the equipment, and it seems certain that some form of public service will be possible later on. The benefits accruing from the more faithful reproduction of the audio frequencies will then become apparent, and readers of PRACTICAL AND AMATEUR WIRELESS who have studied the weekly short-wave section will be in a position to take immediate advantage of any transmissions of this nature.



On Your Wavelength

By THERMION

who say scon for scon, or pruen for prune. I could easily add to this list, but that's

enough to go on with.

Sheer Cussedness

MY friend the Secretary of the New Zealand Short-Wave Radio Club asks me to ask you if it has ever occurred to you that a man's life is full of cussedness. He comes into the world without his consent, goes out against his will, and the trip between is extremely rocky. When he is little the big girls kiss him; when he is big the little girls kiss him; if he is poor he is a bad manager; if he is rich he is a crook. If he is prosperous everybody wants to do him a favour; if he needs credit they hand him a lemon; if he is in politics it is for graft; if out of politics he is no good to his country. If he does not give to charity he is tight-fisted; if he does it is for show; if he is religious he is a hypocrite, and if he takes no interest in religion he is a heathen; if he is affectionate he is soft; if he cares for no one he is cold-blooded; if he dies young there was a great future before him; if he lives to an old age he missed his calling. If he likes girls he is a flirt; if he doesn't he is a misogynist. Well, I have asked you the question; if you want to supply the answer write to the New Zealand Short-Wave Radio Club.

My Pet Aversions

ONE or two readers have written to ask if I have any more pet aversions besides crooners. Yes, I have! I simply loathe grown-up girls who talk about their daddy and their mummy. I despise men who wear suede shoes and silk underwear. I execrate those poor nitwits who spend their time writing letters to the Editors of daily papers on every subject under the sun; I hate young men who spend all their spare time dancing. I hate the sporty boys who drive low-built sports cars; I dislike jazz music and, equally, classical music is anathema to me. I do not like people

New Wireless Clubs

LAST week the Editor published a full page of names and addresses of wireless clubs. This is the most complete list ever published, but it is incomplete in that in some cases we are without the names and addresses of the officials. Will you do the necessary if you can help? Mr. H. A. Brown, of 12, Stourport Road, Kidderminster, wishes to form a club in his district. Will local readers get into touch with him? Several of the secretaries of wireless clubs have written me deploring the lack of interest in club life. Mr. J. J. Maling, of The Southall Radio Society, tells me that they have found that at Southall to keep enthusiasm at a high pitch it is essential to have a constant stream of new members. They encourage visitors to meetings, but never ask them to join the society; the approach must come from the visitor. The Secretary of the Smethwick Wireless Society, Mr. E. Fisher, M.A., of 33, Freeth Street, Oldbury, Nr. Birmingham, tells me that his society holds a transmitting licence (G2GX), and for some time have been conducting tests on the 10-metre and 5-metre bands. The Smethwick Wireless Society is a very old one, but has had great difficulty in keeping going, for in spite of their public lectures, demonstrations, advertisements, and practical experiments, the backbone of the society still consists of those diehards who have been members for years, and who regard the society as being something that really belongs to them. He is very pleased to see that this journal is taking an active interest in societies. This journal has without a break since its inception regularly published wireless reports of clubs. Our difficulty has not been to find

space for them, but to get secretaries sufficiently interested to take advantage of the free publicity we offer. If a secretary is so lax that he cannot send reports to the wireless papers he must expect the club to die. Local advertisements may be all very well in their way, but a report in a national journal such as P. and A. W. will put every club in touch with the most desirable type of prospective member—the enthusiast.

Poor Components

HEREWITH a letter from L. B. J., of Weston-super-Mare, which speaks for itself:—

"I have taken PRACTICAL WIRELESS since it first came out and also PRACTICAL AND AMATEUR WIRELESS and I have frequently noticed comments by yourself about the poor components which are sold to home constructors.

"I have been constructing now for over ten years, but I won't bother you with details of faulty speakers, valves, fixed and variable condensers, potentiometers, although I have had more than my share of them, but I should like to give you a brief summary of my experiences with coils and to ask you what on earth is the matter with them all.

"1927 or 1928. Built a widely advertised set, my first set. Coils faulty, gave up constructing for some months, except with plug-in coils which never gave any trouble.

1931. Built a set employing a pair of—Coils, had two faulty pairs sent me in succession, scrapped them and returned to plug-in coils, and the firm refunded the money for the Coils.

"1933. Decided to try the iron cored coils and to build a set described in a journal, using a pair of—coils. One coil turned out faulty. I wrote Messrs. — and for some reason they suggested that I exchange them for a pair of ganged coils — for the Ether Searcher in *Amateur Wireless*, January, 1934. This they offered to do, and charge

no extra, these coils being dearer than the pair they were exchanging.

"I did so, and received a pair in which the switch was hopelessly faulty—medium on long-wave, high-wave everywhere. I took the coils out and returned them, and the next pair they sent me were connected together the wrong way round. After a week or so trying to make the set go I scrapped the coils, and wrote them down as a dead loss. I finally got the set going with a pair of — coils, —, but not before I had to return one for a broken connection.

"All those months I had been wearily struggling to get my set finished, continually being held up with the faulty coils and thoroughly fed up, and owing to a growing horror of buying coils I have kept my set as it is ever since 1934.

"But I have a spare small 3-valve set, and I have had very similar bother.

"I first built the — and had much switch trouble, changed to — iron-cored type, but the selectivity was so poor I decided to remodel the set and use a pair of — coils. The reaction winding in one of these was shorting and I returned it. Three times it came back to me, and each time in the same condition. I then got wild and wrote to the firm declining to have any more of it and asking for the 10s. back. They were very contrite, said those responsible would be reprimanded, and returned me the 10s. I next bought a pair of Unigen coils, and, wonderful to relate, they were both in order.

"During this last week I have been building another small 3-valve set—Det. and two L.F.—and I sent for another — coil, asking the makers to be sure and test before sending. I roughly tested the coil for continuity, built the set, and then on trying out found the coil was faulty, and on test the terminals were found to be shorting between 2 and 3. I am now held up pending the arrival of another 'faulty' coil.

"What can one do? I have given up dealers because they do not cater for the constructor, and the big London firms take an appalling time to execute orders, often send the wrong or broken component, so I invariably buy straight from the makers.

"I often feel tempted to build sets as set forth in your paper, but I do not feel I can cope with the worry and bother of the coil question.

"I would rather give up wireless than listen to commercial sets, and



Notes from the Test Bench

H.F. or I.F. Stage?

THE most common type of superhet in use to-day employs four valves; a frequency-changer, an H.F. pentode as I.F. amplifier, a double-diode or a double-diode-triode, and a pentode in the output stage. The popularity of the all-wave type of set during the past few months has caused the manufacturers to experiment with additional stages, however. The standard four-valve type is quite good enough for reception on the broadcast bands, but it leaves room for great improvement on the short-wave bands. Some manufacturers favour the addition of an H.F. stage, whereas others prefer to add an extra I.F. stage.

Up to the present there are more sets available with an H.F. stage than with two I.F. stages, but it is probable that this order will be reversed during the coming season. An extra I.F. stage will, certainly increase the sensitivity to a greater extent than an H.F. amplifier, but it is difficult to control, and unless very effective screening is used optimum amplification cannot be obtained. This difficulty is being overcome by manufacturers, however, but the home constructor is advised to use an H.F. stage and one I.F. stage for the present. Perhaps before the end of the year suitable components for effectively employing two I.F. stages will be available and sufficient room should therefore be allowed for the addition of an extra valve and I.F. transformer—it will be much easier to add an I.F. valve than an H.F. valve.

Frame Aerials

MANY of our readers seem to be very doubtful concerning the correct use of the frame aerial. It is very commonly believed that the frame aerial is merely a coil of wire wound round the receiver case and connected to the aerial terminal in the same way as an outside aerial. This type of aerial is sometimes used in transportable receivers having a large cabinet, but is unsuitable for a small portable. For the latter type of receiver, a correctly-designed frame aerial should be used, one end being connected to the fixed vanes of the first tuning condenser and the other end to the moving vanes, the coil normally connected across the condenser being omitted. Approximately 70 feet of wire should be used for medium-wave reception, and the turns should be spaced about $\frac{1}{2}$ in. apart for best results.

Everyman's Wireless Book

3/6, by post 4/-
helps you to trace that fault!

besides, half the fun is in building but I see no option but to give it up and hang on to my present sets until they fall to pieces.

"I thought my experiences might be of some interest to you."

Sir Thomas Beecham

I READ that Sir Thomas Beecham has been having a slash at the B.B.C. because, in his opinion, three parts of the broadcast matter is nonsense. That is an arguable point. I think that a very high proportion of the matter broadcast by the B.B.C. is excellent, but I agree that a high proportion of the music is jazz. Sir Thomas Beecham is not in any position to judge what wireless listeners want. The B.B.C. is, and because it believes in giving the public what it wants, and not what Sir Thomas Beecham thinks it ought to have, that is a point in its favour. If Sir Thomas Beecham were in charge of the B.B.C. Music Department, I have no doubt that the wails from listeners would be more voluminous than they are to-day about crooning and jazz. We must also remember that there was less interest in the style of music which Sir Thomas Beecham purveys before broadcasting started than there is to-day, so radio must have done orchestras a bit of good. I do not think that Sir Thomas Beecham, in his efforts to fan the lost cause of promenade concerts and classical music, does his case a lot of good by lashing the B.B.C. in this way. It is not the first occasion on which he has let himself go!

A Challenge

THE Secretary of the Southend and District Radio and Scientific Society held a Coronation Year Radio Exhibition on April 2nd and 3rd. They produced an excellent programme of this, and on page 5 I note the following: "Every important town in England has its Radio Society or Club, founded with the object of enabling those interested in the art and science of Radio Communication to get together, exchange ideas, and improve their knowledge of this vast subject. Some of these are solely 'Short-wave Clubs,' consisting only of the people interested in certain aspects of radio work, others are purely scientific bodies, but, as far as we are aware, ours is the only Society in the country which not only embraces all aspects of Radio and allied scientific studies, but also carries out a comprehensive programme of charitable work. We rely on the generosity of visitors to our exhibitions for the greater part of the funds which are needed to carry on this work."

Practical Television

April 24, 1937. Vol. 3. No. 47.

Those Standards

IN many quarters it is a matter of mystery how the standards of definition for the line dissection of television pictures is arrived at. Why choose what is an apparently abstruse odd number when on the surface any other should suffice? For example, we have a B.B.C. standard of 405 lines interlaced in this country, whereas to the uninitiated a figure of 403 or 407 should do just as well. The decision, however, is not so simple as it seems at first sight. First of all, assuming that interlacing is to be preferred to sequential scanning owing to its reduction of flicker, readers will appreciate from the various diagrams published in these pages that an odd number of lines is an advantage, since it enables the intermeshing to occur better with the one line halved and the two pieces positioned at the top and bottom of the scan. With an even number of scanning lines the time-base generator would be complicated, as it would be essential to shift the scan position bodily up and down each frame (half picture scan) to enable the odd and even lines to intermesh. Secondly, the master oscillator which generates the line and frame scanning frequencies is locked to the A.C. mains for its prime frequency. This is 50 in this country, and to obtain the required high-definition line frequency, harmonic multiplication takes place, the selection being of the lower order of harmonics because of the higher efficiency of the selecting filter circuits working under these conditions.

There are a whole series of graded numbers which fulfil these conditions and 405 is one of them, so that, briefly, is the reason for the present choice. It is known that the Americans are trying to secure some form of international agreement on standards of definition, picture and frame frequency, and also picture ratio of length to height. In this way it is claimed that the commercial field of exploitation will be extended very considerably. Many of their Press demonstrations have been undertaken on a standard of 343 lines, but more recently the American R.M.A. have recommended to the Federal Communications Commission that this should be changed to 441. Both these figures are based on an interlaced picture and differ from this country because the standard A.C. mains frequency in the States is 60. It has been stated quite frequently that in America there is a desire to avoid any possibility of rapid obsolescence of television receivers due to altered standards, coupled with the wish to bring television to a higher state of perfection before initiating any wide scale public service. This certainly is a good policy, but is a form of conservatism which may result in the United States being left behind by those European countries who have already started transmissions. Valuable experience is being gained in England, France, Italy and Germany, and public co-operation, together with unbiased Press criticism, especially when of a constructive nature, keeps the project alive to such an extent that there is little likelihood of a stalemate occurring here.

Breakdowns

IT is a matter of regret that there have been one or two breakdowns in the television transmissions from Alexandra Palace. On the last occasion, an evening transmission, a sound programme was radiated by the artists, but this only seemed to emphasise the importance of the pictures and show how radiated intelligence depends to such a large extent on the appeal to the eye. Since the B.B.C. as a result of the recent Advisory Committee decision, have duplicate radio transmitters, etc., it would seem a better plan to have this equipment always standing by and so preserve a continuity of service which is so essential in the early days.

Cable Tests

THE Post Office engineers are determined to make sure that the coaxial cable which is now being laid between some of the principal cities in this country is capable of carrying the wide range of signal frequencies for which it was originally intended. To this end equipment has been bought for the purpose of simulating signals embracing the ultra-high frequencies included in every good quality television signal. In this way a direct comparison between input and output signals can be made and a careful examination made for any form of phase distortion or amplitude mutilation. No doubt the best course for this purpose will be to use a cathode-ray oscillograph and either watch the signal shape on the screen or alternatively make photographic records on a special type of film camera for subsequent enlargement on to a cinema screen. It is stated that the equipment can reproduce signal frequencies considerably in excess of those already present in the B.B.C. television service picture. This is to prepare for the future when improved standards of definition are certain to materialise.

French Progress

A LARGE exhibition is being organised to take place in Paris this year, and it is now learned that a new and powerful television transmitting station is to be erected at the base of the Eiffel Tower so as to be in operation in time for the exhibition. The power is given as 30 kilowatts, but it is not known whether this figure is for the mean aerial dissipation or peak power. The company from whom the equipment has been ordered is Le Material Telephonique, and the aerials will be over one thousand feet above the ground. This should ensure a good service range, and the studios housing the scanning equipment will be built in the Radio building of the Paris exhibition as well as in the P.T.T. broadcasting station. Visitors will thus be able to see some of the latest developments and no doubt compare the studio scene itself with the received pictures shown on various sets. It is not yet known what standards of definition will be employed, but no doubt they will be an improvement on the early ones of 180 lines with consecutive scanning.

An Early Portable Camera

WITH the degree of flexibility and portability associated with the

present forms of electron cameras accepted now as a natural part of their function, one is apt to overlook the early efforts made in this connection when the B.B.C. were radiating their low-definition television service. This was brought to light by the recent appearance of Jack Payne and his band at the Alexandra Palace. Although this was the band's initial appearance on high-definition receivers, it was by no means the first occasion on which they were brought face to face with the television camera. In October, 1931, the band inaugurated a series of weekly half-hour television transmissions by the Baird process from the old B.B.C. building at Savoy Hill. A newly-designed portable scanner was installed in one of the studios, and not only was Jack Payne seen conducting and announcing, but several members of the band were seen in concerted numbers. The actual equipment used on this occasion is seen in the accompanying illustration. It consisted of an automatic arc lamp, in front of which was an encased scanning disc driven by a steady speed motor. Two lenses on an adjustable arcuate arm enabled extended and close-up scenes to be featured, while portability was ensured by having the whole scanner mounted on a tubular tripod with rubber-tyred wheels. Horizontal panning was allowed for by incorporating a small turntable at the top of the tripod and the results at that time were outstandingly good when the degree of definition was borne in mind. This "camera" was used for several months together with the associated banks of photo-electric cells, and quite rightly can be regarded as the forerunner of present-day portable television scanners, although not of the modern electronic form.

(Continued overleaf)



The first portable television scanner used by the B.B.C. over five years ago at Savoy Hill.

(Continued from previous page)

In Berlin

RADIO executives from most of the important European countries attended Berlin recently for a meeting of the International Broadcasting Union. The conference took place in Berlin's luxury hotel, The Adlon, and a special television demonstration was witnessed. This was not too impressive as the Germans are still radiating an experimental service with only 180 lines, 25 frames, 25 pictures per second, and the results were very inferior to what is now possible in this country. This consistent maintenance of one standard by Germany for so many years is difficult to understand, for they were first in the field with a high-definition experimental service, and with Government backing it is hardly possible that progress has not been made beyond this point. Perhaps the authorities are waiting for an opportune moment to inaugurate a service which will be even better than the present B.B.C. one, or alternatively the improved equipment is being retained for Government purposes.

Television Cost

WHEN the B.B.C. television service was first inaugurated it was impossible to arrive at any definite figure for the cost involved. The purchase of equipment, alterations to the chosen site, the appointment of staff, etc., were unknown factors in terms of money. Now that the service has been in operation for some months, however, a closer approximation to the sum involved for a year's operation is possible, and in a recently published report, the B.B.C. estimate the cost as £300,000. This is a large sum, but it seems certain

that economies will be effected by using suitable television items as broadcast material on the ordinary medium and long-wave stations. Properly organised, with the requirements of both viewers and listeners adequately catered for, a scheme of this nature is sure to develop, and experiments in this connection will be watched with interest. Viewers are certainly helping in programme compilation by their letters to the B.B.C. and the replies to the Question Forms which were sent out recently. One

The Coronation Procession.

It is hoped to televise the Coronation procession at Apsley Gate, Hyde Park Corner, on the return journey from Westminster Abbey. A running commentary will accompany the broadcast, which will open with crowd scenes and last approximately an hour.

The B.B.C. anticipates using three cameras. One of these, installed on the plinth of Apsley Gate, will give overhead views of the advancing procession, while a second camera, operated from the pavement immediately to the north of the Gate, will provide close-ups as the procession passes through the arch. Another camera facing southwards from Apsley Gate will show the end of the procession crossing Piccadilly towards the Green Park and Constitution Hill.

thing is very apparent, however, and that is that it is going to be almost as difficult to satisfy viewers as it is listeners, owing to the wide variety of tastes.

O.B. Preparations

THE present aerial array at Alexandra Palace is positioned at the top of a mast which is 300ft. high. This is to be capped, however, by another slender pole, at the summit of which will be attached the most efficient form of modern ultra-short-wave receiving aerial. A scheme of this character is necessary in order to pick up the signals from the fleet of mobile television vans now nearing completion. This aerial, the highest receiving aerial in the country but not the highest transmitting aerial, since the South Tower of the Crystal Palace has three or four acrials nearly 700ft. above sea level, will feed the received signals from the ground level van to the modulation amplifiers for re-radiation by the normal Alexandra Palace equipment. Apart from test work, its first real function will be in connection with the televising of the Coronation procession. In one van will be accommodated the sensitive electron cameras, while a second van will act as the ultra-short-wave transmitter with its aerial undoubtedly "beamed" in the direction of Alexandra Palace. This independence of land lines will make the equipment much more flexible in character and extend considerably the field over which outside broadcasts can be undertaken. To meet situations where electrical power is not readily available a special van will be built with a power plant to furnish the necessary supplies to the radio transmitter, cameras, control plant, etc. When complete, viewers can look forward to the inclusion of many interesting items in the broadcasts and the regular portrayal of sporting and other events which have been impossible so far.

TELEVISION NOTES**Interference from an Aeroplane**

REPORTS are coming in of an entirely new form of interference peculiar to television. When an aeroplane passes over or along a line drawn between transmitter and receiver, the picture slides all over the place. Serious interference of this nature can be caused by an aeroplane a mile or more away, and with a flight of 'planes, it has been observed when they are five miles from the receiver. It is evidently not interference from the magneto, but appears to be caused by the 'plane reflecting a sky wave down on to the receiver aerial, and causing the aerial to pick up transmission in the normal way, but reflected out of phase, resulting in the picture appearing normal on the screen, and then displaced.

Assuming the 'plane to be travelling along a line between receiver and transmitter, the picture is displaced to the maximum extent for approximately 25ft. of the aeroplane's travel. As this interference is in no way connected with the electrical apparatus on the machinery, but is caused entirely by the mass of metal of which the 'plane is built, it would seem extremely difficult to foresee how such a form of interference could be cured.

What Happens to the Electrons?

READERS will be familiar with the fact that in a television tube the electron stream impinges upon the fluorescent screen, causing it to glow and form the light parts of the picture. Few, however, stop to

wonder what happens to the electrons afterwards. If they remained on the screen, the screen would become so negative after a time that the beam would be deflected away by repulsion. Obviously the electrons cannot flow back to the cathode in the ordinary way, as the screen

is, of course, insulated by the glass bulb, and is not connected in any way. The bulk of the electrons get "lost" by secondary emission. The electrons in the electron beam impinge on the screen so violently that they knock off electrons from the molecular structure of the screen, which, being free and started off in the downward direction are picked up by the positive electrodes, and/or the "silver" lining fitted to many tubes. In addition to this a certain amount do actually leak along the inside of the glass, and return to the electrodes by this means.



A recent television broadcast included a Casino scene, and the above illustration shows Russell Swan, the illusionist, entertaining the visitors.

A PAGE OF PRACTICAL HINTS

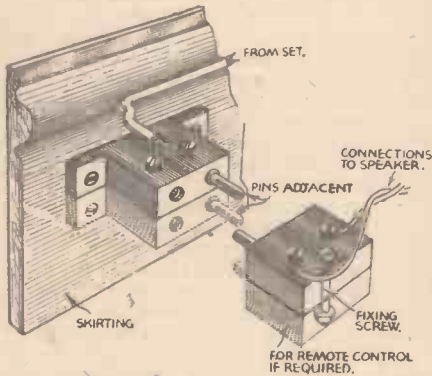
**SUBMIT
YOUR
IDEA**

READERS WRINKLES

**THE
HALF-
GUINEA
PAGE**

Extension Speaker Plugs

NO doubt many readers possess a few old-type plug-in coils and sockets. These can be utilised for extension speakers by removing the coil from the plug and connecting the speaker flex to the screws,



Method of utilising old type plug-in coil fittings for extension speaker plugs and sockets.

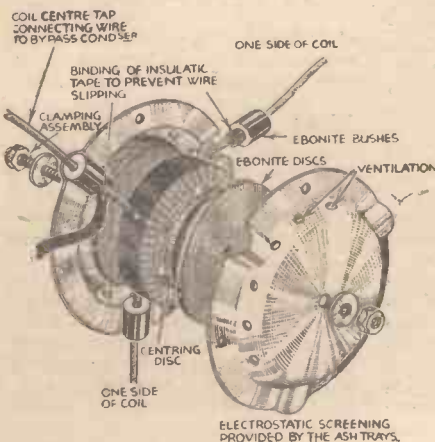
which are placed one on each side or both on one face. The socket should preferably be of the baseboard type, which is more easily secured to the skirting, etc.

A double plug, consisting of two sockets and two plugs fastened together, will be found very useful for remote control purposes. Care should be taken to see that the pins on each pair are placed adjacent to each other, which will prevent wrong connections being made. When using the double plug the remote control switch can be placed on the speaker cabinet.—N. SMITH (Liverpool).

A Universal Fitment

THE accompanying illustration shows one method of employing a brass ash-tray, and I have found that considerable scope in various radio fitments is afforded by this type of tray.

For example, a doublet aerial trans-



A novel use for stamped metal ash trays.

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.

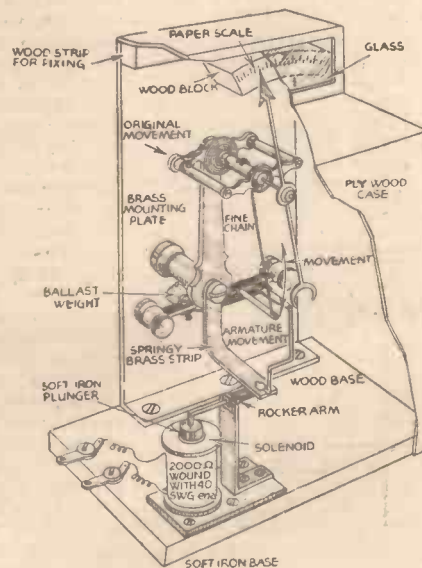
former may be constructed by replacing the coil illustrated by two smaller coils of the required step-up ratio, the ash-trays providing adequate screening and the earth connection being soldered to the clamping screw. Further clamping may be accomplished, if required, by the three holes shown on the flanges.

For use as a mains suppressor H.F. choke the assembly is compact, and tends to enhance the appearance of the chassis—it was originally designed for this duty, and the connections were taken to a 100-turn coil (34 D.S.C.) centre tapped, the connection being taken to the bypass condenser (4 mf.) as shown.

Another use is in its adaptation for L.S. H.F. chokes in long extension leads, and in this instance a 60-turn coil in each lead will prove sufficient in most cases.—A. R. H. PARKER (Sheffield).

A Ripple and Signal Detector

I CONSTRUCTED this apparatus for the sole purpose of localising and checking superimposed ripples in frequency, filter, and smoothing circuits, and find its sensitivity remarkable. It will respond to frequencies of the order of 10,000 c.p.s.



An efficient ripple and signal detector.

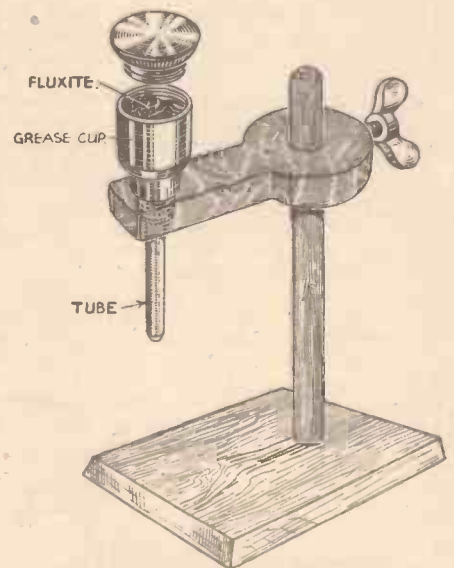
provided the current is sufficiently operative. The minimum current is about 5 mA, and the maximum is of course dependent on the type of coil used—in this case up to about 100 mA. For signal indication this unit is very efficient.

The barometer movement should carefully be fixed in the manner shown, and the tension on the springy brass strip should be adjusted so that the arrow is set at zero (Z) with the rocker arm soldered to the tip of this strip.

A low-frequency test of about 25 c.p.s. at a low voltage with a milliammeter in circuit will provide the initial test for adjustment, and a fuse should be incorporated to prevent damage to the solenoid.—H. FREEMAN (London).

Automatic Feeder for Soldering Flux

THE adaptation of a grease cup for use as an automatic feeder of soldering flux to a job is very convenient in some



An ordinary grease cup adapted as an automatic feeder for soldering flux.

circumstances. When the job can be held in the hand, and the soldering iron and flux is held in a fixed position, the job can be transferred with facility from one to the other. A tube is fitted to the end of the grease cup, as shown, and held at right angles or vertically for convenience in handling. Much saving of time is possible with this device, and it is clean in working, and also economical.—W. H. GRAYLING (Cambridge).

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MICROPHONE METHOD

A Practical Article Explaining the Construction of Microphone with Best Advantage

IT is rather surprising, bearing in mind the number of microphones sold each year, to find how few people have any idea of how to obtain the most satisfactory results from them, and their associated amplifying equipment. A very large number of users, not only home constructors, appear to be under the impression that a microphone is something which, when connected to any old receiver or amplifier, will cause sounds to be reproduced via the loudspeaker at an intensity many times greater than the original. To any reader holding those views, I would say "forget them as quickly as possible."

A microphone—speaking in a true component sense—is a delicate and sensitive instrument, and, as such, demands as much, if not more, consideration than the rest of the equipment. If one is really interested in microphone work, to the extent of requiring decent quality and trouble-free results, it is worth their while giving the details mentioned below careful consideration.

Types

While I do not propose dealing with the various types of microphones, I wish to differentiate between the two most popular types in the "carbon" class, namely, the "button" and "transverse current" models.

Button Microphone

The original "Skinderviken" button microphone employs an actual carbon button, as depicted in Fig. 1, which also shows the general arrangement of the vital parts.

The electrical circuit is formed between the carbon button fixed to the small diaphragm and the carbon container, which is shaped to the curvature of the button, the intervening space being filled with very fine carbon granules.

The slightest movement of the diaphragm "d" causes a variation in the formation of the mass of carbon granules "g" and, as they form part of the electrical circuit, a change in resistance is produced, which, according to Ohm's Law affects the current in the circuit.

Transverse Current Type

In this type, the diaphragm does not form part of the electrical circuit; therefore, greater consideration can be given to its shape, size, weight and the substance used for its formation, resulting, in a properly

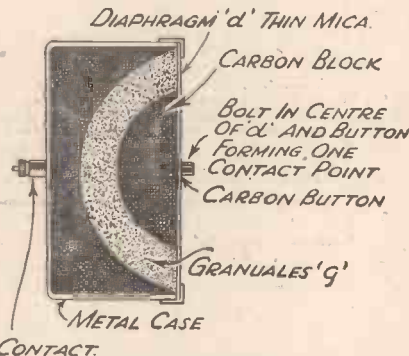


Fig. 1.—Diagram of the method of construction of a button type microphone.

designed instrument, in a better frequency response.

The fundamental parts are shown in Fig. 5, "d" being the diaphragm made from some suitable insulating material, "b" and "b1" representing the two electrodes between which the electrical circuit is completed by the carbon granules "G." The electrodes are usually carbon rod, of a very fine grade, though in some instruments they are made from certain metals, the surfaces being electro-plated with a non-corrosive film.

As in the previous example, the slightest movement of the diaphragm causes a variation in the current flowing in the circuit by virtue of the change in the formation of the mass of granules affecting the electrical resistance. It should be noted, however, that the diaphragm is perfectly free, as regards its centre, and does not have to carry any carbon or other conducting material thus allowing a more faithful response to the sound waves, a freedom from additional damping and a more robust construction.

It is, of course, necessary with each type to use a transformer between the microphone and the input to the receiver or amplifier, and a low voltage battery to supply the energising current.

The circuit is shown in Fig. 3, the transformer "T" having a ratio of between 20:1 and 50:1, according to the characteristics of the "mike."

Amplification

It is not usually appreciated that the output of a microphone is very small, far less than that of the average pick-up, and it will be found that as the quality of the microphone output increases, so the output decreases thus necessitating additional amplifying stages.

It is possible to use some of the more sensitive "button" models with, say, the average three-valve straight receiver, but the output will be very limited, and quality is likely to suffer unless particular care is taken.

For serious microphone work, I would strongly advise the construction and use of a separate amplifier or, if the existing receiver already embodies an output stage capable of giving the required output, a pre-amplifier to boost the "mike" output up to input required by the L.F. portion of the receiver fully to load the output valves. The unit can be of simple construction, and a suggested circuit is shown in Fig. 4. It can be battery or mains operated, but the latter calls for rather more care in the decoupling arrangements, the smoothing of the H.T. supply, and the layout of the components.

The advantages of a pre-amplifier are many. For example, better mixing arrangements can be obtained; the length of the microphone line can be increased considerably without loss of frequency response; the output can be used to feed any number

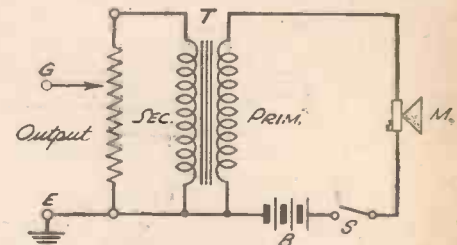


Fig. 3.—The microphone input circuit.

of "final" amplifiers, while the general operation of the complete installation is rendered more simple and satisfactory.

Hum

A microphone transformer is exceptionally sensitive to the magnetic field produced around a mains transformer or any other component carrying A.C., and as the field of interference is fairly wide—say, three feet with certain transformers—it is practically impossible to embody the microphone transformer in the final amplifier or on the same chassis. The trouble can be overcome by housing the transformer and its energising battery in a small box, and using screened leads sufficiently long to enable it to be placed, say, 5 to 6ft. away from the amplifier.

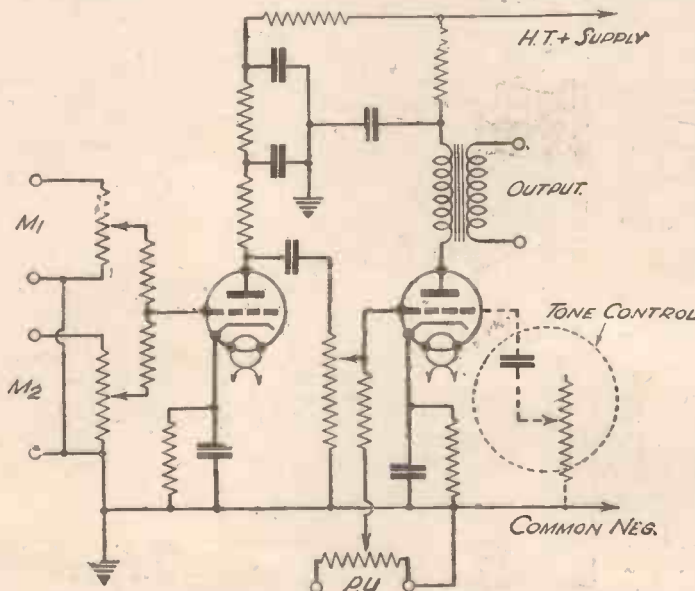


Fig. 2.—A comprehensive circuit arrangement with mixer-fader and tone control.

METHODS MADE PLAIN

Microphones, and How to Install and Use Them to the Best Advantage

By L. ORMOND SPARKS

With a pre-amplifier, assuming it is free from mains gear, the microphone transformer can be housed on the same chassis, and the possibility of hum eliminated. The very fact that the initial or high amplifying stages, when a pre-amplifier is used, are removed from the field of magnetic interference also removes effectively the hum danger.

Microphone Transformers

These components can be purchased at various prices, but I would strongly advise the use of a good and reliable article, as the characteristics of the transformer can make or break the whole "mike" circuit, as regards sensitivity and, what is more important, frequency response.

I have carried out extensive tests in this direction, and I have no hesitation in saying that a good transverse current microphone can be brought down to the level of a cheap "button" job, as regards results, by the use of an inferior transformer, and, conversely, a poor microphone can be improved considerably by using a good transformer.

Select one designed for the microphone in use—i.e., high or low resistance. See that the primary has a high inductance at the rated current consumption of the

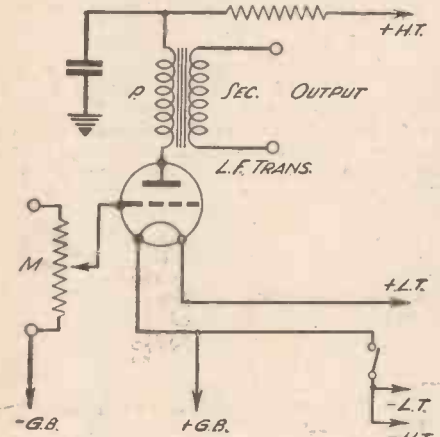


Fig. A.—A simple single-valve battery-operated pre-amplifier.

microphone, and that a good core is provided.

Lines

While it is not always essential to use screened leads for the microphone line, they are certainly advantageous, and in many instances prevent undesirable pick-up.

Providing thick insulating walls surround the cable, and the total resistance of the line does not exceed, say, 1/10th of the microphone resistance, lengths up to 250 yards can be used between the "mike" and the transformer, but, on the secondary side, it is advisable to use earthed screened leads having only sufficient length to keep the transformer out of the magnetic field of the mains equipment.

Feed-back

One of the most distressing troubles with microphone work is the "howl" which is so often set up by the speaker when the microphone is switched on or spoken into. It is due to "feed-back" between the

STOUT CASE

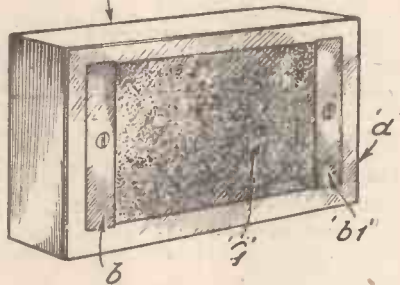


Fig. 5.—The transverse current type microphone.

loudspeaker and the microphone, the "feed-back" being chiefly of an acoustic nature, although it is possible for a similar effect to be produced electrically.

Considering the most common form, namely, acoustic "feed-back," this can be introduced by any of the following causes:—

The microphone being too sensitive. This in turn may be due to the construction of the microphone; too high an energising voltage; too high ratio transformer, or too great an overall amplification.

The position of the microphone in relation to the loudspeaker. This calls for experiment with every installation, as so much depends on the output required, the acoustic properties of the room or hall, and the amount of shielding or damping between the loudspeaker and microphone.

Acoustic properties. If a hall or room is very lightly damped, as regards sound absorption and/or reflection, then it is likely that "echo" effects will be pronounced, and cause some little difficulty in overcoming "feed-back," although the same hall, when filled with people, will not be so troublesome; therefore, experience and tests are the only guides. In such circum-

stances, in fact, in most circumstances, it is always better to use two or more loudspeakers, operating at lower volume levels than, say, one trying to cover the whole area. (See Figs. 6 and 7.)

Place the speakers as far away from the microphone as conditions permit, facing, of course, away from it, and utilise to the utmost any shielding which may be provided by pillars, recesses or drapings, and keep the output down to the lowest consistent with satisfactory results.

As a last resource, reduce the sensitivity of the mike, but, as this necessitates the performer, in the case of speech, getting very close to the microphone, it is not always a happy solution. If other types, of microphones are available, such as moving-coil or crystal, then they will improve matters very considerably, providing the input connections are re-arranged accordingly.

High-impedance Mikes

The high-impedance microphones, such as the crystal and condenser types, do not need an input transformer, and much greater care is required in using them on this account. For instance, the condenser microphone has such a capacity that the leads from it to the amplifier must be kept down to a matter of inches. This necessitates a special pre-amplifier, where the microphone is joined direct to the grid of the valve, keeping the lead, if possible, to a matter of only one inch or so, and adopting very careful screening. An amplifier of this type may be built in a small metal box, with the microphone mounted in one side. Similarly, the crystal microphone has to be joined direct to the grid circuit, and again a pre-amplifier is a highly desirable feature. As these components vary, the manufacturers' instructions should be carefully followed.

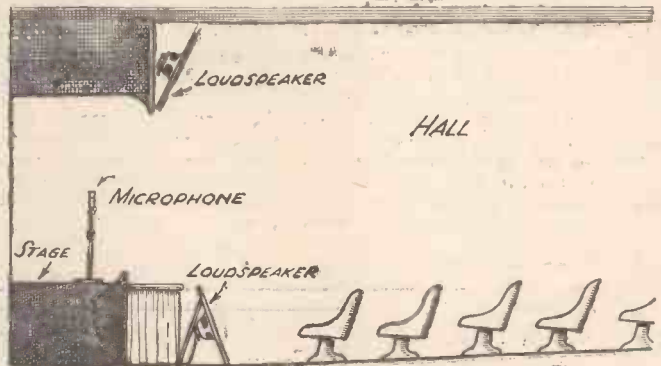


Fig. 6.—Bad arrangement of loudspeakers in a hall.

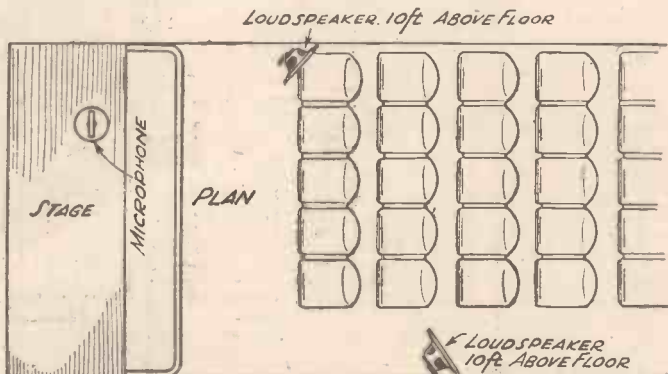


Fig. 7.—A much better arrangement which provides better diffusion of sound.

Making a Universal Transportable

DETAILS were given in last week's issue concerning the construction of a few different types of portable receivers. In general, much of the information included in the previous article can be applied to the design of an A.C./D.C. transportable, although there are additional points to be taken into consideration. One of the most important is that a considerable amount of difficulty is sometimes encountered when adopting a frame aerial.

This is principally due to the fact that any "hum" present on the mains supply is apt to be induced into the frame. It is not suggested that this trouble cannot be overcome by tackling the problem fundamentally, but the trouble can nearly always be obviated quite satisfactorily by using a so-called mains aerial instead of the frame. After all, there does not seem to be any point in wasting the potential value of the mains leads as a source of pick-up!

Mains Aerial

In order to use the mains in place of an aerial, it is necessary only to connect a small-value fixed condenser (of reputable quality) between the usual aerial terminal on the input tuning coil and one side of the mains supply. This is shown in Fig. 2, where two alternative connections for a .0001-mfd. fixed condenser are shown. Both methods of connection can be tried, but that shown in full lines generally proves most effective; there is less risk of induced mains hum, and selectivity is good.

It is always preferable to employ an earth connection whenever possible, and a terminal for the earth lead is shown in the circuit. Incidentally, it should be observed that this is joined to the "earth line" of the set, and to the mains, through a .1-mfd. fixed condenser. If the condenser were omitted there would be a danger of short-circuiting the mains when the set was being fed from a D.C. supply with positive earthing. The condenser must be a good one, with a rated working voltage of not less than 350.

There are, of course, dozens of different circuit arrangements which can be used with complete satisfaction for a portable or transportable receiver, but only one is given as an example of a simple and effective type. Any of the circuits given last week could be used by modifying the power-supply system, and by replacing the frame aerial by a standard tuning coil and condenser. The circuit shown, however, is one of the simplest for good reception of a reasonable number of transmissions without the connection of an elevated aerial. At the same time, should it

Some Practical Items to Which the Constructor Should Give His Attention When Designing and Building a Transportable Set for A.C./D.C. Operation

By FRANK PRESTON

ever be desired to add an aerial it would be necessary only to break the lead from the .0001-mfd. condenser and the mains leads, and to replace it by an aerial lead-in.

Valve-heater Connections

As a mains transportable must be of such a nature that it can be operated from either

across the valve heaters, regardless of the voltage of the mains supply. Actually, the barretter can only operate within certain limits, and the Osram type 302 which is indicated has a working voltage range of 112 to 195, at .3 amp. This means that it will keep the current passing through it constant at .3 amp. as the applied voltage varies between the two figures given.

The three valves are used as: variable- μ H.F. amplifier, triode detector and power pentode, Osram valves, types W.30, H.30 and N.30 being suggested. For rectification, an Osram type U.30 is indicated. Since the three receiving valves have heaters rated at 13 volts, .3 amp. each, and the rectifier has a heater rated at 26 volts, .3 amp., it will be seen that the total voltage drop across the four will be 65. In consequence, the set can be fed from mains whose voltage varies between 177 and 260—a much wider range than is normally required.

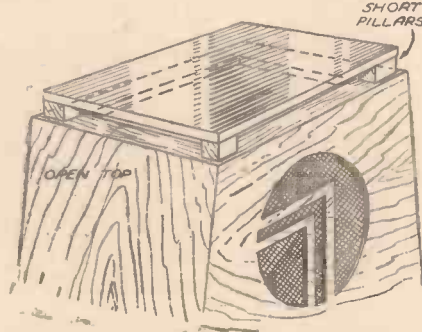


Fig. 1.—A form of construction for the top of the cabinet which allows for air circulation and cooling of the valves and barretter.

A.C. or D.C. mains, universal valves with 13-volt heaters are indicated; their heaters are connected in series with the heater of a valve rectifier, which is wired on the half-wave principle. There is also in the heater circuit a barretter, the purpose of which is to maintain a uniform voltage

Component Values

Apart from the points already considered, the circuit illustrated is not in any way unusual. The first valve is given a 5,000-ohm potentiometer, by means of which the "gain" or amplification can be regulated, whilst it is connected to the detector on the tuned-anode system. A two-gang condenser might well be used for tuning both coils, and a reaction condenser is also included. The grid-leak detector feeds into the output pentode through a resistance-fed transformer, and the grid circuit of the last valve is decoupled by means of a .1-megohm resistance and a 25-mfd., 50-volt electrolytic condenser.

Mention should be made of the grid-bias resistance for the last valve, which is shown as being of 375 ohms. Normally, a resistance of this value is not obtainable, but the figure can be obtained almost exactly by connecting a 1,000-ohm resistance in parallel with one of 600 ohms; both resistances can be rated at $\frac{1}{2}$ watt. Another method is to connect two $\frac{1}{2}$ -watt resistances, of 250 ohms and 125 ohms in series. All of the other resistances shown can be rated at 1 watt. All of the fixed condensers, excepting that used for L.F. grid decoupling, should be rated at not less than 350 volts working, including the two electrolytics required for H.T. smoothing.

It is not proposed to deal more fully with the circuit, or to give anything in the nature of a wiring plan, because the diagram given is intended only as an example. Provided that the valves specified are employed, and that the principal components are of the values shown, the actual makes and types

(Continued on page 137)

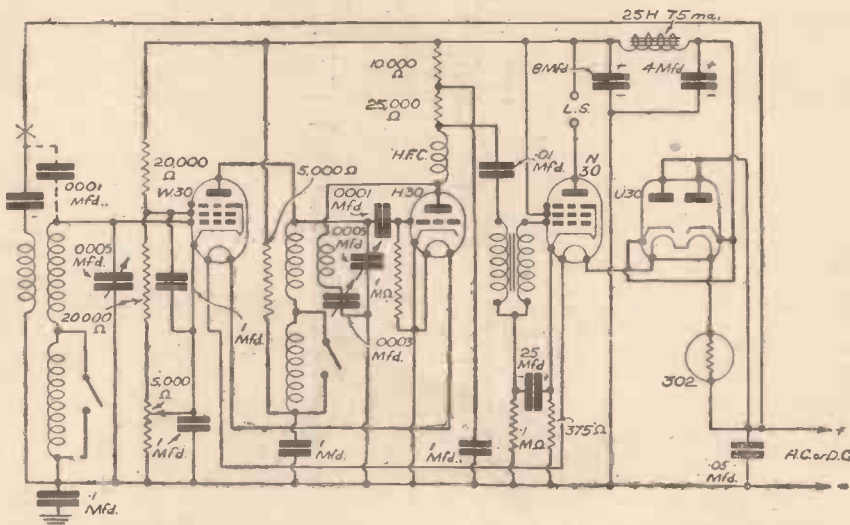
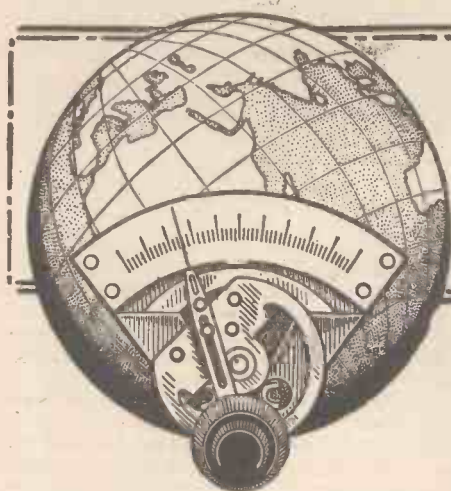


Fig. 2.—A good three-valve circuit for use in a universal mains transportable set. Suitable valve types (Osram) are indicated.



SHORT WAVE SECTION

BAND-SPREAD TUNING FOR BEGINNERS

The Advantages of Band-spread Tuning as Associated With Short-wave Receiving Apparatus, Cannot be Over Emphasised, and Various Systems which may be Adopted to Suit Individual Requirements are Described in this Article.

By A. W. MANN

BOTH mechanical and electrical methods of band-spreading are in common use, and the extra trouble and modest additional outlay are more than justified.

Dealing first with mechanical methods, the average slow-motion dial has a ratio of about 16 to 1, and whilst a useful compromise, it cannot be regarded as a satisfactory arrangement from the short-wave enthusiast's point of view. There are, however, a number of specially designed open scale twin ratio dials available, employing ratios of 18 to 1 and 100 to 1 or 150 to 1. Thus quick band-setting and slow searching over the bands is possible. A further aid in some instances is the fitting of an extra graduated dial scale. There are also the popular slow-motion driving heads, which are fitted with a comparatively long indicating pointer and a large calibrated scale.

Where space is definitely limited, so that the incorporation of electrical band-spreading components is impossible, the use of mechanical methods will prove to be a great advantage so far as ease of tuning and station logging are concerned.

Electrical Methods

Whilst appreciating the advantages of mechanical systems as outlined, the writer realises their limitations, and much prefers electrical methods incorporating them whenever it is possible to do so.

There are various methods of incorporating electrical band-spreading both simple and complicated, depending mainly upon the type of receiver, and the operator's requirements. For example, large communication type short-wave receivers in which elaborate coil switching units are included, add to the designer's problems, and call for the introduction of equally elaborate and complicated methods of applying band-spreading.

Such arrangements are definitely reliable because of sound engineering and design, but are somewhat beyond the scope and ingenuity of the average home constructor and experimenter. I propose, therefore, to confine my remarks to methods well within their scope.

Fig. 1 shows the popular parallel method in common use. When this method is used, the band setting condenser A should be of .0001 mfd. or .00016 mfd. capacity, and condenser B, which is the band-spreader, of 15 mmfd., or even lower capacity. Fig. 2 shows the series condenser method, C being the band-setter and D the spreader,

the respective capacities being .00016 and 15 mmfd. or lower. The disadvantage of this method is that in the case of one of the variable condensers, both sides with respect to H.F. currents are alive, and ebonite bushing is therefore necessary when an aluminium panel is used.

to find the correct tap position, and once this is ascertained, the trimming adjustment will enable the amount of spread to be adjusted to suit individual requirements within reasonable limits.

Condenser Values

It should be remembered that in dealing with various systems of band-spreading, the suggested condenser capacity values will not always hold good. For example, coil design and circuit differences, especially in home-constructed receivers using home-constructed coils, must be taken into account.

If, however, commercially manufactured coils are used in the receiver in which it is desired to incorporate band-spread tuning, the coil manufacturers will be only too willing to advise as to the most suitable values to use in conjunction with their products.

This brings to mind the fact that certain manufacturers of short-wave coils also market specially designed band-setting and spreading variable condensers for use in conjunction with their own particular coils.

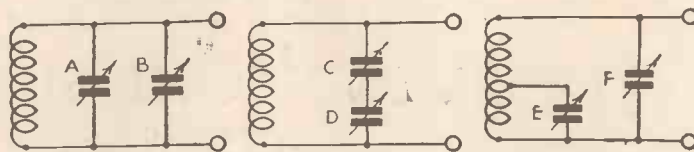
Due to careful choice of capacity values and care in design of coils, users of such products are enabled to undertake the inclusion of band-spread tuning, confident of satisfactory results, and a definite spread coverage per coil.

Sufficient spread over various ranges is a very important factor. The user of commercial coils and their associated tuning condensers will, however, experience no difficulties in this respect. Others, using home-made coils and various types of tuning condensers, are less fortunate, and must undertake the necessary spade work, using cut and try methods.

Bearing this in mind, the reasons why some favour band-spreading whilst others who have tried it do not, are fairly obvious. The subject is another example of viewing matters from the wrong angle. Not willingly, perhaps, but due to being misled and placing a too literal interpretation on the statement that one form of band-spread consists of a small capacity vernier condenser wired in parallel with the main-tuning condenser.

The explanation is simply that unsuitable values of setting and spreading capacities are used in conjunction with a particular coil, and the result is that the wanted bands are put right off the dial in some instances,

(Continued overleaf)



Figs. 1, 2, and 3 show various methods of arranging the tuned circuit in order to obtain a spreading of the tuning, or band-spread as it is now called.

Fig. 3 shows a different arrangement in which a tapped coil is used. This is a very adaptable system, especially for specialised amateur reception, but great care in the selection of suitable coils and correct tapping point is most desirable. Condenser F is included for trimming purposes.

A little experiment is necessary in order

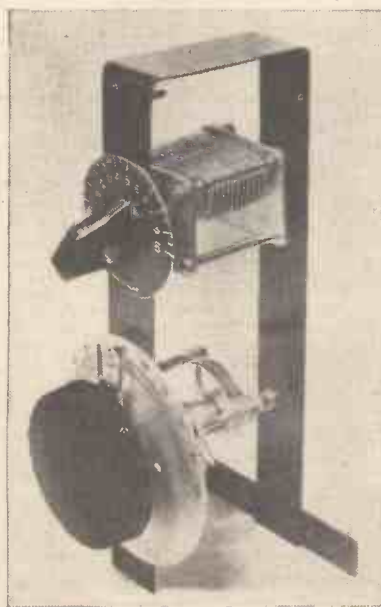


Fig. 4.—The Eddystone Band-spread Assembly which greatly facilitates the tuning of a band-spread circuit.

SHORT-WAVE SECTION

(Continued from previous page)

due to too high a value of band-spreader being used.

Problems of this nature can be overcome if a midget type .0001 mfd. tuning condenser, which can be dismantled, is to hand.

All that is necessary, when the parallel method is chosen, is to reassemble the midget condenser as a two-fixed and one-moving plate double-spaced condenser, and run a practical test. If it is found that the desired amount of spread is not obtainable, the condenser should be taken out and one of the fixed vanes removed, and a further test carried out, etc.

Generally it will be found that by the adoption of cut and try methods, matters can be so arranged that a useful degree of band-spread is obtainable over various ranges. The popular 15 mmfd. type of band-spreading condenser now available will be found to meet most requirements, and can, if desired, be modified without difficulty to meet special requirements.

Instances come to mind in which experimenters incorporate band-spread tuning, but complain that the amount of spread appears to be very limited. Examination usually discloses that a plain knob that is without calibrated markings is fitted to the band-spreader, and in these circum-

stances it is difficult to determine the exact amount of spread obtainable.

Whether it is desirable to invariably fit slow-motion dials to band-spreaders is a matter of opinion, depending on various other factors about which more will be said.

Multi-stage Receivers

The application of band-spreading to multi-stage receivers of the T.R.F. type may appear at sight to be difficult. In the case of receivers incorporating a single S.G., H.F. stage, it is a more or less simple undertaking.

For example, the H.F. stage in a well-designed receiver, will be arranged so that it does not tune sharply, but with more of a volume-control effect, yet not too broad so as to make the set unselective. In this case it will be found that band-spreading need only be applied to the detector stage, because the comparatively small increase in capacity due to the spreading effect of the additional condenser will not have an adverse effect on the tracking of the detector and H.F. stage to any appreciable extent.

The correct method is, of course, to incorporate ganged band-spreading condensers according to the number of tuned stages, and the above applies to home-constructed receivers of the single H.F. type, and is suggested as a compromise.

Band-spreading undoubtedly increases the usefulness of any receiver, and makes all the difference between DX with ease or difficulty.

When using electrical methods, it is sometimes difficult to decide on which condenser to fit an illuminated or other S.M. dial. Various problems of design will govern the final choice. A slow-motion drive, fitted to the tank condenser with a direct drive, using a graduated dial in conjunction with the band-spreader, will be found quite satisfactory when it is desired to keep panel dimensions to a minimum, and in addition has the further advantage of combining mechanical and electrical methods, yet allowing calibration with a useful degree of accuracy to be carried out.

Whilst the writer is aware of, and appreciates the advantages of, the various midget slow-motion devices now available, he is personally of the opinion that there is room for further developments in the design of small panel-mounting dials of the old Ethovermier or Epicyclic type.

In conclusion, the beginner and more experienced experimenter will find that once having incorporated electrical methods of band-spreading, and realised the advantages and simplicity, its incorporation in subsequent receivers will be carried out as a matter of course.

More Coronation Broadcasts

On May 12th the Schenectady (N.Y.) short-wave stations W2XAD, and W2XAF, on respectively 19.57 m. (15.33 mc/s) and 31.48 m. (9.53 mc/s), will rebroadcast the Coronation ceremony of King George VI, between B.S.T. 12.15 and 18.00. It is expected that the transmission will be taken by all U.S.A. broadcasting stations.

Leaves from a Short-wave Log

(1) Maracaibo and Valera; (2) San Cristobal; (3) Barquisimeto; (4) Valencia and Maracay; (5) Caracas; (6) Bolivar. Moreover, the end letter of the call indicates whether you are listening to an officially recognised broadcaster or to an experimental amateur. The first is shown by the letter R, and the latter by the final A.

YVIRH, Maracaibo, on 46.95 m. (6.39 mc/s)—formerly YVIRV—may be picked up easily at this period of the year between B.S.T. 24.00-07.00. You will recognise the broadcast by its five or six chimes struck before the announcement and call, which usually includes the words: *Emisora Philco*. Every Sunday between B.S.T. 05.00-05.30 the studio transmits a special English programme destined to listeners in the United States. If you want a veri the address is: Radio emisora YVIRH, Apartado Postal, 261, Maracaibo, Venezuela.

Both Powerful and Late

One of the lesser logged U.S.A. broadcasters is W9XF, of Downer's Grove, entrusted with the relay of the WENR, Chicago, programmes. The station is on the air daily (except Sundays) from B.S.T. 05.00-08.00 with a power of 10 kilowatts, on 49.18 m. (6.1 mc/s). It belongs to the N.B.C. network, and uses the same interval signal, namely, three notes (G.E.C.), as Schenectady. On signing-off in the morning the call is given out in seven or eight different languages. When experiments are carried out the call letters W9XQ are used.

Fiji's New Transmitter

Radio Suva, so far operating on 22.94 m. (13.075 mc/s), is now trying out a new and more powerful transmitter on 34.44 m. (8.71 mc/s). Tests have been heard between B.S.T. 12.00-13.00. The programmes open with the *Song of the Islands* and broadcasts are frequently given of native tribal chants accompanied by the beating of tom-toms. Fijian music, be it said, is for the most part in a minor key. The station announces in English and closes down with the playing of *God Save The King*.

A Worth-while Catch

On 33.94 m. (8.84 mc/s) concerts are broadcast between B.S.T. 08.00-14.00 by the S.S. *Awatea*, plying between Sydney (N.S.W.) and Wellington (N.Z.). Announcements between items usually include the slogan: *The Voice and Ears of Tasmania*. The programme consists of dance and orchestral music relayed from

the ship's cafeteria and restaurant, and of which the broadcasts have been picked up by listeners on the North American continent at greater volume than those from the five-times more powerful VK2ME, Sydney, station. When closing down, the announcer, after giving the ship's name and call-letters (ZMBJ), greets the world on behalf of the officers and crew. The best time to listen is from B.S.T. 08.30-09.30.

"The Voice of Spain"

During the past few weeks listeners may have noticed the disappearance of signals from EAQ, Madrid, which, for some considerable time, have been so well heard on 30.43 m. (9.86 mc/s). The transmitter was situated at Aranjuez, some thirty miles distant from the Spanish capital, and at present in a violently contested area. As a substitute the Spanish Government is now using the 20 kW. EDZ, Vallecas, station, and on every Tuesday and Friday between B.S.T. 20.45-22.00, as well as on Sundays at 21.00, you may hear under the call-letters EAQ2, "The Voice of Spain," an orchestral concert or "canned" music, followed by a war news bulletin in the English language. The channel now used is 31.65 m. (9.48 mc/s).

Re-allotment of Venezuelan Call-signs

As already reported in these columns, many transmitters in Venezuela have had new call-signs given to them. The number following the International prefix (YV) now indicates the district, and thus considerably facilitates identification. It is worth while making a note of the following:

Listen Nightly to Japan

Excellent reception of the special broadcasts to Europe is now obtained through the two Nazaki stations, JVM, 27.93 m. (10.74 mc/s) and JZJ, 25.42 m. (11.8 mc/s), which work nightly from B.S.T. 20.30-21.30. The Japanese announcer gives full details in English, and the programme consists of instrumental and vocal music items given by native artists; in some instances, western compositions form part of the entertainment. Towards the end of the broadcast they switch over to Tokio for a Japanese news bulletin. The choice of channels has not yet been definitely fixed, as occasionally JZI, 31.46 m. (9.535 mc/s); JVP, 39.95 m. (7.51 mc/s) and JVH, 20.56 m. (14.6 mc/s) are also used. As a rule you will find that an S.B. is given on two different wavelengths for the sake of comparison. The transmissions end with an orchestral rendering of the National Anthem in which you will not fail to recognise a famous aria included in Puccini's opera *Madame Butterfly*.

The CYCLIST - - 2d.
Every Wednesday.

Important Broadcasts of the Week

NATIONAL

Wednesday, April 21st.—Symphony Concert.

Thursday, April 22nd.—“The Quaker Girl,” a musical comedy by James Tanner.

Friday, April 23rd.—Speeches following the Luncheon on the occasion of the Annual Shakespeare Birthday Celebration, from the Conference Hall, Stratford-upon-Avon.

Saturday, April 24th.—Final Game in Seven-a-Side: A running commentary from Twickenham.

REGIONAL

Wednesday, April 21st.—Variety programme, from the Palace Theatre, Plymouth.

Thursday, April 22nd.—Midland Parliament: Modern Advertising and Industry, a discussion.

Friday, April 23rd.—Speech at the Royal Society of St. George's Banquet, from the Connaught Rooms.

Saturday, April 24th.—King Arthur, an historical programme by D. G. Bridson, music by Benjamin Britten.

MIDLAND

Wednesday, April 21st.—Midland Football Clubs: Wolverhampton Wanderers—a sketch of the Club's history, policy and players, past and present.

Thursday, April 22nd.—Midland Parliament: Modern Advertising and Industry, a discussion.

Friday, April 23rd.—The International Six Days' Contest: Behind the Scenes in a Midland Motor-Cycle Factory.

Saturday, April 24th.—English Song Writers, Elgar: Orchestral concert.

WESTERN AND WELSH

Wednesday, April 21st.—“The Prisoner of Newgate,” a play by Froom Tyler.

Thursday, April 22nd.—Pafiliwn Caernarfon: Caernarvon Pavilion—a programme of some of its memorable events.

Friday, April 23rd.—Over Carmarthen Bridge: Sound-pictures of Carmarthen Town.

Saturday, April 24th.—Birds of the West Country, a talk.

NORTHERN

Wednesday, April 21st.—Variety programme, including excerpts from the Lyceum Theatre, Sheffield, the Palace Theatre, Huddersfield, and the Argyle Theatre, Birkenhead.

Thursday, April 22nd.—A Loyal Address: a programme from the Yorkshire village of Thorne.

Friday, April 23rd.—Part of the Armthorpe Schools Musical Festival, from the Armthorpe Methodist Church.

Saturday, April 24th.—Roaming Rhythm: Dance Band programme.

SCOTTISH

Wednesday, April 21st.—Variety programme from the Empress Playhouse, Glasgow.

Thursday, April 22nd.—Organ recital, from St. Machar's Cathedral, Aberdeen.

Friday, April 23rd.—Orchestral programme.

Saturday, April 24th.—Choral programme.

MAKING A UNIVERSAL TRANS-PORTABLE

(Continued from page 134)

are not important. It is important, however, that the valve heaters should be wired in the sequence shown, although it is not the most usual one. The main point is that the detector heater is connected directly to the earth line; if this is not the case, hum and instability will probably prove troublesome.

H.T. Supply

Perhaps it would be wise to make reference to the rectifier, because the type indicated is designed to give a maximum output of 136 mA when connected as shown, whereas in this particular circuit the total H.T. current consumption is only about one-half of this. When used at half load, the U.30 provides a voltage output of about 220, for a mains input of approximately 240 volts. This is high enough to allow for a voltage drop across the 25-henry smoothing choke having a D.C. resistance of not more than 500 ohms. Thus, an adequate anode voltage can be supplied to all the valves to ensure that they operate at a high degree of efficiency.

More care should be taken with the construction of a universal set than is necessary with a battery or A.C. receiver. One important reason is that a considerable amount of heat is developed by the valves and barretter when the set has been running for a short time. This means that the valves should be situated so that there can be a stream of air passing round them. This is generally arranged by leaving the back of the cabinet partly open, or by covering it with a form of grille, or per-

forated sheet of fibre. A method which is sometimes better is to leave an opening in the bottom of the cabinet, and to fit the top so that there is an open space through which the warm air can pass. Another method is to make the cabinet as shown in Fig. 1, a design which looks well.

Avoiding Heat

Another point which should be closely watched, on account of the heat which is given off by the valves, is that tubular fixed condensers, L.F. transformers and coils should be kept fairly well away from the valves. These parts often have wax in their construction and this might melt, with consequent damage. As far as possible, these parts should be placed on the underside of the chassis, where they are out of range of the rising heat.

CONSTRUCTIONAL DETAILS OF “PRACTICAL WIRELESS” RECEIVERS

(Continued from page 124)

for this receiver, and an important point should be noted in this respect. A metal panel is specified and this is obviously at earth potential. Consequently, the fact of mounting the components on the panel automatically connects them to earth. The tuning condensers have to be earthed, as also does the reaction condenser, but the volume control must be mounted with the insulated bushes provided or it will be short-circuited. If, however, a wooden chassis and insulated panel are employed, it will be necessary to connect to earth the moving vanes of the tuning and reaction condensers. A list of components is attached for this particular receiver.

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VITESSE 5-VALVE ALL-WAVER KIT “A” YOURS FOR

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WITH 4 BRITISH VALVES.

3 WAVEBANDS: 18-52, 200-550, 900-2,100 metres.



Overall dimensions: 8 1/2" high; 11 1/2" wide; 9" deep.

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RADIO CLUBS AND 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

THE Croydon Radio Society's meeting
 on Tuesday, April 6th, was devoted
 to a talk on the design and use of valves
 by Mr. J. H. Owen Harries, of Harries
 Thermionics, Ltd. It took place in St.
 Peter's Hall, Ledbury Road, S. Croydon,
 with the Vice-Chairman, Mr. G. A. Hoskins,
 presiding. The designer's task was to
 obtain the most advantageous balance
 of the relationship existing between the
 electrodes of a valve. Mr. Harries dis-
 cussed the theory of the diode valve, and
 went on to deal with the triode and his-
 torical development. The talk became
 even more interesting when he reached
 the topics of anode space and critical
 distance. Here he showed the society
 a valve with a sliding anode, and its ex-
 perimental uses were obvious enough.
 By shaking it the anode could be located
 at any position, while its distance then
 could be measured and characteristics
 noted. He had also much to say on the
 behaviour of electrons and how they were
 controlled.

Hon. Pub. Sec.: E. L. Cumbers, May-
 court, Campden Road, S. Croydon.

Tottenham Short-Wave Club

THE above club has held a series of very
 interesting meetings during the winter
 months and recently celebrated its second
 anniversary, at which the newly-elected
 President, Mr. Batt, was presented with the
 first prize for the DX phone competition,
 held on the two middle week-ends in March,
 during which he succeeded in logging 52
 countries.

The club has arranged a programme of
 Field Days for the summer months at which
 visitors will be welcome. It is being
 arranged for a special 5-metre section to be
 active at these, and transmitting members
 in the locality will be looked out for if they
 care to let me know if they will be on the air
 on these various Field Days.

The club meetings are well attended, and
 lectures together with practical experi-
 ments in transmitting are being given by
 the secretary. Morse practice is pro-
 gressing very well, and members are proving
 quite good at speed tests. The Log Dept.,
 which has been mentioned in our previous
 reports, has now been collecting valuable
 data for the last 18 months, and a very
 comprehensive list of stations and con-
 ditions over this period has been obtained.

I wish to thank this journal for all the
 help it has given us since the club's begin-
 ning, and for the way in which it has
 encouraged the club spirit among its
 readers. Also, I wish to thank the various
 clubs at home and abroad that have written
 to me.

Full particulars of membership, fees,
 meeting nights, etc., can be obtained by
 writing to the Hon. Secretary, S. Wood-
 house 57, Pembury Road, Bruce Grove,
 Tottenham, N.17.

Southall Radio Society

THE Annual General Meeting of the
 above society was held on April 6th.
 It was announced that a new and more
 spacious headquarters had been found at
 the Three Tuns Hotel, The Green, Southall.
 A large hall is available for the use of the
 society, and it will not be necessary to make

any limitation in membership, a step which
 seemed likely before, due to the rapid
 increase of members—over 50 per cent.
 in the last three months.

The officers were elected as follows:—

President: Douglas Walters (G5CV).
 Chairman: Arthur J. Stephens (2CCH).
 Vice-presidents (subject to them accepting
 office): John Clarricoats (G6CL), H. V.
 Wilkins (G6WN), Harley Carter, H. Ray-
 ner, H. W. Ancrum, C. Rapsey. Hon.
 Secretary: H. F. Reeve. Hon. Treasurer:
 H. Deane. Hon. Programme Secretary:
 J. J. Maling (G5JL). Hon. Publicity
 Manager: J. T. Pinsent. Committee:
 R. Guy (2CGS), H. Cook, A. Harris, W. G.
 Lee (2BLX).

Meetings will continue at the new head-
 quarters each Tuesday until further notice.
 Visitors will be welcomed. Hon. Secretary:
 H. F. Reeve, 26, Green Drive, Southall.

Portsmouth Wireless and Television Society

AT the sixth annual meeting of the above
 society, held recently at 1A, Hudson
 Road, many points were discussed about
 the ensuing year's programme. A library
 of technical books was started, and several
 gifts of books were promised. As the
 society has now four members holding
 transmitting licences it was decided to
 apply for a licence for building and operat-
 ing a 10-watt transmitter for experimental
 purposes. The President, Vice-presidents,
 and honorary members were re-elected.
 Mr. A. Parsons being elected Vice-president
 —as an appreciation of the valuable work he
 had done for the society—Mr. Harold
 Leigh as Chairman, Mr. Kentsbeer, Vice-
 chairman; Mr. F. L. Moore, Hon. Secretary
 and Treasurer; and Mr. Marsh, Assistant
 Hon. Secretary. The following committee
 were also elected: Messrs. Leigh, Kentsbeer,
 Moore, Marsh, Batt, Wright, Bull, Bettin-
 son, Evans, and Pegler.—Harold Leigh,
 20, King Street, Southsea.

Exeter and District Wireless Society

AT the last meeting of the above
 society a very interesting and in-
 structive lecture was given by Mr. Bateman,
 of the local G.P.O. telephones, on Modern
 Telephony Methods. Mr. Bateman traced
 the history of telephony from Graham Bell's
 first attempts at communication between
 points connected by wire, and many lantern
 slides indicated the enormous strides which
 have taken place in the development of
 telephony. Pictures were also given of the
 mechanism of modern exchanges, meters for
 registering the number of calls by sub-
 scribers, power plant, batteries and re-
 peater stations.

Mr. Bateman's final remarks were devoted
 to modern cables, and he gave a very
 interesting outline of the work which cable
 ships carry out in their search for, and
 repair of, breakdowns in whatever part of
 the world they may take place.

These lectures are held every Monday at
 8 p.m. at 3, Dix's Field, Exeter, and
 intending members should communicate
 with the Secretary, Mr. W. J. Ching, 9,
 Sivell Place, Heavitree, Exeter.

Wellingborough and District Radio and Television Society

THE final lecture meeting of the present
 winter programme was held at the
 Midland Hotel, Wellingborough, on Wed-
 nesday evening, April 7th, when a large
 and interested audience listened to a
 lecture given by Mr. A. Freeman, of
 Kettering, and entitled "Sound on Film."

Mr. Freeman prefaced his lecture by a

few remarks upon the history and progress of the Sound on Film patents, and mentioned that, strangely enough, the first patent was granted to a lady for such a system in 1909. Since that date until recent years very little advance had been made, but with the advent of the possibility of the talking picture, great strides had been made.

The basis of reproduction was the photo-electric cell, universally called the Electric Eye, and it was this cell, with its rapid sensitivity to changes in the intensity of light, that made the talking picture the model of perfection that it was to-day. Mr. Freeman then went on to explain in detail, with explanatory diagrams, the problems of recording, and gave instances of how these difficulties in transferring sound waves to light waves and then recording them on a sensitive film, had been overcome in recent years. Hon. Sec., Mr. L. F. Parker (G5LP), 127, Jubilee Crescent, Wellingborough, Northants.

Nottingham Amateur Radio Society
ON Tuesday, April 6th, the above society was given a lecture, illustrated by lantern slides, on "Aerials and Interference." As Nottingham suffers from interference and man-made static this lecture was a welcome enlightenment to the members. New members will be welcomed at the society's headquarters at 2, Bridgford Road, West Bridgford, Nottingham. Hon. Sec.: C. Lambert, 199, Sherwood Street, Nottingham.

Halifax Experimental Radio Society
AT their last meeting the members of the above society were entertained to a very interesting and instructive lecture kindly given by Mr. C. Berg, of Alkum Storage Batteries, Ltd., Halifax, on "The Alkaline Battery." He described how research work started in Sweden in 1893, required 16 years to produce a practicable and commercial alkaline battery, and developments which have since taken place. The main type of Alkaline batteries were described and illustrated and their many applications discussed in detail. Particulars were given of both the nickel-iron and the nickel-cadmium battery as used for miscellaneous services, and in this connection the Milnes H.T. Unit, miners' lamp batteries, and some of the largest alkaline batteries ever made, such as for the sister ship of the *Queen Mary*, were described.—J. B. Bedford, Hon. Sec., Oak House, Triangle, Nr. Halifax.

Morpeth Amateur Radio Society
WE wish to extend our heartiest thanks to all readers of PRACTICAL AND AMATEUR WIRELESS who co-operated in our tests announced in these columns a few weeks ago.

The response to our request was unprecedented, and we regret the delay, in some cases, in the despatching of certificates. However, we hope that all reports will be acknowledged by the time this appears. The majority of reports contained excellent data—many containing temperature and barometer readings, also detailed graphs and charts.

We hope to submit in the near future our conclusions re the weather effects on short-wave reception from the data now to hand, and this we feel sure will be of interest to many readers.

Meanwhile we wish to express our thanks to the Editor for allowing us space, and also to those readers who so kindly offered us their help and assistance.—Chas. L. Towers, Hon. Sec., 2, Edward Street, Morpeth, Northumberland.

11 NEW N.T.S. BARGAINS!

COMPONENT BARGAINS

Amazing value in brand new components at prices unequalled elsewhere. Few only available. Order immediately.

N.T.S. SHORT WAVE COILS. Interchangeable plug-in coils. Low-loss material ribbed formers. N.T.S. coils are expertly wound with high-grade copper wire, to ensure accurate distributed self capacity, 100% efficient.
 4-pin: 12-26, 22-47, 41-94, 76-170 metres. List Value 2/9. Bargain Price 1/9.
 6-pin wave-lengths as for 4-pin types. List Value 3/6. Bargain Price 2/-.
 Diagrams of circuits with which N.T.S. Coils are suitable sent free with every order.

Ormond Slow-motion Dial R362. List price 2/8. Bargain 1/9. 10 to 1 Slow motion illuminated scale, 0-180 degrees. Burnished acetone as illustrated. For all standard 4in. condenser spindles. Fitted with bracket for single condenser and with knob.
 3 gang .0005 Condenser (fully screened). List value 17/6. Bargain 4/11. Die cast throughout. .00005 adjustable trimmer to each section.

Ideally suited for all-wave receivers. End vanes of each section split for perfect balancing. Tested to 500 volts. Complete with 4in. operating spindle and removable cover. Size of case 4 1/2" long; 2 1/2" wide; 3 1/2" high.

2 gang .0005 Condenser (unscreened). List value 12/-. Bargain 3/11. Each section fitted split end vanes and separate adjustable trimmers. 1" operating spindle. Size of case, 2 1/2" long; 3 1/2" wide; 2 1/2" high. Tested to 500 volts.
Class "B" Output L.F. Transformer (3.5 to 1). List value 10/6. Bargain 2/6. Exceptionally heavy core. Finest quality laminations. Section wound on 3 large ebonite bobbins. Low resistance secondary winding centre tapped for Class "B" output. Tested 500 volts between windings. Designed to follow driver valve of the L21 class and to precede all standard Class "B" output valves.

New 2-valve BANDSPREAD SHORT WAVE KIT VALUE 59/6 BARGAIN

Assembled by a novice in an evening, this wonderful receiver, of entirely new and unique design, will bring you a lifetime of fascinating short-wave entertainment. Send your order now. Delivery from stock.
 ● Reacting Detector and Transformer coupled circuit. Power Output.
 ● Slow motion bandspread tuning. ● SIMPLIFIES WORLD RECEPTION!
 ● Low-loss reaction condenser. ● Air-spaced bandspread and tank condensers. ● SPECIAL ANTI BLIND-SPOT CONDENSER. ● 3 scales calibrated in degrees.
KIT comprises every part for assembly, including 3 4-pin Coils, wiring and assembly instructions, less valves only. Cash or C.O.D. Carr. Pd., 22/6 or 2/6 down and 11 monthly payments 3/-. With 2 British Valves £21/9 or 4/- down and 11 monthly payments 3/10. If N.T.S. Headphones required, add 7/6 to Cash. Prices or 8d. to deposit and each monthly payment.
 Fully described in Free Booklet offered below.

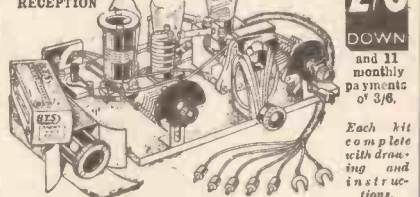
Amazing New Short-Waver!

3-valve BANDSPREAD * SHORT WAVE KIT *

LIST VALUE 60/- BARGAIN

● Det. and 2 L.F. Aperiodic Aerial Circuit, Pentode Output. ● Slow motion bandspread tuning SIMPLIFIES WORLD RECEPTION!
 ● Efficient reaction condenser. ● Air-spaced bandspread and tank condensers. ● SPECIAL ANTI BLIND-SPOT CONDENSER. ● 3 scales calibrated in degrees.

WORLD WIDE RECEPTION 12-94 metres



NEW DESIGN! WONDERFUL PERFORMANCE!
 The latest Bandspread world-wide tuning system incorporated into an ultra-modern aperiodic aerial short-wave circuit... and this amazing kit is yours at almost half the list value!
KIT comprises every part for assembly, including 3 6-pin Coils, wiring and assembly instructions, less valves only. Cash or C.O.D. 37/6 or 2/6 down and 11 monthly payments, 3/6.
 With 3 British valves. £2 15 0 or 12 monthly payments, 5/-. If N.T.S. Headphones required, add 7/6 to Cash. Prices or 8d. to deposit and each monthly payment.
 Fully described in Free Booklet offered below.

A.C. 4 RECEIVER

with Valves, Speaker in Cabinet illustrated Ready to play LIST PRICE £8:8:0 BARGAIN

£4:19:6
 ● Four matched British valves. ● Screened Band-pass Coils. ● Slow Motion Tuning. ● Illuminated Wave-length dial. ● Gramo pick-up sockets. ● 2 1/2 watts output.
 200-2,000 metres. ● For A.C. Mains ONLY.
 200-250 volts 40-80 Cycles. ● Beautiful Walnut veneered cabinet complete with Celestion Field Energised Moving Coil Speaker, ready to play.
 Don't miss this amazing offer! An A.C. Bandpass S.G.4 receiver with wonderful selectivity and sensitivity, at almost half-price! 1/5-down recures; balance in 12 monthly payments of 8/9.

B.T.S. 1937 SHORT WAVE ADAPTOR List Price £2:12:6

Brings Short Waves to your Present Set! BARGAIN 39/6 Ready for instant use—just plug in for World reception

HEAR AMERICA direct on your existing receiver. This amazing unit simply plugs into your battery or A.C. Mains set. No alterations necessary. 100-1 ratio aerial tuning and slow-motion reaction: for use either as Plug-in or Superhet Adaptor. Walnut finished Cabinet (illustrated). With 2 plug-in coils, 12-26, 22-47 metres. Ready built and tested. Yours for 2/6 down and 10 monthly payments of 4/-

FREE! Write today for free Booklet describing in full, with actual photographs, 5 entirely new N.T.S. Bargain Short-Wave Kits, and range of Bargain Short-Wave Components, including the 2 and 3-valve Bandspread Receiver Kits offered above.

All P.O.'s should be crossed and made payable to New Times Sales Co. All currency must be registered.

EST. **NEW TIMES SALES CO.,** 56 (Pr.W.16), Ludgate Hill, London, E.C.4. 1924.

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).

Suggested Club for East Sheen

SIR,—A few friends and myself, being interested in S.W. listening and radio generally and who have been readers of PRACTICAL AND AMATEUR WIRELESS for the past eighteen months, would like to get in touch with other S.W.L.'s and amateur transmitters, if any, in this district with the object of forming a local club. As our ages average about 15 years we would rather older readers co-operated with us. Will anyone interested either call at my address between 6.30 and 7.30 p.m., except on Wednesdays, or drop me a line; and also, if possible, forward suggestions as to where a club H.Q. could be held.—N. G. ANSLOW (35, Gilpin Avenue, East Sheen, S.W.14).

Good DX Reception in Forest Gate

SIR,—I have been taking your 'paper from the first issue, and must congratulate you on the fine articles published, especially the Amateur Transmitter series, which I hope to see continued.

As I have not seen a log from this part of London, I enclose the best DX received here this month. All the stations were between R5-8 here, and QSA5.

The receiver used is an 0-v-1, S.G. det., and pentode, battery-operated.

I enclose a photo showing a corner of my den.

Again thanking you for the fine articles and information and wishing PRACTICAL AND AMATEUR WIRELESS further success.—H. J. CARTER, 2BPC (Forest Gate).

[We were very interested in your log, which was, however, too long to publish.—ED.]

Terminals, Plugs and Sockets

SIR,—We have read with great interest the article under the heading, "Terminals, Plugs and Sockets—There's No Connection," appearing in the issue of PRACTICAL AND AMATEUR WIRELESS for April 3rd, 1937, but we are somewhat surprised that a [service engineer of such wide experience as the contributor of this article should not be acquainted with the undermentioned Clix lines, which have been consistently advertised in your journal and which meet the various points that were raised by him.

(1) Clix 5 amp. 2-pin Wall Plug ("M" type).

In addition to providing a positively non-collapsible pin with great [versatility of fit in varying socket diameters and centres, it has a simple but most effective wiring device holding the wire strands in 100 per cent. vice-like grip.

We may add that we have contracts in hand which will ensure that during the coming season a very large percentage of manufacturers will standardise this plug,



Amateur station 2 BPC, operated by a reader, Mr. H. J. Carter, of Forest Gate.

CUT THIS OUT EACH WEEK.

Do you know

—THAT when breaking circuits carrying a high current a Q.M.B. (quick make-and-break) switch should be employed.

—THAT a rough method of calculating grid bias voltage is to divide the H.T. voltage by double the amplification factor of the valve.

—THAT care should be taken to prevent the metallised coating of indirectly-heated valves from coming into contact with earthed surfaces.

—THAT the reason for the above precaution is that grid-bias circuits may be short-circuited by earthing the coating.

—THAT copper tubing, half-an-inch in diameter, is ideal for a television dipole aerial.

—THAT it is often desirable to include a fuse in the G.B. leads of a powerful mains receiver.

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 to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newman 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.

but there is still a very large replacement market unsatisfied.

(2) Heavy Duty Master Plug.

This plug, which allows for the use of leads up to 3-16in. diameter without stripping insulation tape, enables aerial and earth leads to be taken direct to sets. The pin on the other hand being standard 1/4in. size.—BRITISH MECHANICAL PRODUCTIONS, LTD. (Westminster, S.W.1).

[Our contributor is fully acquainted with the excellent Clix components mentioned in this letter, and he stated that the "average" mains plug was at fault. The split pin in the Clix patent does definitely overcome the difficulty of fractured wires caused by the locking screw, and provides a definite and certain contact with the mains socket throughout its life. We ourselves have had no trouble whatsoever with these components, but know only too well how the ordinary type of plug can give rise to noises as mentioned in the article.—ED.]

Received on Our Single-valver

SIR,—I enclose a log of stations received on my single-valve set recently. It is the one described in your issue for January 23rd, 1937, the only modification being a 20-80-metre dual range coil.

On 20 m. (Amateur): OFIAW, EI4L, PY2EJ, VE1GH, VE3CK, SV1KE and 20 W stations.

On 30-50 m.: DJN, DJD, DJQ, GSD-F, EAQ, 2RO, CT1AA, W2XAF, W2XAD, W1XAL, W4XB-W, RW59, HAT4, and W3XAL. Belgrade 49.18 m., and several G stations on 40 m.

All these stations were received at R4-5, and the aerial is 30ft. long (W.-E.).—L. SANDOZ (Moseley; Birmingham).

Singapore S.W. Station ZHI

SIR,—In your issue of March 13th, 1937, page 761, mention was made of Singapore Station ZHI on 49.92 m. (6.01 mc/s). This station ceased operating at the end of last year. Station ZHL, of the British Malaya Broadcasting Corporation, Ltd., has taken its place. It is on daily for 36 hours a week. Weekdays, 6 to 10.15 p.m. Saturdays, 12.45 to 2 p.m. and 5 to 11.15 p.m. Sundays, 10.15 a.m. to 2 p.m. and 6.30 p.m. to 10 p.m. local time. (Malayan time is 7 hours 20 minutes ahead of G.M.T.)

Chinese, Malay or Tamil music are on from 6 to 7 p.m. daily. The station which is operating on a wavelength of 225 metres serves Singapore Island and South Johore. On March 1st, 1937, the station was opened by His Excellency the Governor, Sir Shenton Thomas.—TAN BIN HUSSAIN (Ipoh, Perak, Federated Malay States).

A Good Log from Bedfordshire

SIR,—My short-wave reception results on the Cambs-Beds border may be of interest to other readers of your excellent publication. During the past two months, listening on the amateur bands, over 900 calls were heard. These include 490 North American phones, with many W6 and 7. Among the South Americans are HI, HK, LU, VP1, 2, 5, 6, 9, OA, CO, CE, YV, PY, K4, K6, and NY calls. Oceanic phones include VK2, 3, 4 and 5 stations.

In one week, on 28 mc/s, over 100 of the commoner U.S.A. phones were heard, with some DX, such as W6JEY, 6MAF, W7BEJ, 6BQX, ZU6P, ZS6Q, ZE1JR, PY2AC, PY4AC, VP5PZ, VP9G and LU7AZ.—S. G. ABBOTT (Sandy, Bedfordshire).

BRIEF RADIO BIOGRAPHIES—7

By RUTH MASCHWITZ
Leonard Henry

L EONARD HENRY started his career as a budding young scientist working twelve hours a day for a firm of manufacturing chemists. However, an explosion put a stop to his activities, and when he sufficiently recovered he was sent to Southend to complete the cure. Strolling along the front one afternoon he was attracted by the strains of a concert party, and discovered that a friend of his was a member of the company. They chatted together, and Leonard made the suggestion that he should try out a few songs at the piano for a joke. So he borrowed his father's dress clothes and carried out his plan. Such was his success that the concert party engaged him for the season. Then followed musical comedy engagements, revue and more concert parties. For years he worked under Charlot's management—in fact, he was part-author of Charlot's Hour for the microphone. Now he is busy filming, recording, rehearsing, and devising new songs and patter.

Leonard is well known for his kindness of heart, but he really felt that things were going a little too far when, just as he was going on for the Royal Command performance, an old lady telephoned from Tooting and in a quavering voice asked if he would go down and put her wireless set right as she was having a great deal of trouble with it!

Being in the public eye is not all beer and skittles, but on one occasion it kept Leonard from being marched off to prison! He came home unexpectedly from the country without the keys of the house, and was just trying to climb through the kitchen window when a heavy hand was laid upon his shoulder.

"What are you up to?" asked a gruff voice, and a burly policeman towered above him in a most menacing manner. "This is my house, and I've just come back unexpectedly," said Leonard.

"You can't put that over," was the reply. "You're not Mr. Henry! You'd better come along with me!"

Leonard was nonplussed. Suddenly he had a bright thought, and took from his pocket a packet of cigarettes which he had bought on the way from the station. "Perhaps you'll believe me now," he said, and produced a cigarette card on which was a picture of himself!

Wynne Ajello

AS a child Wynne Ajello's great ambition was to become a dancer, and it was quite by chance that it was discovered that she had a singing voice. While training for the ballet she took singing lessons, and her teacher was so impressed by her ability that she was encouraged to take up the art seriously.

Her first public appearance as a singer was at a competition for children at the seaside, when she carried off the prize, a book entitled "Picturesque Views of the Town." She was the first member of her family—who were all musical—to take up singing professionally, and at first the idea was viewed with disfavour, but her enthusiasm was so great that her parents eventually gave way.

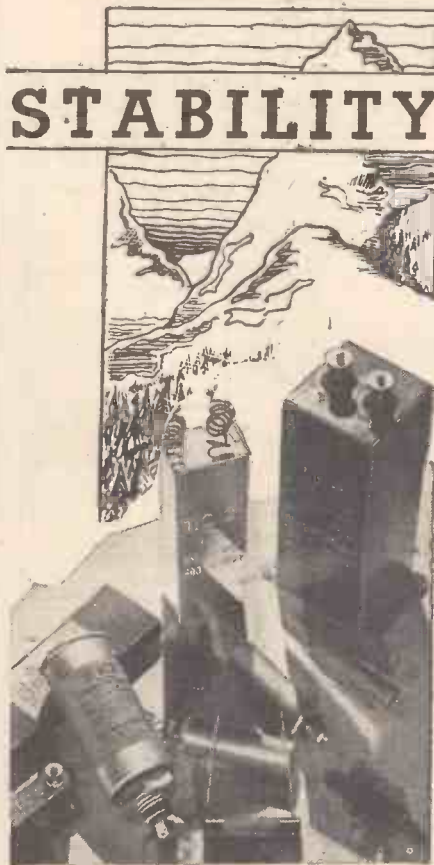
Wynne first broadcast in 1925 and faced a more than usually terrifying ordeal, for she had to sing four coloratura arias with orchestra in succession—and she had never had an orchestral accompaniment before! However, she made an immediate success, and was asked to repeat the programme a fortnight later. Wynne was one of the first singers to make a reputation entirely through the microphone. She is possibly unique in being heard on the air five nights in succession.

She decided to develop her scope by combining acting with singing, and so, in addition to her serious work, she has been the heroine in numerous musical shows and operas.

Returning by train from one of the provincial stations recently, she fell into conversation with a fellow passenger who asked her opinion of "that Wynne Ajello who sings on the air."

She did not reveal her identity, and was gratified to find that her interlocutor considered Wynne was "pretty good."

Her hobbies are motoring, swimming and dancing, and her pet aversions are snobs and bridge!



Stability, n.
The quality of being steady or constant, having durability or permanence.
—Dictionary

Let the dictionary guide you in the choice of your

CONDENSERS

MANY have been the makes of condensers... all good to look at... some good performers—for a time. Why aren't they on the market now? Because they lacked the quality of permanence... Inadequate experience, doubtful materials or unskilled workers left the job in some way incomplete... they failed in the test of time.

T.C.C. Condensers are the product of over 28 years' specialisation in condenser design and manufacture. That experience—that solid foundation is behind every T.C.C. Condenser. The result is a range second-to-none plus a reliability that is pre-eminent. For safety's sake use T.C.C.

T.C.C.

ALL-BRITISH

CONDENSERS

The Telegraph Condenser Co. Ltd., Wales Farm Road, N. Acton, W.3.

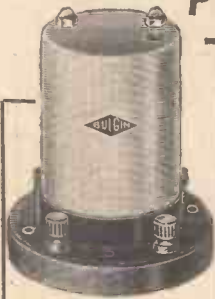
REPLIES IN BRIEF

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.

- T. R. (Southend-on-Sea). We regret that we cannot trace the coils in question and are therefore unable to give you the connections.
- G. N. L. (Sidcup). The I.F. was 110 kc/s. No details are now available for this receiver, and we have no blueprints of any equivalent type of receiver.
- W. J. F. (Nettleton). In view of all of the tests you have made the trouble must be due to the damping of the aerial system, and you should try some alternative.
- A. J. S. (Leeds). The control would have to be across the speech coil of the extension speaker and should be approximately the same resistance.
- L. C. L. (E.2). If you strip off turns the reading on the dial will decrease, or in other words you will have the receiver tuned to a lower wavelength if you do not alter the condenser setting. To include a high wavelength or to increase the condenser reading turns should be added to the coil.
- V. F. (Bedminster). The diaphragms may be obtained from Electradix Radios, whose advertisement appears in each issue. The gauge of wire is immaterial, but one winding should have thirty times as many turns as the other. The small winding is the primary and the large winding the secondary.
- M. H. G. (Bow). The only satisfactory way would be to obtain a converter, in order to change the D.C.

- supply to A.C. We do not advise you to try to modify the circuit in this case.
- A. W. (Hove, 4). The trouble is due to your aerial-earth system, and you should include a variable condenser in the aerial lead in order to reduce some of the damping effects imposed by it.
- A. H. M. (nr. Skipton). You should be able to hear the North Regional and Droitwich on the long waves. The switch costs 4s. and the condenser 5s. 6d. complete with dial.
- D. F. R. (N. 14). The apparatus works on the hysteresis principle, with a length of iron tape, but the details are too involved to enable it to be dealt with satisfactorily under this section.
- T. A. J. (Rottingdean). In your particular case it would probably be found best to use a short horizontal aerial, about 15ft. in length with a direct lead-in as vertical as possible.
- T. B. (Liverpool, 5). We regret that we cannot trace any coil of the type mentioned in our records. Are you certain regarding the maker's name?
- L. J. G. (Dulwich, S.E.). We are shortly publishing some quality circuits for local-station receivers which will no doubt meet your requirements.
- T. G. D. (Edinburgh). The easiest solution would be to obtain a modern dual-range coil, preferably with a self-contained switch to avoid difficulty in wiring this. The coil could then be substituted for that now in use and would give you the desired improvement.
- R. G. (Weybridge). The circuit does not utilise a frame aerial. Valve types are XD and XL (Hivac).
- J. H. (N. 1). It is impossible to answer your question without further details. The circuit appears correct, but the set may be unstable and thus burst into oscillation at certain settings of the volume-control.

IS YOUR SET PERFECTLY TUNED?



Perhaps you are losing half your stations with mistuned I.F. Transformers. . . . Don't waste any more time searching for faults. Get those I.F.s lined up—easily and accurately.

465 kc/s I.F. LINER

SELF-CONTAINED, consuming but a fraction of a milliamp, this handy gadget will take the place of an expensive modulated test oscillator. Plugged in to any D.C. supply of 200 volts or over—or even run off an A.C. set's own rectified H.T.—it renders both easy and quick the skilled, important job of re-trimming Intermediate Frequency Transformers. A workshop instrument which the Serviceman or Experimenter simply must add to his kit!

List No. V.T.17.

14/7

To A. F. Bulgin & Co., Ltd., Abbey Road, Barking, Essex, No. 156 for which I enclose 3d. in stamps.

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Address.....
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Don't let faults stump you. Every cause of trouble is accurately revealed by the Avominor. Thirteen Meters in One. Provides unique testing facilities. Milliamp ranges sufficient for testing all valves and apparatus. Six voltage ranges for all radio voltage tests. Ohms ranges adequate for all resistance tests. In case, with leads, testing prods, crocodile clips, and Instruction Booklet.

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- Current
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- 0-6 volts
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- 0-10,000 ohms
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QUERIES and ENQUIRIES

Short-wave Tuning

"Could you please tell me which of the three 'Apex Economy' condensers I should use in your 'One-valve Short-waver' for tuning, either 15 mmfds., 40 mmfds., or 100 mmfds.?"—G. H. W. (Gt. Malvern).

To obtain results similar to those given by the condenser arrangement specified for this receiver the 100 mmfd. condenser should be used. Tuning would be simplified if you used a much smaller capacity (15 mmfds.) in parallel to form a band-spread device, but this is not essential. The two condensers used in the receiver provide a capacity equivalent to that given approximately by a 150 mmfd. condenser.

Amateur Transmitting

"Could you please inform me of the regulations of amateur transmitting, and for a full licence do you have to pass a Morse test if you do not wish to transmit Morse? Has a small battery transmitter been described in your paper?"—J. W. H. (Harwich).

FULL details concerning a transmitting licence may be obtained from the Engineer-in-Chief, Radio Section, G.P.O., Armour House, London, E.C.1. For use

Tantalum Charger

"Could you please give me instructions for making a tantalum charger, size of strip, etc.? I have tried to get a back copy of the issue in which this was described, but find that it is out of print."—J. M. (Rawmarsh).

FOR the charger in question the tantalum strip is 3½ in. long by ¼ in. wide, and about the thickness of stout notepaper. The lead strip measures 5 in. long by ¼ in. wide and ¼ in. thick. These two electrodes are immersed in a glass jam jar containing ordinary accumulator acid. It is desirable to pour a small quantity of heavy oil on top of the acid to prevent creeping, and a small quantity of iron filings may be placed in the acid to improve conductivity. The cell should be fed from a small transformer of the "bell" type delivering about 5 volts at ½ amp. To obtain satisfactory results, the metals and the acid must be as pure as possible. The tantalum strip may be obtained from Blackwell's Metallurgical Works, Ltd., Speke Road Works, Garston, Liverpool.

Pick-up and Amplifier

"I have built a small 2-valve amplifier (circuit attached) which gives excellent results when used with a crystal set. I am unable to understand why, with a pick-up, the loud passages on records fade severely, and terrible distortion sets in. These faults are not present in the crystal set. Can you say what is wrong?"—J. G. R. (W.13).

THE circuit is quite straightforward, but no form of volume control is fitted to either stage. Consequently, the loud passages on gramophone records are sufficient to overload the input valve and the only satisfactory way of overcoming that is to fit a volume control across the input circuit. The fact that a high resistance is included in the anode circuit of the first valve reduces the H.T. applied to that stage, and the valve would handle a greater input if the H.T. were increased. The only satisfactory way of doing this, without increasing the size of the H.T. battery, would be to use transformer coupling.

Valves for the "Colt"

"I have three valves taken from a dismantled set. At present I am building the 'Colt' all-wave three, and I should like to know whether these valves may be used for it. They are Mullard PM1HL (two), and Osram HL210."—J. S. (Barrhead).

NONE of the valves mentioned by you is equivalent to those specified for the Colt. It might be possible to obtain results with the first two valves in the first two positions, but you could not use any of them in the output stage. Furthermore, the valves may not be in good condition if they have been taken from a receiver which has been in use for some time, and thus you may be introducing trouble to the new receiver from the start. We advise you to obtain the specified valves.

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.

Please note also, that queries must be limited to two per reader, and 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 different department.

If a postal reply is desired, a stamped addressed envelope must be enclosed. 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.

with an Artificial Aerial, the cost is 10s. per annum, and no tests have to be passed. Certain technical details have to be entered upon the application form. A full licence costs £1 per annum plus an initial 10s., but you are restricted to a power not exceeding 10 watts and must pass a test in Morse, sending and receiving at 12 words per minute. There is no exemption from this rule, and the test has to be carried out for five minutes. A small battery transmitter (2½ watts) was described in our issues dated December 26th, 1936, January 2nd and January 9th, 1937.

The coupon on Cover iii must be attached to every query.

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS.

Date of Issue. *No. of Blueprint*

CRYSTAL SETS.

Blueprint, 6d.		
1937 Crystal Receiver	9.1.37	PW71
STRAIGHT SETS. Battery Operated.		
One-valve: Blueprint, 1s.		
All-wave Unipen (Pentode)		PW31A
Two-valve: Blueprint, 1s.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW30B
Three-valve: Blueprints, 1s. each.		
The Long Range Express Three (SG, D, Pen)	24.4.37	PW2
Selectone Battery Three (D, 2 LF (Trans))		PW10
Sixty Shilling Three (D, 2LF (RC & Trans))		PW34A
Leader Three (SG, D, Pow)		PW35
Summit Three (HF Pen, D, Pen)	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Pen)	22.0.34	PW39
Hall-Mark Three (SG, D, Pow)		PW41
Hall-Mark Cadet (D, LF, Pen (RC))	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)	17.8.35	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)		PW64
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	20.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36	PW72
Four-valve: Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)		PW11
Beta Universal Four (SG, D, LF, Cl. B)		PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)		PW34C
Battery Hall-Mark 4 (HF, Pen, D, Push-Pull)		PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)		PW18
A.C./D.C. Two (SG, Pow)	7.10.33	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)	7.4.34	PW35G
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (RC))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)		PW56
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70
Four-valve: Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)		PW20
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D
A.C. Hall-Mark (HF, Pen, D, Push-Pull)		PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47
SUPERHETS.		
Battery Sets: Blueprints, 1s. each.		
£5 Superhet (Three Valve)		PW40
F. J. Camm's 2-valve Superhet Two-Valve	13.7.35	PW52
F. J. Camm's £4 Superhet		PW58
F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37	PW75
Mains Sets: Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve)		PW43
D.C. £5 Superhet (Three-valve)	1.12.34	PW42
Universal £5 Superhet (Three valve)		PW44
F. J. Camm's A.C. £4 Superhet 4		PW59
F. J. Camm's Universal £4 Superhet 4		PW60
"Qualitone" Universal Four	16.1.37	PW73
SHORT-WAVE SETS.		
Two-valve: Blueprint, 1s.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A

Three-valve: Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow)		PW30A
The Prefect 3 (D, 2 LF (RC and Trans))		PW63
The Bandspread S.W. Three (HF Pen, D (Pen), Pen)	20.8.30	PW68
"Tele-Cent" S.W.3 (SG, D (SG), Pen)	30.1.37	PW74
PORTABLES.		
Three-valve: Blueprint, 1s.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36	PW65
Four-valve: Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B)		PW12
MISCELLANEOUS		
S.W. Converter-Adapter (1 valve)		PW48A
AMATEUR WIRELESS AND WIRELESS MAGAZINE		
CRYSTAL SETS.		
Blueprints, 6d. each.		
Four-station Crystal Set	12.12.36	AW427
1934 Crystal Set		AW444
150-mile Crystal Set		AW450
STRAIGHT SETS. Battery Operated.		
One-valve: Blueprints, 1s. each.		
B.B.C. Special One-valver		AW387
Twenty-station Loudspeaker One-valver (Class B)		AW449
Two-valve: Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)		AW388
Full-volume Two (SG det. Pen)		AW392
B.B.C. National Two with Lucerne Coil (D, Trans)		AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)		AW338A
Lucerne Minor (D, Pen)		AW426
A Modern Two-valver	July '36	WM400
Three-valve: Blueprints, 1s. each.		
Class B Three (D, Trans, Class B)		AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-built Coil Three (SG, D, Trans)		AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)		AW417
1934 Ether Searcher: Chassis Model (SG, D, Pen)		AW419
Lucerne Ranger (SG, D, Trans)		AW422
Cosser Melody Maker with Lucerne Coils		AW423
Mullard Master Three with Lucerne Coils		AW424
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)		AW437
All-Britain Three (HF Pen, D, Pen)		AW448
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)		WM271
£6 6s. Radiogram (D, RC, Trans)		WM318
Simple-tune Three (SG, D, Pen)	June '33	WM327
Economy-Pentode Three (SG, D, Pen)	Oct. '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)		WM351
£3 3s. Three (SG, D, Trans)	Mar. '34	WM354
Iron-core Band-pass Three (SG, D, QP21)	June '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)		WM371
PTP Three (Pen, D, Pen)	June '35	WM398
Certainty Three (SG, D, Pen)	Sept. '35	WM393
Minute Three (SG, D, Trans)	Oct. '35	WM396
All-wave Winning Three (SG, D, Pen)	Dec. '35	WM400
Four-valve: Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans)		AW370
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2 SG, D, Pen)		AW421
Crusaders' A.V.C. 4 (2 HF, D, QP21)	18.8.34	AW445
(Pentode and Class B Outputs for above: Blueprints, 6d. each.)	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B)	Aug. '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)		WM350
£5 5s. Battery Four (HF, D, 2LF)	Feb. '35	WM381
The H.K. four (SG, SG, D, Pen)	Mar. '35	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	April '36	WM404
Five-valve: Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)	May '33	WM320
Class B Quadradyne (2 SG, D, LF, Class B)	Dec. '33	WM344
New Class-B Five (2SG, D, LF, Class B)	Nov. '33	WM340
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.		AW403
Economy A.C. Two (D, Trans) A.C.		WM286
Unicorn A.C./D.C. Two (D, Pen)	Sept. '35	WM394

These blueprints are drawn full size.

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Issues of Practical Wireless	..	4d.	Post paid.
Amateur Wireless	..	4d.	"
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Wireless Magazine	..	1/3	"

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

Three-valve: Blueprints, 1s. each.		
Home-Lover's New All-electric Three (SG, D, Trans) A.C.		AW383
S.G. Three (SG, D, Pen) A.C.		AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34	AW430
Mantovani A.C. Three (HF Pen, D, Pen) A.C.		WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '36	WM401
Four-valve: Blueprints, 1s. 6d. each.		
All-Metal Four (2 SG, D, Pen)	July '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	May '35	WM386
SUPERHETS.		
Battery Sets: Blueprints, 1s. 6d. each.		
Modern Super Senior		WM375
Varsity Four	Oct. '35	WM395
The Request All-Waver	June '36	AW377
1935 Super Five Battery (Superhet)		WM379
Mains Sets: Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.		AW425
Heptode Super Three A.C.	May '34	WM359
"W.M." Radiogram Super A.C.		WM366
1935 A.C. Stenode	Apr. '35	WM385
PORTABLES.		
Four-valve: Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
TWO H.F. Portable (2 SG, D, QP21)	June '34	WM363
Tyers Portable (SG, D, 2 Trans.)		WM367
SHORT-WAVE SETS—Battery Operated.		
One-valve: Blueprints, 1s. each.		
S.W. One-valver converter (Price 6d.)		AW329
S.W. One-valver for America	23.1.37	AW429
Rome Short-Waver		AW452
Two-valve: Blueprints, 1s. each.		
Ultra-short Battery Two (SG det., Pen)	Feb. '36	WM402
Home-made Coil Two (D, Pen)		AW440
Three-valve: Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)		AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-wave (SG, D, Pen)	Jan. 19, '35	AW403
The Carrier Short-waver (SG, D, P)	July '35	WM390
Four-valve: Blueprints, 1s. 6d. each.		
A.W. Short-Wave World-Beater (HF Pen, D, RC, Trans)		AW436
Empire Short-Waver (SG, D, RC, Trans)		WM313
Standard Four-valver Short-waver (SG, D, LF, P)	Mar. '35	WM383
Superhet: Blueprint, 1s. 6d.		
Simplified Short-waver Super	Nov. '35	WM397
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Two-valve Mains short-waver (D, Pen) A.C.		AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.		WM368
"W.M." Long-wave Converter		WM380
Three-valve: Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.		WM352
Four-valve: Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35	WM391
MISCELLANEOUS.		
Enthusiast's Power Amplifier (1/8) June, '35		WM387
Listener's 5-watt A.C. Amplifier (1/8)	Sept. '35	WM392
Radio Unit (2v.) for WM392	Nov. '35	WM398
Harris Electrogram (battery amplifier) (1/-)	Dec. '35	WM399
Dg-Luxe Concert A.C. Electrogram	Mar. '36	WM403
New Style Short-Waver Adapter (1/-)	June '35	WM388
Trickle Charger (6d.)	Jan. 5, '35	AW462
Short-wave Adapter (1/-)	Dec. 1, '34	AW456
Superhet Converter (1/-)	Dec. 1, '34	AW457
B.L.D.L.C. Short-wave Converter (1/-)	May, '36	WM405
Wilson Tone Master (1/-)	June, '36	WM406
The W.M. A.C. Short-Wave Converter (1/-)	July '36	WM408

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Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aerials, Class B amplifications, neutralizations, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free, 7½d. including catalogue.

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44, HOLLOWAY HEAD, BIRMINGHAM 1

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

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SHORT WAVE on a crystal set. Full building instruction and crystal 1/2 post paid.—Radiomart, Tanworth-in-Arden, Warwickshire.

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63, HIGH HOLBORN, W.C.1.

HOLBORN 4631

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5-Pin Chassis or Baseboard mounting Valveholders. A really First-class Job. 3d. each. **7-Pin Ditto**, 7d. each. **PHILCO VALVE SCREENS**. 1-Piece type, with Separate Base, 4d. each.

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BATTERY VALVES, 2 volts. H.P., L.P., 2/3. Power, Super-Power, 2/9. S.G., Var.-Mu-S.G., 4- or 5-pin. Pentodes, H.P. Pens., V. Mu-H.F. Pens. 5/-, Class B, 5/-.

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3-WATT A.C. AMPLIFIER, 2-stage for mike or pick-up. Complete kit of parts with 3 valves, 40/-.

7-WATT A.C./D.C. AMPLIFIER, 3-stage high-gain, push-pull output. Complete kit of parts with 5 specially matched valves, £4 4s. Completely Wired and Tested, £5/5/0.

COSMOCORD PICK-UPS, with tonarm and volume control, 10/6 each. **PICK-UP HEADS** only, 4/8 each.

PREMIER MAINS TRANSFORMERS, wire-end type with screened primaries, tapped 200-250 v. Centre-tapped Filaments. Guaranteed one year. H.T. 8 & 9 or H.T. 10 with 4 v. A.C. CT. and 4 v. 1 a. C.T., 8/6. 250-250 v. 60 m.a. 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 8/6. 350-250 v. 120 m.a. 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 10/6. Any of these Transformers with engraved panel and N.P. terminals 1/8 extra. 500-500 v. 150 m.a. 4 v., 2-3 a., 4 v., 2-3 a., 4 v., 2-3 a., 4 v. 3-4 a., all C.T., 17/6. **SPECIAL OFFER PHILIPS MAINS TRANSFORMERS**, 250-250 v. or 300-300 v. at 80 m.a., 4 v. 5 a., C.T.; 4 v. 1 a. Tapped Primary 100-250 volts, 6/11. 450-450 v. at 150 m.a. or 500-500 v. 100 m.a., 4 v. 4 a. C.T. 4 v. 4 a. and 4 v. 3 a. Screened Primary. Tapped input 100-250 v., 12/6. **AUTO TRANSFORMERS**, step up or down, 60 watts, 7/8; 100 watts, 10/-. **SMOOTHING CHOKES**, 25 m.a., 2/9; 40 m.a., 4/-; 60 m.a., 5/6; 150 m.a., 10/6. 2,500 ohms, 60 m.a. Speaker Replacement Chokes, 8/6.

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SPECIAL OFFER. LISSEN TWO-GANG SCREENED ALL-WAVE COILS, 12 to 2,000 Metres, complete with switching and wiring diagrams, 6/11 per set.

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Special Offer BTH Energized Moving Coils, 10½in. diam. 1,000 ohms field. Power or Pentode transformer (state which), 14/6.

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Reliable **MORSE-KEYS** with Morse Code engraved on bakelite base, 2/- each.

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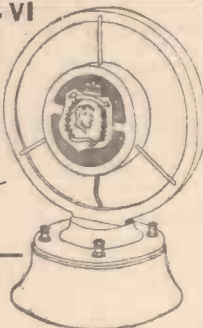
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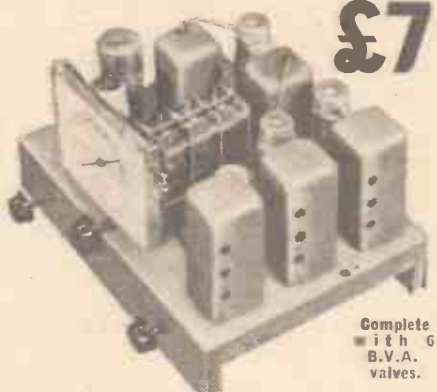
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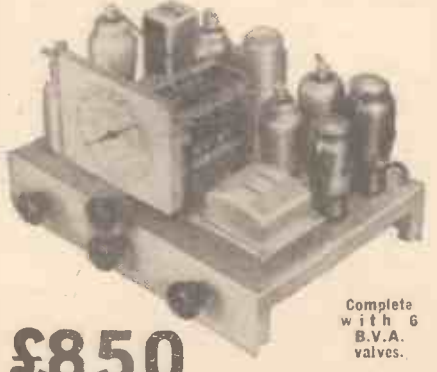


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