

Greenwood

H.F. INTER-VALVE COUPLINGS — See page 505

Practical and Amateur Wireless

3^d
EVERY WEDNESDAY

Edited by F.J. CAMM

a GEORGE NEWNES Publication

Vol. 12. No. 307.
August 6th, 1938.

AND PRACTICAL TELEVISION

CAR RADIO SYSTEMS

The illustration shows a vintage dark-colored car with a license plate 'PTK 80'. A hand is shown holding a portable radio unit, with a cord connecting it to a larger radio unit inside the car. Musical notes are depicted floating around the car, suggesting music being played. A 'CORDON-KNIGHT' brand radio is also shown.

OUTLINE of WIRELESS

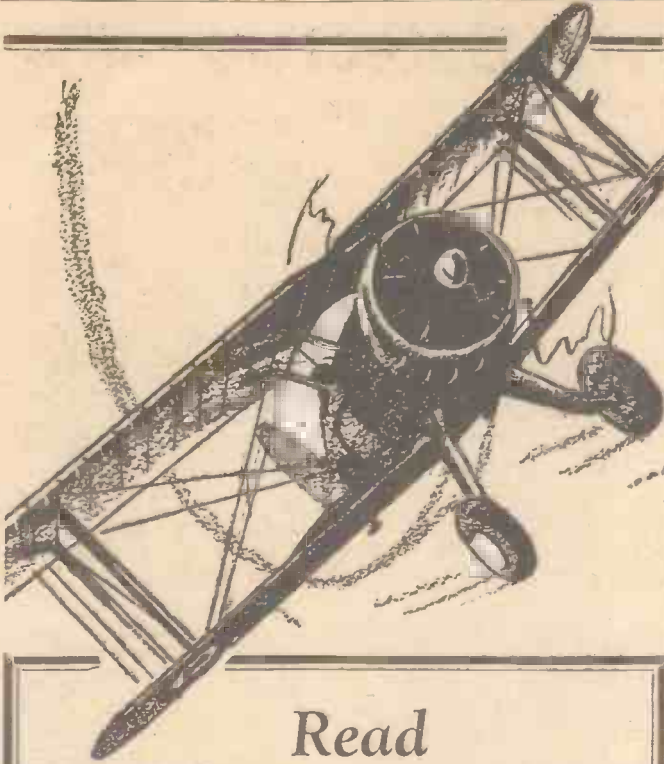
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Experiments with Crystal Detectors See page 508



Practical and Amateur Wireless

Edited by F. J. CAMM

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

VOL. XII. No. 307. August 6th, 1938.

ROUND *the* WORLD of WIRELESS

Car Radio

THERE has been considerable opposition to the installation of radio in cars, and many so-called authoritative people have claimed that it will lead to more accidents. This has now been proved to be wrong, and on the contrary in America claims are made that the radio in a car will prevent a lonely driver from speeding due to the fact that normally his mind is unoccupied, and he therefore concentrates on getting to his destination in the shortest possible time. A special programme is radiated on Sunday afternoons directed to the entertainment of week-end car drivers and the provision of the programme gives the driver something to occupy his mind and, although the distraction does not prevent him from concentrating on his driving, it does put a rein on his speed—and they claim that speed, rather than carelessness, is the main cause of accidents. There are now many interesting car radio outfits obtainable in this country, and in this issue we deal with some of the popular models, with notes on their installation.

Railway Radio

THE installation of radio on the railway has brought many interesting problems into prominence, and from a public address point of view the use of speakers in the average terminal station is not a simple matter. Reverberation, due to the domes, roofs and general architectural design, is not easily overcome, but in Germany a new type of speaker has been developed, in which the sound is directed beam fashion just above the heads of the people, and it is claimed that very much greater powers may be used so that announcements are audible above the noise of general traffic work, with complete freedom from echoes and similar troubles.

Aircraft Radio

EXTENSIVE claims are being made in America for a "new" type of microphone which enables a pilot to speak to a listening point without any background from the engine or other flying noises. The mike is attached to a small strap placed round his neck so that the mouth need not be opened—the pilot merely voicing the words in his throat. The idea is, of course, not new, although the application to commercial aircraft may prove an interesting development of modern aircraft radio.

Short-wave Aerials

THE fact that there is still some mystery surrounding short-wave work is borne out by the recent experiments of the B.B.C. engineers. As disclosed by the illustration in last week's issue and the further picture on page 506 of this week's issue, a balloon is being used on top of Broadcasting House so that various short-wave aerial arrays may be tried under modern working conditions. It is understood that these experiments are in connection with television relays.

August 11th and an eye-witness account will be broadcast for Regional and West of England listeners by George Greening from the football ground. Entrants from all over the country are expected, and it is hoped that the winner will come to the microphone during the broadcast. F. Welch, of Bridport, is the present holder of the title.

Water Polo

ON August 12th, Raymond Glendenning will take the microphone to the Templemore Avenue Swimming Baths in Belfast to describe an International Trial Water Polo Match. This event is being organised by the Northern Ireland Amateur Swimming Association, and should prove particularly interesting in view of the forthcoming contest in Eire on August 20th, between an Irish team and an English team.

Midland Orchestra

THE Victor Fleming Orchestra and Andrew Clayton (tenor) will give a programme of light music from the Midland studio on August 9th. This orchestra was only formed this year and broadcast for the first time a few weeks ago. Victor Fleming himself is conductor of the Birmingham Choral and Orchestral Society, and was for two years Music Director to Aberystwyth.

Coronation Scot

ON August 17th, Midland and Regional listeners will hear a programme entitled "Coronation Scot," written by D. G. Bridson, telling the story of the journey of the Coronation Scot from London to Glasgow. The Midland part of the production will include recordings and reflect the work of those in the Midlands who contribute to the smoothness of this famous train's run.

A.R.P. in Gloucestershire

CAPTAIN A. H. SHAKESHAF, who is A.R.P. organiser for the County of Gloucester, will give a talk on August 16th in which he will refer to the Mobile School which has been obtained to get over the difficulties of large rural areas. This is a 32-seater motor omnibus equipped as a travelling schoolroom. A cinematograph camera is installed and the racks are fitted to hold respirators. The experiment has proved very successful. Four or five villages can be visited on a single evening.

ON OTHER PAGES	
	Page
Car-radio Systems	499
Short-wave Section	501
On Your Wavelength	503
H.F. Intervale Couplings ..	505
Wrinkles	507
Experiments with Crystal Detectors	508
B.B.C.'s New Director-General	510
Practical Television	513
Terms in Tabloid	515
Letters from Readers	517
Blueprints	518
Queries and Enquiries	519

General Knowledge Tests

WHEN P. Caton Baddeley broadcast in June his fifteen-minute "Pencil and Paper" test of general knowledge, many requests were received for a repeat performance. Two further tests are therefore to be broadcast—the first on August 12th and the second two days later. The questions cover all manner of subjects and no entries have to be sent in. The answers will be given at the end of the broadcast and listeners may thus mark their own papers.

Town Criers' Championship

FOR the first time, the National Town Criers' Championship will be held at Bridport. This event takes place on

ROUND the WORLD of WIRELESS (Continued)

New Schenectady Studios

THE General Electric station WGY, in Schenectady, recently used for the first time its new five-studio headquarters. This 50-kW station, which works on 790 kc/s (380 metres), is now equipped with a new 625-foot vertical mast radiator.

Opening of New Calcutta Station

IT is reported that transmissions will begin on August 16th from the new short-wave station WUC2, the All-India Radio station at Calcutta, with a power of 10 kW. The times of transmissions are given as 8 to 10 a.m. (B.S.T.) on 31.48 m., and 12.30 to 6 p.m. (B.S.T.) on 61.48 m.

New B.B.C. Appointment

WE are informed by the B.B.C. that Mr. Worsley, who has recently completed his tenth year in the Welsh and West of England Regions, will shortly be transferring to London for duty at headquarters. His place in the West of England Region as Programme Director will be taken by Mr. Felix Felton, but the date on which these arrangements will take effect has not yet been settled.

Reginald Foort Leaving the B.B.C.

MANY listeners will learn with regret that Mr. Reginald Foort is resigning from the B.B.C. in order to free himself to undertake engagements in the outside entertainment world. His contract with the B.B.C. expires on November 1st, and he will, it is hoped, still continue after that to be heard frequently in the B.B.C. programmes.

He is arranging to visit all parts of the country with a new theatre organ of his own design which he believes will be the largest organ ever to be toured.

Broadcasts from Blackpool

IN addition to the important contribution which Blackpool will make to the National programme on August 9th in the series of "Seaside Nights," Toni and the North Pier Orchestra will broadcast a concert for Regional listeners on August 10th from the Pier.

In the same week the National programme will include broadcasts by two of Blackpool's well-known ballroom organists—Reginald Dixon on August 8th, and Horace Finch on August 13th; while Regional listeners will hear Martell and his Orchestra on August 11th from the Blackpool Hippodrome.

INTERESTING and TOPICAL NEWS and NOTES

Malvern Festival

DURING the Malvern Festival the Torquay Municipal Orchestra, conducted by Ernest Goss, will broadcast on August 7th, from the Winter Garden



During the A.A.A. Games at the White City recently, results of races were relayed to the scoreboard for the first time by radio. The illustration shows Mr. Kendrew with his portable transmitter, sending the results to the scorer.

Theatre, Malvern. This Orchestra is well known to West of England listeners and also broadcasts regularly in the Regional daytime programmes, but this will be its first evening broadcast in the Midland programme.

Kings of the Keyboard

ON August 8th (National) the first of a weekly series of pianoforte programmes will be given by Billy Mayerl, who needs no introduction to listeners. As a syncopated pianist he became widely known with the Savoy Band, in which he played for five years, following which he extended his popularity in vaudeville with several well-known artists, including Gwen Farrat and Marjorie Lotinga. He claims to have been the first pianist in England to play the "Rhapsody in Blue" from memory.

Billy Mayerl is almost equally well known as a composer of dance music and songs. He wrote the entire music for the Cliff-Lupino show "Over She Goes."

"Pleasure on Parade"

A FORTY-FIVE minute programme from the Floral Pavilion, New Brighton, will be broadcast on August 11th, when Northern listeners will hear an excerpt from the Follies which Frank A. Terry presents under the now-familiar title of "Pleasure on Parade." Favourite artists like Marion Dawson, Louis Holt and Bert Maurice are included in the cast.

English Announcer Killed in Spain

ACCORDING to a recent report, the English announcer of Radio Barcelona, Mr. T. Powell, was killed during an air raid on the town.

"Bubbles" from Boscombe

"BUBBLES," a concert party presented by Will Seymour, will be broadcast on August 11th from the Pier, Boscombe, in the Western programme. The cast will include: Patrick Colbert (bass-baritone); Douglas Young and Nan Kenway (entertainers); Leo Conriche and Winifred Swinford (pianists); Jan Ramsden (violinist); Kathleen West (dancing eccentricities); Ella Drummond (soubrette); Jack Crosbie (cartoonist); Jeffrey Piddock (entertainer) and Will Seymour (comedian).

Variety from Southampton

A PROGRAMME in the series entitled "Theatres of Variety" will be broadcast from the stage of the Hippodrome, Southampton, on August 12th, to West of England and Regional listeners.

Band's First Broadcast

HUGO RIGNOLD and his own orchestra are to make their first microphone appearance on August 6th, when they will broadcast during the tea-time period on the National wavelength.

SOLVE THIS!

PROBLEM No. 307

Arthurs was building a mains receiver and amongst the components he obtained was a skeleton model mains transformer. This had tapping loops for the primary, but as he was on 240-volt mains he did not need the intermediate tapping points. As these were provided by long leads he cut them off and slipped short lengths of systoflex over them to keep them neat, but when he tested the set could obtain no signals. Why was this? Three books will be awarded for the first three correct solutions opened. Address your envelopes 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. 307 and must be posted to reach this office not later than the first post on Monday, August 8th, 1938.

Solution to Problem No. 306

When he replaced his receiver Smith overlooked the fact that in removing it he had disconnected the aerial and earth. He forgot to replace these when he tested the set. The following three readers successfully solved Problem No. 305, and books have accordingly been forwarded to them: R. E. Coope, "Brooklands," Grove Avenue, Ilkley, Yorks; F. Blamey, Bridge St., Whaley Bridge, Cheshire; L. Jones, 72, Fenian St., Merrion Sq., Dublin, I.F.S.

Car-Radio Systems

In this Article some Practical Answers to Oft-repeated Questions concerning Wireless in the Car, and Notes on Effect on Driving, Interference Suppression, Types of Aerial, and Current Consumption are given

WITH a modern car-radio installation it is possible to ensure good reception of at least three or four programmes when travelling in any part of the British Isles. There is therefore no difficulty in making an appropriate choice of entertainment, whether that be a talk or a symphony concert, the

even so, the effect was almost entirely confined to sports-car engines and could seldom be detected in the case of the engines fitted to standard touring cars.

Nowadays these resistors are unnecessary, because various interference-suppression devices—often in the form of small coils or high-frequency chokes—are built

effective as the outside ones except when driving alongside trams, when interference is sometimes more noticeable.

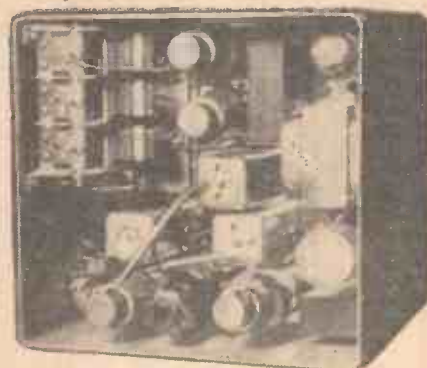
This particular question is, of course, of



A Philco model K.728 seven-valve car-radio set. It costs 18 guineas.



A Philips aerial fitted to a Vauxhall saloon. The self-contained set costs 14½ guineas, whilst the price of the de-luxe model, with separate speaker, is 16½ guineas.



An interior view of the compact Masteradio unit.

news or an organ recital. News bulletins are particularly useful when touring away from the beaten track, as well as when camping and caravanning. Should any "National Emergency" ever arise nobody can doubt the inestimable value of radio—and it might be more important in the car than in the home!

In bad weather, notices of road conditions, fog, snow and gales can be important safety factors, enabling the driver to pick his route with care and preventing him from venturing forth in times when such a course would clearly be undesirable.

Suppressor Resistors Not Necessary

A question that still crops up with fair regularity is: "Does the car-radio installation affect engine performance?" Those who are well informed on the subject might laugh at the question, for it is by now well known that any modern installation does not. Until the last couple of years or so it was generally necessary to fit so-called ignition interference suppressors comprising fixed resistors of high value, one of which was fitted in each plug lead and one in the main high-tension lead to the distributor. It is very rarely that these are essential to-day, even when using inexpensive sets.

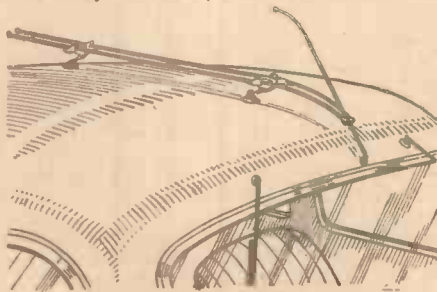
It must be admitted that in a few instances the inclusion of these resistors in the high-tension circuit did have a slightly adverse effect on engine performance at high speeds and when it was pulling hard. But

into the set itself. Nevertheless, we are in favour of the use of such suppressors and believe that they should be made compulsory, since the ignition system is very prone to cause serious interference with reception by "home" receivers on ultra-short waves—especially reception of television programmes.

Roof or Under-car Aerial

Another question: "Is it necessary to have an aerial fitted over the roof of the car to enjoy car-radio?" Once again the answer is in the negative, although the external aerial of this or a similar kind is often to be preferred to others. The other types of aerial are those fitted under the running boards, and those consisting of a V-shaped wire specially arranged under the chassis. These "underneath" aerials are extremely effective, and are almost as

far less importance than it was only a year ago, because there are now so many forms of really attractive aerial that it is never difficult to find one which harmonises with the general style and shape of the car. Besides, it is evident from the large number of roof aerials that are now in evidence that the previous prejudice against them has become practically extinct. The most usual form of roof aerial is that consisting of a single chromium-plated tube curved to follow the roof contour and held by a clamp at each end. Another very attractive form of roof aerial is that comprising two rods placed parallel to each other,



The Ward "Eaglet" aerial, of doublet design.



Philco telescopic "fishing-rod" aerial, three-quarters extended.

curved to run parallel to the roof and often with a form of ornament or *motif* at the forward end.

In other cases the two rods are opened out to a V shape, forming a type of dipole aerial, which has certain advantages from the anti-interference point of view. Most of these aerials can be fitted by drilling only a single hole in the roof. This is for the lead in (often shielded or of special tubular form) which connects the aerial to the receiver. The other mounting blocks are of hard rubber or composition, and are attached to the roof by means of suction cups and an adhesive; they fit perfectly securely and there is no chance of their working loose due to vibration.

A third type of "elevated" aerial which is often preferred is of the "fishing-rod" type. It is telescopic and mounted on the side of the car, so that it can be fully or partly extended according to the degree of sensitivity required in any circumstances. When not in use it can be closed so that it is scarcely visible.

There are several forms of "underneath" aerial, most of them being of the "hairpin dipole" type for mounting underneath the running boards or side valances. When of correct design they are extremely efficient and, being directional to a large extent, they are less inclined to pick up any interference radiated by the electrical system of the car. It is clearly impossible to make reference to even a few of the many types, but some of them are shown in the accompanying illustrations.

Low Operating Current

So far little mention has been made of the receivers themselves, and this brings us to yet another important question: "Is the current consumption of a car-radio receiver high, and will it necessitate the use of a battery charger to keep the battery in good condition?" The consumption rarely exceeds that of a single headlamp bulb, being in the region 30 to 36 watts. That means that the current taken from a 12-volt battery is no more than about 3 amp. or from a 6-volt battery 6 amp. Except in winter this current consumption is negligible; even in winter and when the starter motor is frequently used, the consumption on a 12-volt system is so low as to have little effect on battery condition. In the case of a 6-volt battery on a small car it might be desirable in winter to use a trickle charger over-night, but a very large percentage of regular motorists have



A new Ferranti car-radio installation on a Bentley drop-head coupé.

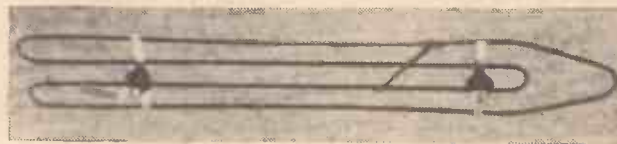
long-since found this to be desirable in any case, so that point is not important.

Compactness

And now we come to the question of whether or not a car-radio installation can be fitted without taking away valuable foot and leg room. This time the answer is "yes." Present-day sets are so compact that they can be accommodated in the smallest of cars. For example, many hundreds have recently been fitted to cars

The Control Panel

Control units are always available in different forms for mounting under the dashboard, on the steering column or on the dash, which means that they can be placed in such a position that the driver can reach the knobs without leaning forward and as easily as he can operate the direction-indicator switch. They are nearly always provided with an illuminated tuning scale, whilst medium- and long-wave bands are almost invariably included. In some cases



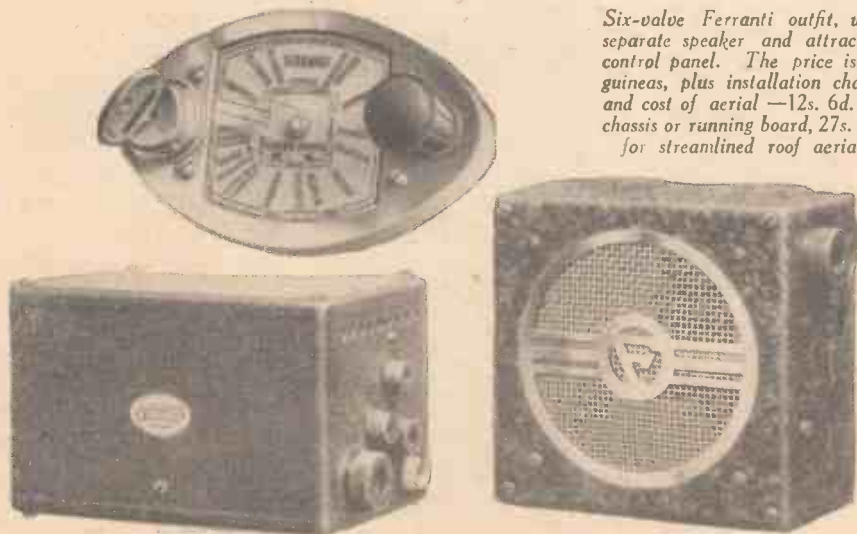
The Masteradio running-board aerial.

such as the Morris "Eight" and Ford "Eight" without the front passenger's leg room being restricted to any appreciable extent. An average size for a complete receiver-speaker unit is about 9ins. by 8ins. by 7ins., and if a box of that size is fitted under the dash and near the centre of the car the difference to the amount of leg room is almost negligible. In some cases the speaker is separate from the receiver unit, so that the former can often be mounted out of the way under the bonnet.

the wave-change switch is fitted to the set itself, in others it is operated by pulling and pushing the tuning knob and in others there is a switch or a pair of push-buttons on the control box itself.

Prices of British-made receivers range from about 13½ guineas upward. In most instances there is an additional fitting charge and also an extra charge for the aerial unit, but in the case of the "Masteradio," for instance, the price of 13½ guineas is "all-in," and includes everything. Fitting can be carried out in two to three hours by most of the well-equipped car-radio fitting stations, and the work is carried out so well that there is no interference with the body work or interior trimmings. In most instances the receiver is mounted by means of a single bolt only, and the interior appearance is scarcely changed. The fitting charge generally ranges from about 25s.

Six-valve Ferranti outfit, with separate speaker and attractive control panel. The price is 16 guineas, plus installation charge and cost of aerial—12s. 6d. for chassis or running board, 27s. 6d. for streamlined roof aerial.

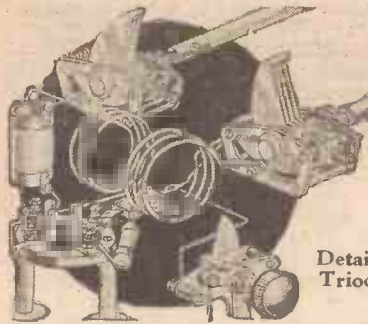


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Short Wave Section

OSCILLATOR CIRCUITS

Details of Some of the Simpler but Efficient Types of Triode Oscillator Stages. By W. J. DELANEY

THE superhet calls for a frequency-changing stage in which it is usual to combine the functions of first detector with an oscillator. In the standard broadcast receiver, and in some simpler types of all-wave receiver, this is carried out by the multi-electrode type of valve of the pentagrid or heptode class. The triode-hexode or similar valve is also used, but is a development of the pentagrid or multi-grid valve. In the receiver designed especially for the short waves, and especially for wavelengths of 10 metres or below, it is more usual to employ separate valves for the dual function, and thus a special oscillator is required. The principal defects of the single valve are the drop in conversion conductance which takes place as the frequency is increased, and a form of frequency instability which is now commonly referred to as "frequency drift," or more briefly as "drift." The first defect is caused by the coupling which exists between the oscillator and the first or signal grid, and which is due to the space charge or accumulation of electrons round the grid. This fault or trouble is inherent in all valves of the heptode type on wavelengths below 15 metres. Even so, the use of a heptode with a separate oscillator does not overcome this trouble unless a neutralised circuit is adopted.

tunately, however, such a scheme results in a shortening of the tuning range.

It is now possible to obtain a multi-grid valve so designed that this trouble is avoided, and by the use of a separate oscillator valve maximum gain may be obtained, and complete freedom from frequency drift assured on the ultra-short

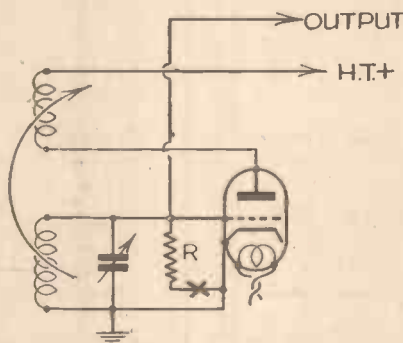


Fig. 1.—The simplest oscillator circuit, employing a reaction winding.

wavelengths. As this article is dealing mainly with the oscillator circuit we will pass on to the considerations of this circuit in which a triode or a valve designed to act as a triode is employed.

Simple Circuits

Fig. 1 shows the very simplest type of oscillator circuit, from which it will be seen that it resembles the standard type of oscillating detector valve as used in the simple types of broadcast receiver. A reaction coil or winding is included in the anode circuit of the valve, and this is coupled to the grid winding. In the circuits to be described the indirectly-heated type of valve is shown as this will be the general type of valve employed, on the assumption that this type of receiver will be designed for mains operation. A resistance is joined from grid to cathode and the output is taken from the grid. The coupling is most important and must be adjusted until the peak voltage across the resistance R remains

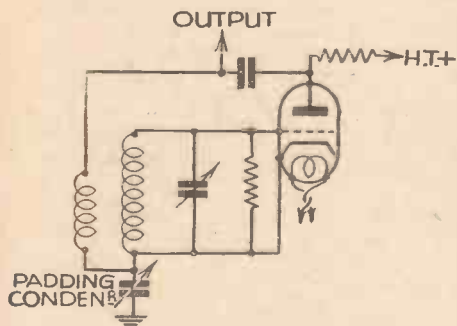


Fig. 2.—In this modification the output is taken from the anode or reaction coil.

Importance of the I.F.

The frequency into which the signal is converted in a superhet, and which is now commonly known as the intermediate frequency (I.F.), is generally about 465 kc/s. The frequency of a signal at 10 metres is equivalent to 30,000 kc/s, and thus the input circuit or signal grid will have a very high impedance to the oscillator frequency. The coupling which is due to the space charge will result in a voltage being impressed on the input grid, which will be out of phase with the oscillator grid voltage, whilst the oscillator frequency is higher than the signal frequency. By making the signal frequency higher than the oscillator frequency, however, the space charge voltage will be in phase with that of the oscillator grid, and thus the conversion conductance will not be reduced. Unfor-

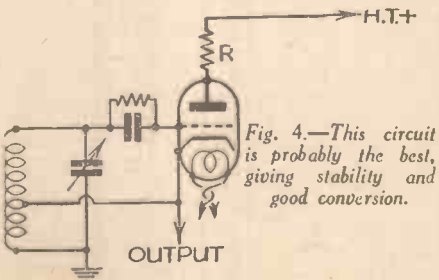


Fig. 4.—This circuit is probably the best, giving stability and good conversion.

constant at certain values dependent upon the valve. In order to ascertain what voltage is present the simplest plan is to connect a milliammeter at the point marked R, and from the current shown the voltage

may be calculated by multiplying the current (in milliamps) by the resistance (in thousands of ohms) and then multiplying the answer by 1.2. The makers will supply the appropriate voltage needed with the valve, on application, if such data is not included in the instruction leaflet.

Avoiding Interaction

Interaction between the signal and the oscillator circuits may take place at certain frequencies with this circuit, and an improvement is shown in Fig. 2, from which it will be noted that the output is now taken from across the anode coil. The type of circuit which is most popular, however, is that known as a Hartley, modified Hartley, or electron-coupled circuit, and the two usual arrangements are seen in Figs. 3 and 4. In the first the output is taken from the anode through a small coupling condenser, and in the remaining illustration the output is taken from the cathode. A condenser must be included between this and the signal grid, with a resistance to earth, and in most cases these two components should be included in the screened section or close to the remaining valve. It will be seen that these circuits call for a tap on the grid coil, and the position of this is fairly critical. Usually, the inductance between the tap and the earth end of the coil should be about a quarter of the total coil inductance, and by using a space-wound coil the most suitable tapping point may be ascertained by using a clip joined to the cathode terminal. These circuits may be used down to 5 metres with absolute success, provided that the remaining circuits are sound, and it should be remembered that although a triode only is shown in the oscillator circuits, a very efficient arrangement is made up by utilising a pentode (either of the variable- μ or straight type) and strapping the screen and suppressor grids to the anode. This results in a very low impedance with a very satis-

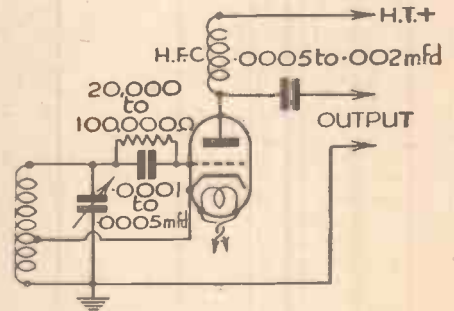


Fig. 3.—A simple electron-coupled oscillator.

factory mutual conductance. In Fig. 3, however, the screen of this type of valve should be joined to a resistor connected to the H.T. positive line, so that screening is provided between the anode and grid of the oscillator valve. Finally, these circuits may be adopted for both the signal oscillator and the beat-frequency oscillator, the coupling from the latter being varied according to the particular circuit design which is being followed.

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Leaves from a Short-wave Log

New Station in Chile

CB1178 is the call-sign of a new 2.5-kilowatt transmitter operated at Santiago by the *Radio Nacional de Agricultura*, on 25.47 m. (11.78 mc/s). Broadcasts are made daily between G.M.T. 13.00-15.00, and from 17.00-05.00.

Another Call from Costa Rica

LA VOZ DE LA REPUBLICA, otherwise, TI2XD, installed at Limon, Costa Rica, has been reported as working on 25.15 m. (11.93 mc/s). Sponsored programmes are broadcast under the slogan: *Radio Pilot*, daily, between G.M.T. 22.00-04.00, a siren being heard as an interval signal. The Address is Estacion TI2XD, Apartado Postal, 1729, Limon, Costa Rica.

Broadcasts from Burma

RADIO BURMA, a small Government transmitter at Mingalodon, near Rangoon, operating on 49.96 m. (6.006 mc/s) is on the air from G.M.T. 13.00-16.40 every day, an English news bulletin being broadcast at G.M.T. 15.15. The transmission closes down with the playing of the British National Anthem.

New Programme Schedule from Buenos Aires

LRA, Buenos Aires (Argentine Republic) on 30.99 m. (9.68 mc/s), a 10-kilowatt station calling itself: *Radio del Estado*, is now regularly on the ether on weekdays from G.M.T. 15.30-18.00, and from 23.00-02.00; on Sundays to G.M.T. 17.00 only, and again from 00.00 to 02.00. Address: Direccion General de Correos y Telegrafos, Estacion de Radiodifusion del Estado, LRA, Buenos Aires (Argentine Republic).

Lithuania Testing

LYR, Kaunas on 32.21 m. (9.315 mc/s), a telegraph station, has been heard testing telephony between G.M.T. 16.30-18.00. The proposed 10-kw. stations LYZ2, LYZ3 and LYZ4 will work eventually on 31.5 m. (9.523 mc/s); 25.21 m. (11.9 mc/s), and 19.61 m. (15.3 mc/s) respectively.

The Nine Stations of Panama

WITH the exception of HP5J, Panama City, the short-wave transmitters of the Republic of Panama work on the 25 and 49 metre bands, and in both they are to be found on fairly neighbouring channels. HP5I, *La Voz del Interior*, at Aguadulce, although listed as 30 watts, has been

logged in this country on 25.22 m. (11.895 mc/s); HP5G, 750 watts, situated at Panama City, is separated from WIXAL, Boston, by only 10 kc/s, using the channel, 25.47 m. (11.78 mc/s) and, in consequence, a careful search may be required. HP5L, at David, in the province of Chiriqui, a 300-watter, advertises its broadcasts on 25.55 m. (11.74 mc/s), but HP5A, using the same power, on 25.64 m. (11.7 mc/s) has been more frequently heard in the British Isles. HP5J, Panama City, is the latest and most important addition to the Panama radio network, as it boasts a power of 3-kilowatts. Although stated to be operating on 31.28 m. (9.59 mc/s) in view of the congestion obtaining on that channel, it deviates from it to the extent of 10 kc/s, and uses fairly consistently the frequency allotted to ZRK, Cape Town, or 31.23 m. (9.6 mc/s).

On the 49-metre band may be found HP5H, rated at 400 watts, also in the capital, on 49 m. (6.122 mc/s) with the slogan: *La Voz del Pueblo* (The voice of the people); HP5F, a 200-watter, at Colon (La Voz de Colon) on 49.34 m. (6.08 mc/s); HP5B, 200 watts, Panama City, known as *Radio Miramar*, on 49.75 m. (6.03 mc/s); and HP5K, 300 watts, also at Colon, *La Voz de la Victor*, on 49.96 m. (6.005 mc/s). Most of these stations relay programmes from medium-wave studios with which they couple their calls. All stations in Panama City and Colon give out their announcements in both the Spanish and English languages.

IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, August 3rd.—*A Ship in the Bay*, musical comedy.

Thursday, August 4th.—*Scrapbook for 1914*, feature programme.

Friday, August 5th.—*The Midnight Sun*, a play by Theo Fleischmann.

Saturday, August 6th.—*Opening Night of the Forty-Fourth Season of Promenade Concerts*, from Queen's Hall, London.

REGIONAL (342.1 m.)

Wednesday, August 3rd.—*Choral programme*.

Thursday, August 4th.—*A Sentimental Journey through France*, by Laurence Sterne.

Friday, August 5th.—*A variety programme from the Hippodrome, Bristol*.

Saturday, August 6th.—*Atlantis, The Lost Continent*, a feature programme.

MIDLAND (297.2 m.)

Wednesday, August 3rd.—*Gloucester on Parade: A variety entertainment by Gloucestershire artists*.

Thursday, August 4th.—*Camp Fire Sing-Song: Public Secondary Schools in Camp*, from Hunting Butts Farm, Chellenham.

Friday, August 5th.—*Dance Band programme*.

Saturday, August 6th.—*A recital of famous love songs*.

WEST OF ENGLAND (285.7 m.)

Wednesday, August 3rd.—*How to look at the Sea-Shore*, a talk.

Thursday, August 4th.—*A Garden Tour, Wiltshire*, a talk.

Friday, August 5th.—*Variety programme from the Hippodrome, Bristol*.

Saturday, August 6th.—*Poole Speed Trials, from Poole Park*.

WELSH (373.1 m.)

Wednesday, August 3rd.—*The Chief Choral Competition, the Royal National Eisteddfod of Wales, from Cardiff*.

Thursday, August 4th.—*Cadeirio'r Bardd: Chaining of the Bard at the National Eisteddfod of Wales, Cardiff*.

THE FIFTH TEST MATCH.

THE fifth Test Match at the Oval will not only be fought to a finish, but televised to a finish. The B.B.C. mobile television unit will be installed on the Kennington ground on the opening day, August 20th, and it is believed that even better pictures will be obtained than in the case of the Lord's Test Match, since the two principal cameras, besides being appreciably nearer the field, will give shots more nearly along the pitch. Viewers may thus be able to see which way the ball is turning. The special television commentary will again be given by Captain H. B. T. Wakelam.

As the Oval is certain to be filled to capacity, viewers will share the excitement of approximately 80,000 people in the stands. If the match should run to four or five days visitors to Radiolympia, which opens on August 24th, will also be able to watch play. The transmission will last daily from three to four hours, beginning at 11.30 a.m. As at Lord's, telephoto lenses will be used, so that, besides general views of the field, the home screen will show bowlers, batsmen and fielders in comparative close-up.

Friday, August 5th.—*National Eisteddfod: The Banshee*, by Bryceson Treharne.

Saturday, August 6th.—*Massed Male Voice Choirs and Winning Soloists, from the Royal National Eisteddfod of Wales, Cardiff*.

NORTHERN (449.1 m.)

Wednesday, August 3rd.—*Northern Saints: a series of plays for radio—3, Saint Cuthbert*.

Thursday, August 4th.—*A Sentimental Journey through France*, by Laurence Sterne.

Friday, August 5th.—*Scarborough Night's Entertainment*.

Saturday, August 6th.—*The Northern Muse: A Festival of Northern Dialect Poetry and Song—3, Yorkshire*.

SCOTTISH (391.1 m.)

Wednesday, August 3rd.—*The Mart*, an impression in sound of scenes at a big agricultural Mart in the North-East of Scotland (recorded).

Thursday, August 4th.—*Orchestral programme*.

Friday, August 5th.—*Concert Party programme, from the Beach Pavilion, Aberdeen*.

Saturday, August 6th.—*Organ recital from the Freemasons' Hall, Edinburgh*.

NORTHERN IRELAND (307.1 m.)

Wednesday, August 3rd.—*Concert Party from the Town Hall, Portrush*.

Thursday, August 4th.—*Country Concert from Newry, County Down*.

Friday, August 5th.—*Chamber Music*.

Saturday, August 6th.—*The Unquiet Ones, by J. S. N. Sewell, a play*.

ON YOUR WAVELENGTH



By *Thermion*

The "Communications" Receiver
 IN a recent paragraph I lampooned the use of the term "communications receiver" on the grounds that it was an American term, and as such is bound to be wrong. We have nothing to learn from America, which is an English-speaking country, hence should take its nomenclature from ours. I do not like the spirit of Yankee phraseology, for which the films are largely responsible. A communications receiver is nothing more nor less than an all-wave receiver. You might call the telephone a communications receiver. Anything which receives messages must receive communications; a tape machine would come within this category. The term communications receiver does not describe any particular features of the set. A wireless set which will only receive one particular broadcast is a communications receiver. However, my paragraph has inspired F. H. K., of Ventnor, to express himself in the following terms: "The earlier communications receivers had a wave-range of 15 to 200 metres. This band is occupied mostly by point-to-point transmissions, such as aeroplane to airport, ship to shore, commercial trans-oceanic services, and amateur transmissions; what are transmitted from point-to-point except communications? Such receivers of necessity possess high sensitivity, high selectivity, band-spread tuning, a beat-note oscillator, and optional A.V.C. When a set is described as a communications receiver, the meaning is that it has the above features. The use of such receivers is more or less confined to professional wireless operators and amateur transmitter operators. Later on, the wave-change was increased to cover the domestic broadcast band. They were then described as communications receivers with broadcast-band coverage. This eliminated the need of amateurs to possess two receivers. A communications receiver is a hot stuff short-wave set that tunes up to a broadcast band." I thank this reader for taking the trouble to write to me on this matter for his letter merely confirms my point of view. The term is a monstrosity. Your Editor has agreed that it is a monstrosity, and as such we shall not use it in this journal. Personally, I shall

not permit further confusion of the term. An all-wave receiver is an all-wave receiver; whatever set you own must receive communications, and the term "communications" does not apply only to those radiated on a particular waveband. A pair of shoes is a pair of shoes irrespective of their size, and a hat is a hat irrespective of shape. A communication is a communication irrespective of the wavelength on which it is radiated, and irrespective of whether it is radiated for amusement, education, information, or experiment. We must expect other nations not to be so well versed in the interpretation of the English language which they so grossly misuse. We, as Englishmen, are expected to know better, and we must not allow other nations to give to our words a meaning they do not possess, and were never intended to possess. Ask the average man in the street what the term means to him, and you will find that it means nothing. Yet the term is being used to advertise to the man in the street. On this point I am unrepentant, and it is sheer waste of time for anyone to endeavour to change my point of view.

"Why Ogilvie?"

FOLLOWING the appointment as Director-General of the B.B.C. of Mr. F. W. Ogilvie, an evening paper recently published an article entitled "Why Ogilvie?" The article ran on to suggest that the name was unknown to the public, and it went on to inquire why a man with no experience of the B.B.C. should be appointed to a £7,000 a year job. The article brought forth the following letter from Mr. C. Jennings Marshall, the distinguished surgeon, examiner in surgery at London and Manchester University; surgeon to Charing Cross Hospital; surgical consultant to the L.C.C.

and the Surrey County Council. Here is Mr. Marshall's letter as published in the paper concerned: "In your article 'Why Ogilvie?' you instance forthright Scots independence and integrity of mind as an advantage, without pointing out the inevitable Scots intolerance of any others' integrity and independence of mind, religious or otherwise. Why should the Broadcasting Service again be subjected to the brunt of Presbyterian bigotry, that persistence of the sadistic Calvinistic perversion of the teachings of the gentle Galilean?"

Crooners

A READER sends me the following joke: "With reference to those first class heart-throbs of the air—crooners—I overheard the following conversation: 'I hear that crooners over in America are very popular.' The reply was: 'Yes, crooners over in America are very popular in England.'"

This reader thanks me for giving a priceless new word to the English language—*ridm*. He need not thank me, because you cannot expect crooners to understand anything but baby language, and in any case *ridm* is the nearest negrese I can find to suit the aboriginal mentality of a crooner.

Sir Adrian Boult Expresses His Views

THE B.B.C. Director of Music—Sir Adrian Boult—said recently: "Television is a medium that calls for sweeping action and movement, and no audience is interested in a study of still life without the stimulation that comes from physical presence and personal contact in a concert hall or broadcasting studio. No one would care to be a witness at a television broadcast of a two-hour concert, any more than you would care to witness a film of one. The spectators would be bored to distraction in no time, no matter how carefully the cameras were used. It might be practicable to televise the first five minutes of a concert. In London we televised one act of Tristan, and while the results were fairly gratifying it was necessary to employ a double part, one group of actors doing the acting, and another the singing." As one B.B.C. Director recently said, "musicians are far too

ugly to present on the television screen!"

Humour from a Scot!

THE following letter from B. F. H. (Kingston-on-Thames) speaks for itself: "The other day a friend and I entered a second-hand radio shop, and the 'expert' demonstrated a set to us. We argued about its performance, my friend having tested a similar model, and at length came to the aerial, an indoor one, just above our heads.

"The demonstrator, evidently one of those Scot 'engineers,' said that the aerial was a very good one, and that if he had it from 'here to the other side of the road, it wouldna be better than this. It is a patent aerial, a' mon, an atom-splitter aerial, it splits the atom in two, drives the atom along."

"My friend and I exchanged glances, having experienced some of his patent ideas before. 'I've been researching for years to find the perfect aerial, and there it is,' he continued.

"His patent aerial consisted of two lengths of bare wire, which were attached to a large mouse-trap at each end, and insulated from these by ebonite rings. The rat-traps were, in turn, suspended with rope and an insulator at each end between two walls. The traps were used to keep the aerial wires stretched, he explained. The wires, running parallel, were kept apart by bare wire spacers, and he used twin flex for the lead-in, which he had soldered to the aerial; one wire of the lead-in to each parallel wire.

"In another of his patent ideas, he had a moving-coil speaker, over the front of which he had fixed a piece of stout paper with holes drilled round the circumference. These were, he said, used to diffuse the sound. Looking behind the speaker, we observed that the cone had several large tears in it!

"In conclusion, I may say that I agree with your views on crooning, but I like a little dance music, as long as it is not jazz. I am looking forward to meeting you at Olympia this year, and, I may add, I think I saw you on the PRACTICAL WIRELESS stand last year, but because you seemed too busy, I did not approach."

I have sent a book to this reader.

"The Three-cornered Hat"

FOR the radio operetta, "The Three-cornered Hat," which will be heard from the National on August 18th, and Regional on August 19th, Phillip Leaver has taken an Andalusian story of a hundred years ago and served it up in an amusing and entertaining fashion. It deals

Notes from the Test Bench

Metal Chassis

WHEN drilling large holes in a metal chassis, such as may be required for mounting volume controls and similar components, a fairly heavy burr is sometimes raised. If this is taken off with a countersink bit it often leaves a rather large bevel, which prevents the control from being mounted rigidly. A good plan in such cases is to drill the hole slightly smaller than is needed, and then to use the countersink on both sides. When the overall diameter (to the edge of the bevelling) is approximately correct the remaining thin metal inside the hole may be cleared out with a penknife and this will leave a clean-cut hole without burr, to which a component may be really firmly locked without the use of shakeproof washers. The hint is particularly valuable when mounting volume controls of the combined on/off switch type, as there is often a tendency to turn this the wrong way and undue pressure is often exerted, with the result that the control becomes loose and in a complete receiver it may be difficult to obtain access to it in order to tighten up the nuts.

Coil and Valve Leads

MANY components of the plug-in type now have the connecting wires soldered to the point of the pin, the wire being taken down inside of it. Thus when opening a pin of this type with a knife the wire may become broken. The only cure, then, is to unsolder all the leads and to remove the base. A new lead should be soldered to the broken lead, but the joint must be made at such a point that the additional thickness of wire will not prevent it from being pulled through the pin. The other leads may also require lengthening so that they can be pushed through the ends of the pins and then soldered and cut off clean.

Fixed Condenser Connections

MODERN tubular condensers are made in inductive and non-inductive forms, and it will be noted that some bear the letters "O.F." near one of the connecting leads, whilst others carry a coloured ring at one end. This indicates the outside foil, and to preserve the non-inductive characteristics it is necessary that the lead marked in this way should be connected to the earth line.

NOW READY!

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

Edited by F. J. Camm.

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

with the passionate, flirtatious happenings of the South in those days when men were men and women wore flashing smiles, and tells the story of Carlos, the Miller, and his wife, Frasquita, with whom His Honour Don Eugenio de Zuniga y Ponce de Leon, the Corregidor, or Governor of the Province, falls head-over-heels in love. And as the Corregidor is on the stout side, it will readily be appreciated that it is "some" fall. The miller's retaliation forms the basis of the main action, and the amusing situations that are created make good radio entertainment. It is hoped that Jan Van der Gucht will play the part of Carlos, with Tessa Deane as his wife, Frasquita. Linda Gray will appear as Eulalia, the wife of the Corregidor, while the corpulent Corregidor himself will be played by that master of character comedy, Bobbie Comber.

The music is by Kenneth Leslie-Smith, the composer of so many successful radio operettas — "Love Needs a Waltz," "Puritan Lullaby," and "Old Words to New Music." This is the first time he has ventured into the Spanish idiom. In addition to a large supporting cast and the B.B.C. Revue Chorus and Theatre Orchestra, conducted by Stanford Robinson, Charles Brewer, the producer, has also booked Eugene Pini and his Tango Orchestra to help provide the necessary background atmosphere of the sunny South.

Sing-song

I AM told that Rupert Hazell, Elsie Day and Tommy Handley will be the hosts and hostess in the first of the "Sing-song" programmes to be produced by Ernest Longstaffe in the Regional programme on August 13th. Longstaffe, who has been spending a "busman's holiday" in New York, returns to work at the beginning of August. While in America he has been seeing shows, studying broadcasting methods and always keeping a look-out for new ideas.

The artists who will be introduced by the lively hosts and hostess include Bertha Willmott, radio's chorus singer; Vine, More and Nevard, entertainers; the Gerard Singers, well-known vocal quartet; Ray Vaughn, in a musical cocktail; the Vagabond Lover, with Bertha Ricardo, in his well-known romantic scena; and George Robey, the Prime Minister of Mirth. Charles Smart will be at the B.B.C. Theatre Organ, and the B.B.C. Variety Orchestra will be conducted by Ernest Longstaffe. Listeners are invited to join in the rousing chorus numbers to make a country-wide community singing audience.

H.F. Intervalve Couplings

In this Article Technical and Practical Considerations of the Subject are Dealt With - - - - - By L. O. SPARKS

THE effective range of a receiver is governed by the field strength of the transmissions at the receiving aerial, the efficiency of the aerial system, and the overall magnification obtainable from the receiving circuit employed. This is assuming that interference is negligible, and that the signal-to-noise ratio does not have to be considered.

It would appear from the above remarks that with the modern high-powered stations

of logging distant stations, as one has to consider the question of interference and selectivity. There might be exceptions to the above in areas remote from a powerful station, but with our present broadcasting system it would be rather difficult to find such a spot.

To obtain the desired results, the designers approach the problem from the other side of the detector and, by so doing, they are not only able to obtain an increased signal strength at the detector, but they also improve the overall selectivity of the receiver.

The method they adopt is to amplify the signal before it reaches the detector valve, by what is termed H.F. or high-frequency amplifiers which make use of the modern screened-grid or H.F. pentode valves. We are not concerned at this stage with the superheterodyne.

characteristics, the selection depending on designers' requirements and the receiver under consideration.

One of the couplings widely used in the early days of radio and, incidentally, back in favour again now, is that shown in Fig. 1. By virtue of the fact that the tuned circuit is included in the anode circuit of the H.F. valve, it is known as "tuned anode" coupling.

When examining the circuit, it should be noted that the coil is in series with the positive H.T. supply to the valve, and that the fixed and moving vanes of the variable condenser are at H.T. potential. When separate tuning condensers were in use, this did not cause any serious consideration, but now that ganged condensers are so widely used, the arrangement is likely to prove rather awkward in view of the fact that all the moving vanes are common to each other. As the aerial circuit has one side at earth potential, it is obvious that a short-circuit of the H.T. would result when a ganged condenser is used in conjunction with the two circuits.

As the method of coupling has certain desirable features, experiments revealed that the circuit shown in Fig. 2 could be used in such circumstances, the moving vanes being at earth potential, thus removing the previous snag.

Good Screening Essential

With a properly designed coil, a high degree of magnification and selectivity can be obtained, but it is essential to see that adequate screening is provided, otherwise unwanted interaction will take place between the anode and aerial coils, or other inductances in close proximity.

The necessity for good screening will be readily appreciated if it is remembered that the anode and the grid circuits of the valve are tuned to the same frequency, thus the slightest feedback between the two circuits will cause the valve to oscillate. For this reason a screened-grid or H.F. pentode is essential, as either offers far less possibility of its inter-electrode capacity providing any feedback.

The coupling is not to be recommended for circuits embodying more than one stage of H.F. amplification.

H.F. Transformer

The form of coupling is shown in Fig. 3. Two inductances or coils are used, the

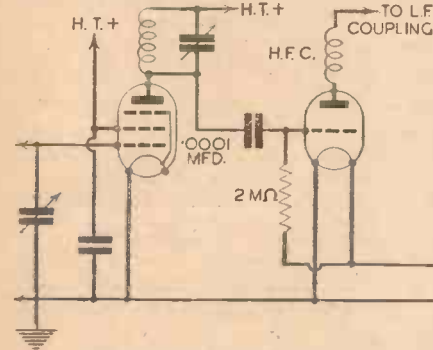


Fig. 1.—The fundamental tuned anode circuit with an H.F. pentode and leaky grid detector.

it is only a question of perfecting the detector system in a receiver, and making the aerial as efficient as possible, to enable the more distant transmissions to be consistently received with ease.

Unfortunately, this does not apply in practice. There is no hard and fast rule which allows set designers to determine the field strength of any one transmission over a large area. It is not possible to say that a transmitting station 1,000 miles away, using 25 kilowatts in the aerial, will give a certain field strength in London or Wigan. Too much depends on the characteristics of the radiating system; the atmospheric conditions at any given instant; geographical considerations, and the reception conditions of the area in which is located the receiving aerial.

It is possible, however, for the designers of receivers to specify that a signal of certain strength is required to allow a receiver to give entertainment volume, or fully load the output valve or valves used; therefore, if a receiver is required for long-distance reception they can base their calculations on an average, and provide sufficient stages or amplification to allow a reasonable factor of safety, or reserve.

Detector Valve Limitations

Most constructors will have found that a detector valve has, for practical purposes, a certain operative range. Stations outside that range cannot be considered to be of entertainment value, no matter how the reaction is pushed up, or how much one attempts to improve operating conditions. The output strength of the signal can, of course, be boosted up by means of L.F. stages to provide additional amplification, but there are limits in that direction.

With any detector handling the aerial input, it is useless to provide excessive low-frequency amplification for the purpose

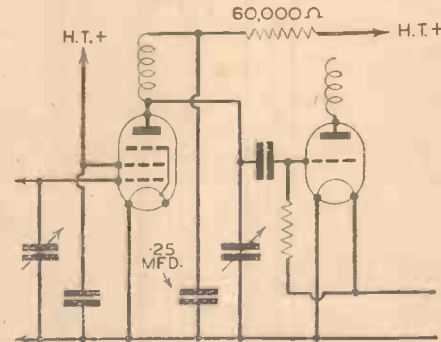


Fig. 2.—A modified form of Fig. 1. The moving vanes of the tuning condenser are at earth potential.

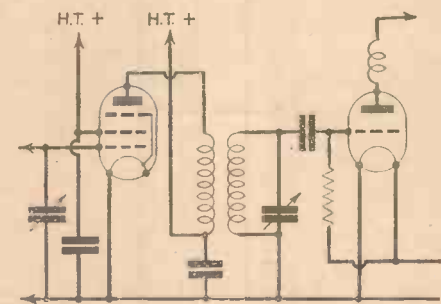


Fig. 3.—A normal H.F. transformer circuit which is efficient and stable, but sometimes requires switching on the primary.

As the H.F. amplifier comes between the aerial and the detector, it becomes necessary to provide some form of coupling to allow the signal to pass from one valve to the other. This is provided by means of one or more tuned circuits, making use of a variable condenser and coil, or coils, which, if properly designed, immediately tend to improve the selectivity of the pre-detector part of the receiver.

Types of H.F. Couplings

There are various forms of H.F. couplings in general use, all serving the same purpose, but each having individual

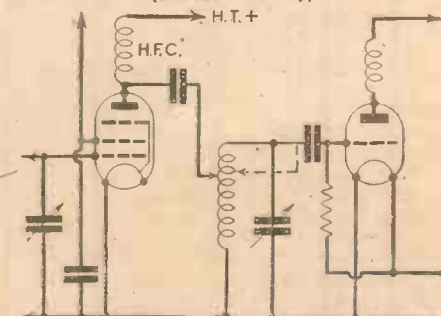


Fig. 4.—A widely used circuit incorporating tuned-grid coupling and simple switching. It is quite efficient providing a good H.F. choke is used.

H.F. INTERVALVE COUPLINGS*(Continued from previous page)*

secondary being tuned in the normal way. The two coils are inductively coupled, and it is possible to control the amount of energy transferred to the detector valve by "a," the degree of coupling provided between the two coils, and "b," by the ratio of the primary turns to the number of turns on the secondary.

The coupling is usually very stable, provided that a high ratio is not used and normal precautions are taken regarding screening. With some makes of transformers it is necessary to provide switching on the primary side and, as it is carrying H.T., this sometimes adds complications. It is possible, however, for the primary to be designed so that its frequency response is fairly flat, thus dispensing with switching, but, unfortunately, reducing the maximum efficiency.

Very interesting experiments can be carried out by constructing transformers of this type and trying various ratios and couplings.

Tuned-grid Coupling

This can be considered as a parallel-fed tuned-anode coupling, though the circuit shown in Fig. 4 reveals that it is, as the name implies, the grid circuit which is actually tuned. The arrangement possesses the advantage that no high tension is in the tuned circuit, thus allowing ganged condensers and simple switching to be used without any undue consideration. It is very efficient, providing the H.F. choke is, in itself, efficient over the wavebands covered by the receiver. A poor component can account for serious losses; therefore, particular attention must be paid to its choice. One of the screened variety is best.

If more than one stage is used, it is advisable to see that there is no possibility of interaction between the chokes, and if one is also used in the detector anode circuit, it is advisable to select either different makes or types. This procedure is suggested in view of the possibility of an H.F. choke "peaking" or resonating at a

certain frequency, apart from the question of interaction. The degree of coupling can be varied by using different capacity coupling condensers, which, by the way, should be of the mica dielectric type, or by tapping the connection from the condenser down the grid coil towards the earth end.

In many circuits, it is advisable to tap the grid condenser connection down the coil, this helping towards improved selectivity and stability; but if one is interested in making coils, experiments should be carried out to determine the best settings. With any of the above forms of coupling, it must be remembered that if ganged condensers are to be used, all the coils must be matched as regards inductance values, otherwise satisfactory tuning over their total waveband will not be obtained.

When carrying out any experiments with H.F. stages or couplings to determine their relative efficiency, it is useless tuning in a powerful signal; tests should be made on a weak transmission, as any amplification will then be more readily detected.

TOPICAL NEWS

More English Broadcasts from Paris

AS France anticipates an influx of British and American tourists during the months of August and September, the Paris broadcasting station Radio Cité (280.9 m.—1,068 kc/s) proposes to organise for their benefit daily transmissions in the English language at hours when they are likely to be in their hotels and boarding-houses.

New Italian Station

THE Ancona relay transmitter has now been brought into operation; it shares the wavelength (221.1 m.—1,357 kc/s) used by Turin (II); Milan (II); Genoa (II); Bari (II); and Rome (III), and broadcasts daily the third programme of the Italian radio network.

A.R.P. in Prague

FOLLOWING the installation of loudspeakers in the main streets of the Czech capital during the recent Sokol athletic fêtes, and the demonstration of their satisfactory assistance in the regulation of wheeled and passenger traffic, the Prague authorities are now considering the permanent adoption of this means of control. In addition, it is pointed out that by linking up the system with the Central Police or Military Headquarters it will be possible to give immediate warnings of air raids to the major bulk of the population. For this reason alone it is probable that the retention of the loudspeakers will be confirmed.

North Wales Seaside Shows

BILLIE MANDERS and his Quaintesque Concert Party will broadcast a programme entitled "Half an Hour at the Seaside," from the Pier Amphitheatre, Rhyl, on August 13th. The programme will be heard in the Welsh Children's Hour, and also in the Regional programme. Later in the same day will be broadcast another programme from Rhyl entitled "Rhyl on Parade." For this programme the microphone will be taken to the Pavilion Theatre, the Coliseum and the Queen's Dance Hall, and listeners will hear how people are enjoying themselves in Rhyl at the peak period of the holiday season.

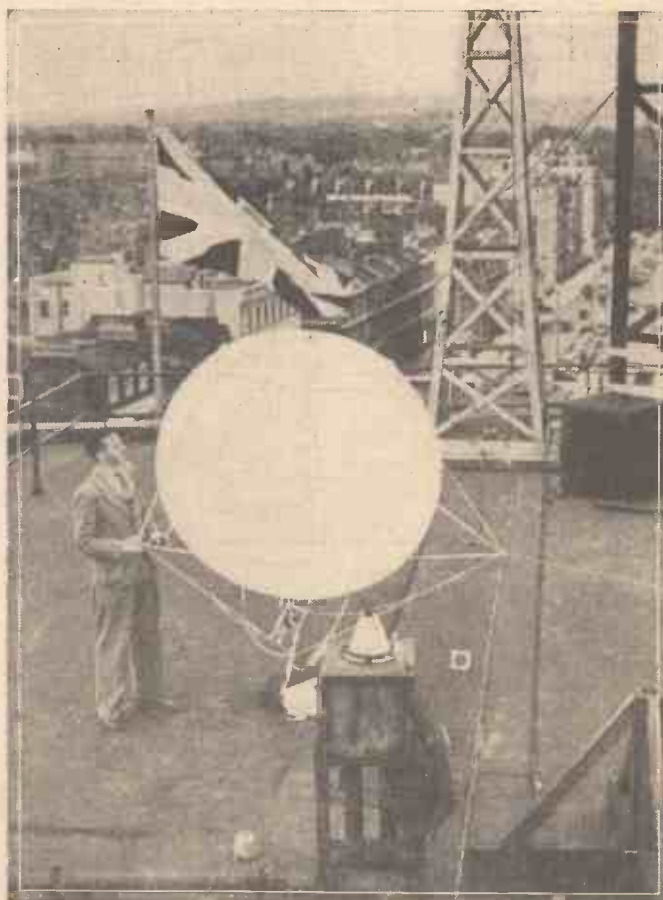
Laying the First Atlantic Cable

ON August 5th, 1858, just eighty years ago, H.M.S. *Agamemnon* sailed into Valentia Island off the coast of Kerry, and the U.S.S. *Niagara* arrived at Newfoundland. These two ships took with them the

ends of the first cable to be successfully laid across the bed of the Atlantic. They had spliced the cable in the middle and each ship had set out for its destination, laying the cable as it went. For the first time Great Britain and the United States were brought within a few seconds of each other. The romantic story of this great idea and of its remarkable achievement will be told in a talk on August 5th, in the Northern Ireland programme, by J. W. Emersin Merrett.

Orchestral Music

DURING the coming week there is some good fare for lovers of orchestral music. On August 7th (National), Sir Adrian Boult will conduct the B.B.C. Orchestra in a programme including "An English Dance," by B. J. Dale, and "Symphonietta on Russian Themes," by Rimsky-Korsakov; and on August 9 (National) Clarence Raybould and the B.B.C. Orchestra will broadcast, among other items, Ernest Bryson's "The Field of Boliauns," a symphonic work based on an old Celtic legend about a Leprechaun, a field of Ragwort (Boliauns), a Crock of Gold, and a credulous Boy. A seldom-heard cantata by Handel, "Apollo and Daphne," will be broadcast on August 11th (National). The singers will be Henry Cummings (baritone) and Noël Eadie (soprano).



A close-up of the balloon which was recently used by B.B.C. engineers for short-wave experiments. The illustration shows an official preparing the balloon for an ascent from the top of Broadcasting House.

A PAGE OF PRACTICAL HINTS

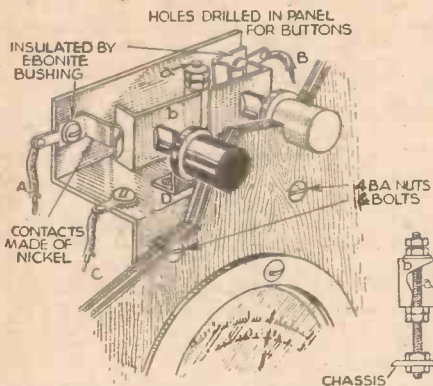
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Rocker Push-button Movement for Meter Panels

THE double type push-buttons having automatic restoring action are rather costly pieces of apparatus, and as I required one such movement for a new meter panel, the only alternative was to construct one with the aid of the "junk"



An effective push-button movement for meter panels.

box. From the sketches it will be seen that a simple brass strip, pivoted as shown, provides the necessary rocker contact, connection to which is made by the common wire "C."

The two other contact pieces were fashioned from old push-pull switches, and, finally, the assembly was fitted to an 18-gauge aluminium chassis, also cut and shaped to suit. The meter panel is of 5-ply wood, giving just the right thickness for the smooth action of the buttons; these buttons have flanges, and by constructing a simple aluminium back stop "D" for each button there is no fear of binding.

It will be noticed that one button is black, whilst the other is white; this prevents any mistake, with the possible damage to the meter, or meters.

The buttons have short lengths of brass rod sweated into the centre, the ends of these being filed slightly to obtain a smooth action on each arm of the rocker "B." The connections to the two contacts are shown at "A" and "B," and it will be noticed that insulation is afforded by ebonite bushing in each instance.—B. S. FRENCH (Malden).

Portable Aerial Connection

FOR those who wish to add an external aerial to a portable receiver where no provision has been made to fix the wire, the following wrinkle will be found useful.

A thin sheet of metal, such as copper or aluminium, should be cut to the inside measurement of the case. A rubber suction-cup is fixed at each of the four corners, suction side out, about an inch from the edges. The type of suction-cups used will govern the method of fixing. The aerial

THAT DODGE OF YOURS!

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

SPECIAL NOTICE

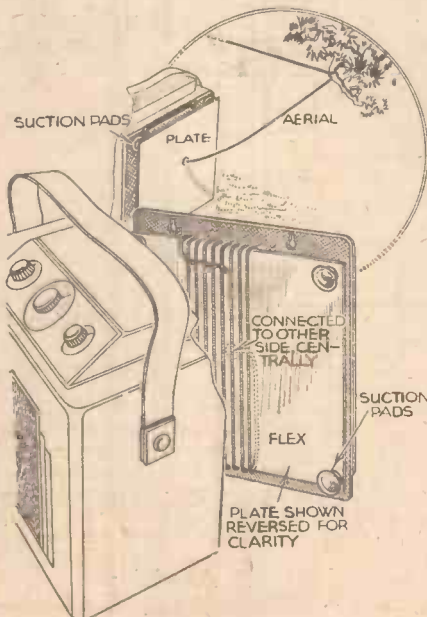
All wrinkles in future must be accompanied by the coupon cut from page 520.

wire, which should be as flexible as possible, is soldered or bolted to the centre of the plate.

If the set is to be used out of doors, the aerial can be slung anywhere convenient, and the plate fixed to the lid of the cabinet by pressing each cup with the fingers. After use the plate is taken off, the aerial is wound round it, as shown in the sketch, and the plate is put into the cabinet.—ALEC DAVIE (Edmonton).

An Illuminated Clock for a Short-wave Set

IN constructing a short-wave set recently I decided to incorporate a neat chromium-plated clock having large distinctive figures, and the illumination has proved a worth while consideration. The

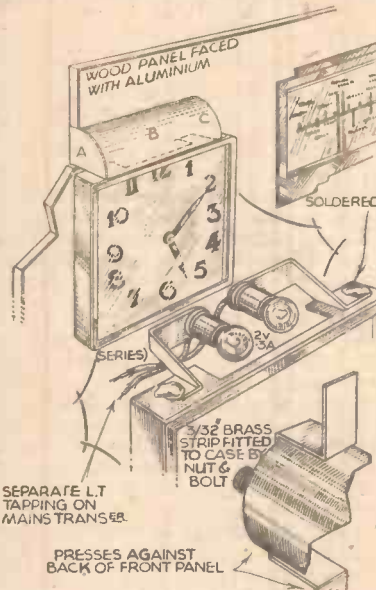


An aerial for a portable set is here seen in use; and ready for packing.

supply for the two 2-volt .3 amp. bulbs is derived from a spare tapping on the mains transformer, and it will be seen that the bulbs are series connected for 4-volt working.

First of all, it was necessary to cut a large hole in the aluminium-faced panel, this permitting the insertion of the clock case; a slot was also cut for the reflector. To fix this securely I bent a brass strip, as shown in the inset, and by drilling an 1/8 in. hole in the case, the fixing could be accomplished with one 6B.A. nut and bolt.

The reflector is simply a strip of tin, "B," soldered to two end pieces of shaped brass, "A and C," and these, in turn,



Method of fitting an illuminated clock to the panel of a short-wave set.

are soldered to the top of the clock, surplus solder being removed to give a flush finish. The bulb-holders were obtained from an old condenser and dial movement and are of brass; they are also soldered to the top of the clock.—R. M. KNIGHT (Brentwood).

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

Edited by F. J. CAMM.

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

QUANTITY of reproduction, simplicity and low cost, are the outstanding features of a crystal receiver; these are often outweighed by the lack of volume and selectivity, rendering it necessary in many instances to cut out the crystal and introduce a valve as a detector.

Except when the installation is within the effective field of two powerful stations, and quite close to one of them, it is not necessary to adopt such drastic measures, as it is then possible to add valves to help overcome the selectivity and volume problems without sacrificing the quality obtainable with crystal rectification.

The fundamental crystal circuit is shown in Fig. 1, and it will be noted that the carborundum type has been selected because of its additional sensitivity. It is not essential to employ this method, and the

FURTHER EXPERIMENTAL CRYSTAL

Adding Valves as H.F. with in this Article

using a Cossor H.P.T. which, apart from having a high magnification factor, consumes little H.T. current. If a volume control is required, one can be fitted, in the form of a .25 megohm potentiometer, across the secondary of the input transformer. One is not shown in the diagram, as it is usually found that sufficient control can be obtained by de-tuning slightly, or

combination is shown in Fig. 4. For the L.F. coupling between the triode and the pentode a transformer is used, as it is desirable to see that the pentode is fully loaded. The ratio can be between 3:1 and 5:1.

If one is prepared to sacrifice a little

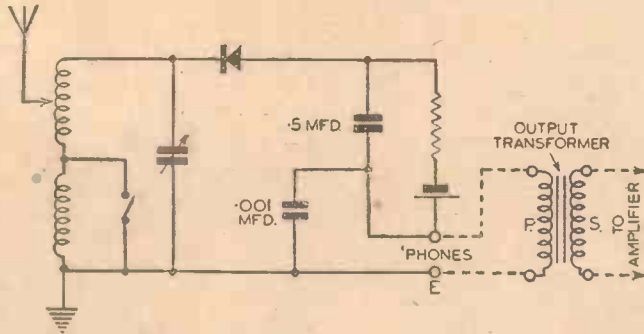


Fig. 1.—The fundamental circuit of a carborundum crystal receiver, with the output transformer connected.

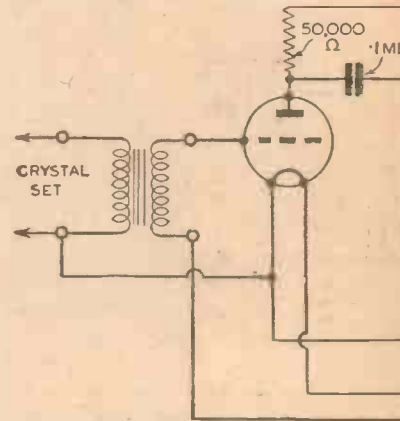


Fig. 3.—This shows the circuit arrangement for a DB240. For clearness' sake, the

suggested experiments given below can be applied to any type of crystal detector, provided that it is of reasonable efficiency.

The most common requirement with crystal users is additional volume to enable a loudspeaker or several pairs of headphones to be used, therefore, L.F. amplification will be considered first.

As it is essential to protect the crystal from any external current, and as it is equally essential for the earth return circuit to be complete, it becomes necessary to employ a transformer between the output of the crystal and the input to the valve system used for amplification purposes.

The number of valves required will depend on the strength of the rectified signal and the ultimate volume desired. If it is only a matter of increasing power for headphones, then a single valve of the

by varying the coupling between the aerial and the tuned coil, when a two-circuit tuner is used.

For those requiring greater output with minimum cost, and where space is a consideration, the circuit shown in Fig. 3 is suitable. If the diagram is examined, it will be seen that the arrangement actually consists of a triode valve feeding into a Class B output, this combination being capable of giving nearly two watts, if 150 volts H.T. is available.

Even with the more usual 100 volts, ample output will be obtained for all normal domestic requirements, and as Class B is very economical as regards H.T. consumption, the idea is worthy of serious consideration.

Although the circuit is equivalent to a two-valve amplifier, i.e., triode and Class

volume, the transformer can be replaced with resistance-capacity coupling, in which case it is only necessary to remove the transformer and insert a 50,000 ohms resistance between the H.T. supply and the anode of the triode, and connect a .01 mfd. condenser between the same anode and the grid of the pentode. Bias must, of course, be applied to the pentode grid, and this is

PROGRAM

"At Your Service, Madam"

THE musical play, "At your Service, Madam," will be revived on August 10th (Regional) and 11th (National) as, when it was previously given in January of this year, it met with a very favourable response. The book and lyrics are by Henrik Ege, and the music by Eric Ansell.

The play has for its setting a Guide Bureau which affords a very extensive service in the way of supplying escorts for visitors to London. The Bureau receives a commission to have a young would-be film star kidnapped, which brings about a complicated situation with amusing results. For the revival Eric Ansell has written a new number entitled "Ginger Hair."

The cast, which will be largely the same as for the previous performance, includes Eddie Bayes, Lyle Evans, Ewart Scott, Norah Howard, Patrick Waddington, Luanne Shaw, Johnnie Schofield, Bernard Ansell, Gwen Day Burroughs, John Dods-

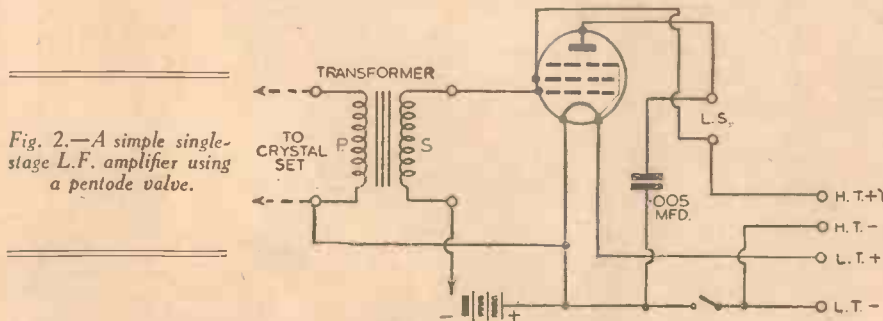


Fig. 2.—A simple single-stage L.F. amplifier using a pentode valve.

steep-slope pentode type will suffice, thus allowing a neat and compact unit to be made. Where, however, it is desired to operate a P.M. moving-coil loudspeaker, it will be necessary to use two or more valves, the types depending on the circuit and the power required.

Single-stage Amplifier

The circuit shown in Fig. 2 is a simple arrangement for a single-stage amplifier

B, only one valve is employed, this being the Hivac DB240, which embodies all the electrodes for the combination in one bulb. By making use of this particular valve, one is able to build a very compact unit, which, apart from crystal work, will always be found useful during experiments.

A Two-valve Amplifier

For those who have a triode and a pentode on hand, a circuit using this com-

EXPERIMENTS WITH DETECTORS

and L.F. Amplifiers is Dealt
by Radio Engineer

done by means of a 1-megohm grid-leak, which is connected to the pentode grid and a suitable tapping on the G.B. battery.

Selectivity

While L.F. amplification can hardly be considered as a means of increasing the

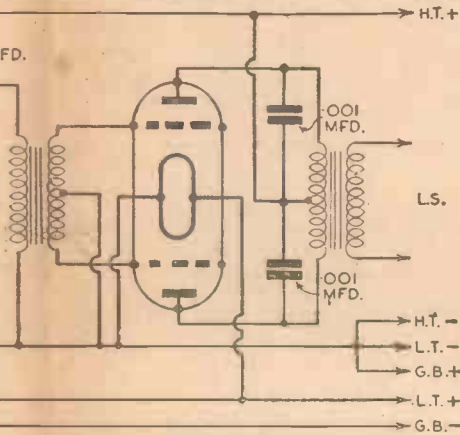


Diagram of the Class B amplifier using the Hivac triode section as a special valve.

effective range of a crystal receiver, it is possible that an apparent increase in efficiency will be obtained, due to the amplification of the weaker signals. This effect may reveal the absence of selectivity and necessitate attention being paid to the tuning circuit, or circuits, to prevent interference from other transmissions, which, when amplified, are sufficient to cause annoyance.

NAME NOTES

worth, Mary Alice Collins and Monte Rey. A section of the B.B.C. Men's Chorus and the augmented Variety Orchestra will be conducted by Charles Shadwell. Production is by Archie Campbell.

Concert Party Cavalcade

CONCERT parties are popular in the North, and in "Cavalcade," a feature to be broadcast on August 12th (Northern and Regional), it is hoped to present recorded cameos of the careers of some Northern concert party personalities, including stars who have now retired and people who, during the last twenty years, and more recently also, have been successful as performers, performers turned managers and proprietors. Northern listeners will hear the whole fifty minutes of this feature, and part of it will also be included in the Regional programme. Many well-known artists and managers will be heard.

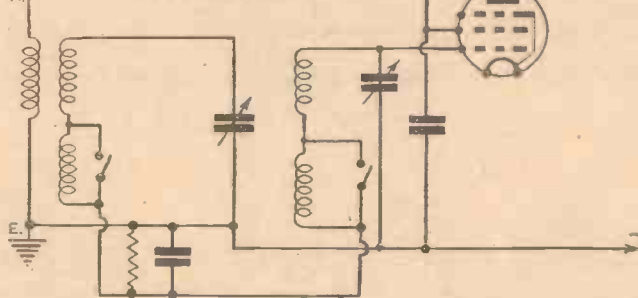
In addition to the tuning systems suggested in the previous article, experiments should be made with modern iron-cored coils, especially those designed for use in front of a Det. L.F. receiver. It will be found that these coils enable sharper tuning to be obtained though, in some cases, a slight loss in input strength might be experienced.

A Band-pass Circuit

For a higher degree of selectivity, two tuned circuits, arranged to form a band-pass system, can be used but, here again, a slight loss in signal strength is likely to be noted. The arrangement is shown in Fig. 5.

This loss is not only experienced with a band-pass circuit, as it is an item which has to be considered with every attempt to improve the selectivity of any tuning

Fig. 5.—Showing the method of connection for using two coils as a bandpass filter circuit.



arrangement. In fact, one can say that the higher the selectivity of a circuit, the greater will be the loss in the signal reaching the H.F. amplifier or detector.

In many cases, it will be found that when conditions call for a very selective circuit, the strength of the transmissions is such that a reduction in signal strength can be tolerated, thus allowing razor-edge tuning to be obtained without affecting the entertainment value of the output.

With a band-pass circuit, two tuned circuits are employed, and as each can be considered as a filter which will only allow an E.M.F. to be set up across it by

a signal having the frequency to which the filter is tuned, it would appear to be obvious that if more filters could be introduced, perfect selectivity would be possible.

In theory, this is so, but in practice one has to consider the question of signal loss.

A Single-valve H.F. Stage

It is not possible to consider two H.F. stages in this article. The arrangement

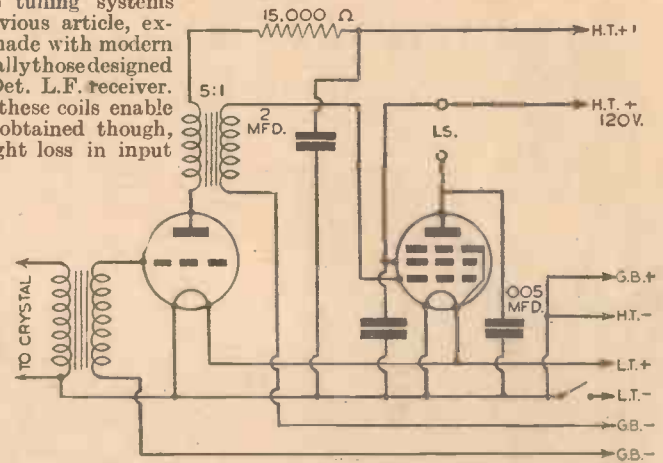


Fig. 4.—A very useful general purpose L.F. amplifier, using a triode and pentode.

shown in Fig. 6, therefore, makes use of a single S.G. or H.F. pentode valve. If one having variable-mu characteristics is selected, provision for varying its bias must be embodied, according to the valve-maker's specification.

The band-pass system is used on the input side of the H.F. amplifier, and a transformer, H.F., provides the coupling between the output of the H.F. stage and the crystal detector. If a suitable H.F. transformer coil is not to hand, tuned-grid coupling can be utilised, experiments

being made with the position of the tapping point from the coupling condenser which has to be employed with that circuit.

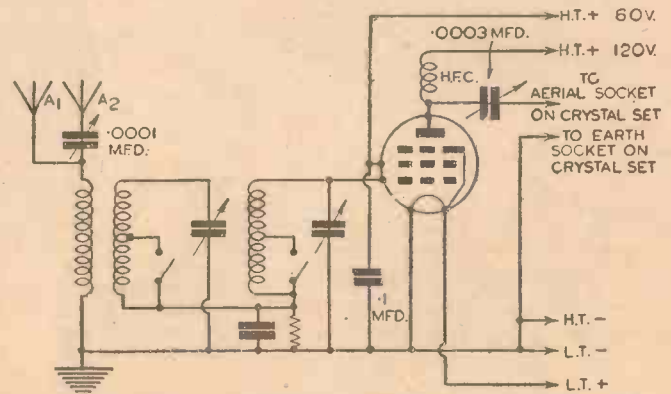


Fig. 6.—An H.F. amplifier, complete with band-pass input circuit, suitable for using in front of a crystal set.

B.B.C.'s NEW DIRECTOR - GENERAL

AS recently announced, Mr. F. W. Ogilvie, President and Vice-Chancellor of the Queen's University, Belfast, has accepted the invitation of the B.B.C. Board of Governors to succeed Sir John Reith, and has been appointed Director-General. He will take up his duties on October 1st.



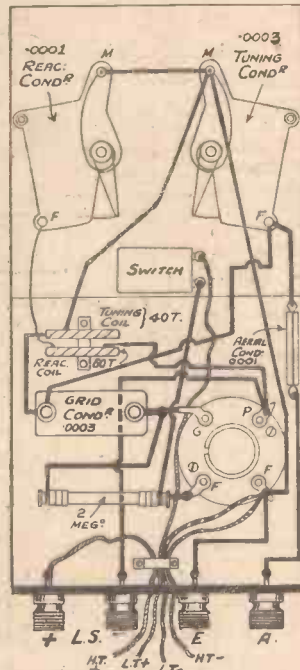
Mr. F. W. Ogilvie, the new Director-General of the B.B.C., photographed in the grounds of the Vice-Chancellor's house at Lennoxvale, Belfast.

Mr. Ogilvie has been President of the Queen's University since 1934; from 1926-1934 he was Professor of Political Economy in the University of Edinburgh; from 1920-1926 he was Fellow and Lecturer at Trinity College, Oxford. He served from 1914-1919 in the 4th Bedfordshire Regiment, and was wounded. He was educated at Clifton College and Balliol College, Oxford.

The British Long-Distance Listeners' Club

Midget Sets

A MEMBER is interested in some freak receivers which he has seen and wishes to know what is the smallest efficient receiver which can be built. He bars the midget type of valve and sets in matchboxes and similar ideas. Actually, of course, a single valve would be needed in the smallest set and the accompanying illustration shows a receiver which we once described of this type. Small solid dielectric



A miniature one-valve receiver using a home-made coil.

type condensers are used for tuning and reaction, and these, together with a simple toggle switch, are included on the panel. The coil is home-made and consists of two small hanks of wire, one for the medium-wave band and one for reaction. No wave-change switching is embodied as long waves are not employed. The H.F. choke is not required, as the 'phones offer sufficient impedance to enable smooth reaction to be obtained. Although primarily intended as a two-station (Regional and National) set, quite a number of distant stations may be heard, although obviously the selectivity is not very good in such a simple arrangement. A set of this type forms a very useful stand-by, and the valve which was employed may still be obtained from Electradix Radios. This was the forerunner of the present midget valves, and a standard valve could easily be included in a set of this type.

Colour Coding

THE fact that all manufacturers are not yet using the recognised colour codes can lead to trouble, as was recently found

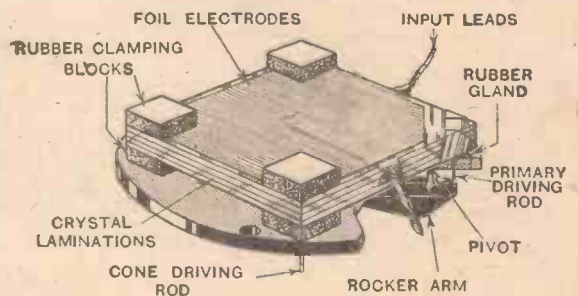
by a member who had obtained a "surplus" mains transformer. The leading-out wires were enclosed in coloured sleeving and these were of the same colours as are employed in modern components. Unfortunately, however, the voltages were not identified by the colours in the correct manner, and in trying out the transformer two or three windings were wrongly connected, with the result that the transformer was burnt out, together with four valves. When selecting items of this nature, therefore, care should be taken to confirm that the standard colour code is employed, and, if not, a key to the code used by the makers should be obtained.

Crystal Components

THERE still seems to be some misconception regarding the pick-ups and speakers known as "crystal" types. These are not built round the types of crystal used in crystal receivers, but are a completely different material. The modern pick-ups, speakers, microphones and 'phones known as crystal types utilise a species of quartz known as piezo-electric crystal, and this is cut in a special manner. The illustration at the foot of this page shows the method in which a tweeter, or high-note speaker, is built up with this material!

Frequency Control

OTHER applications of the piezo-electric crystal are for controlling the frequency of a transmitter or a signal generator for testing purposes. In these directions, it is used to take the place of the more common coil and condenser combination of a tuned circuit and, as it possesses the property of limiting the frequency of a circuit, when selected and cut for such purposes, it forms a constant and consistent control over the output of the apparatus. The crystals are, of course, ground, in the first instance, to the desired dimensions for a given frequency and they are then held in position between two plates under a constant pressure. With transmitters, this reliable control is absolutely essential as the P.M.G. does not allow signals to be radiated by a station whose wavelength might be



A diagram of a piezo-electric crystal speaker movement.

wandering several metres either side of the allotted wavelength. Holders of A.A. licences know that unless crystal control is employed with their transmitters, it is necessary to use elaborate frequency meters for checking purposes.

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NEW SEASON'S MODELS

THE recently introduced McMichael 380 all-wave A.C. superhet has been so well received that the early release of its A.C./D.C. equivalent became imperative, and McMichael Radio, Ltd., have pleasure in announcing the forthcoming release of Model 380 U for A.C./D.C. mains.

The new A.C./D.C. version follows the general lines of the 380 A.C., being identical in appearance and similar in specification; the solidly built walnut cabinet is provided with an inclined panel carrying the controls and triple tuning scales, whilst the 5-valve 8-stage circuit is notable for the excellent volume and quality of reproduction and the exceptionally uniform gain and selectivity over the whole wave-range from 16 metres upwards; the many refinements include extra speaker sockets, "on-off" indicating lamp, tone control, built-in I.F. rejector and whistle filter, and a full-size M.C. speaker with 2 watts input.

CIRCUIT: A five-valve seven-stage all-wave A.C./D.C. superhet with a very high stage-gain and excellent overall efficiency. The valve combination consists of a triode-hexode combined oscillator and first detector, followed by a screened pentode I.F. amplifier, double-diode-triode for detection and first stage of L.F. amplification, with a high-efficiency pentode in the output stage; the fifth valve is a heavy-duty H.T. rectifier.

CONTROLS: Volume, wave-change and tuning plus a tone control.

TUNING: A two-speed tuning knob with ratios of 10-1 and 50-1 simultaneously operates three separate scales showing:

firstly, medium-wave stations; secondly, long-wave stations; and on the third (central) scale, short, medium and long



The new McMichael all-wave A.C./D.C. superhet.

wavelengths; tuning could not possibly be made any simpler.

WAVE-CHANGE: Wide range type

conveniently situated in a recess on the right-hand side of the cabinet.

VISUAL SWITCHING: The position of the wave-change switch and volume control is clearly shown through indicating windows. An illuminated emblem shows when the set is "on."

WAVE-RANGE: 16 to 50, 200 to 550 and 900 to 2,000 metres.

CONSTANT PERFORMANCE: A special high-peaked aerial circuit gives uniform gain and selectivity over the whole wave-range with a built-in I.F. rejector and 9 kc/s whistle-filter to minimise spurious interference. The delayed A.V.C. system is also unusually effective in maintaining steady volume.

SPEAKER: Full-size permanent-magnet coil supplied with 2 watts undistorted output. The generous cabinet space adds to the already fine tonal quality.

EXTRA SPEAKERS: Volume is ample for additional speakers, sockets being fitted for a 2 to 4 ohm type.

MAINS INPUT: A.C./D.C. 200-250 volts, 25-50 cycles; power consumption 60 watts.

CABINET: Solidly built-in piano-finished walnut; dimensions: height 15½ ins., width 14½ ins., depth 9½ ins.

PRICE: 10 guineas.

Visual Conversations

MORE details are now available concerning the German public television telephone which has been extended to Munich, a distance of nearly 400 miles from Berlin, with which it is linked by cable. In spite of the standard of 441 lines, 50 frames interlaced to give 25 pictures which the Germans have chosen for their broadcast television service, they have deemed it advisable to adhere to the old 180-line picture, with sequential scanning at 25 pictures per second, for "visual conversations" between the cities mentioned above. The cost is only 8s. for a three-minute call, while the picture seen by each person is about 15in. wide. If a higher definition was employed then the cable would have to be of a far more elaborate character, and cost correspondingly increased. By using infra-red scanning and a mechanical analyser, however, the resultant picture gives a wrong colour-effect; contrast is somewhat inferior, and those using the service are prone to complain of the flicker when comparing the results with modern television standards. This criticism is hardly fair, however, for it is known that with close-ups of head and shoulders only, picture synthesis can be undertaken at much less than that demanded for ambitious studio scenes, and yet retain all the attributes of a recognisable face. The Post Office authorities responsible for this development considered that this was the principal function of the television telephone, and it must not be forgotten that similar services have been in operation between Berlin and Nuremberg (280 miles), and Berlin and Leipzig (100 miles), for

TELEVISION NEWS AND NOTES

nearly two years now, and a steady income derived from the subscribers content with the results obtained.

As far as the proposed German broadcast television service is concerned, it is as well to bear in mind that the two mountain stations on the summit of the Brocken, and the Feldberg, have been in process of construction for nearly a year now, and the most recent apparatus is being employed similar to that now being installed in Berlin. It has also been made known that special transmitting equipment is being installed by the German Post Office for the purpose of televising theatrical performances, and in one case these pictures will be reproduced in the early autumn in a large open-air theatre in Western Berlin. The promised trial runs in connection with the mountain stations will be awaited with keen interest, for their natural height should bring about a service range with signals of ample strength which should exceed that of any other country. Whether the known vagaries of the ultra-short waves will enable any pictures to be seen in this country is a problem of the future, but in support of the possibility mention has only to be made of the Eiffel Tower station having been seen and heard on the English South Coast, and yet the altitude of the aerial itself is only

approximately one-third of that of the German stations.

An Ingenious Device

AN idea has just been propounded for use in connection with television transmissions which, if it proves successful in practice, should alter very materially the present methods for producing certain scenes. It is really a form of composite television, whereby any type of background can be superimposed on the picture with, if necessary, the actors performing before a blank backcloth. Back-projecting a film on to the screen before which the actors undertake their normal parts has often been tried, and a single camera is employed to give the combined scene. With this new idea, however, any form of stage set, mob scene, or even a miniature battle, can be laid out in one studio with its own television scanner, while in a second studio the principal artists execute their own particular performance before another scanner. This new equipment then merges the performers and the background into one composite picture without any ethereal effects. That is to say, where a principal actor has to fit into the background picture, by means of a blacking-out amplifier scheme, the electrical signals of the background scanner are eliminated entirely at the points where they would coincide with the image signals of the actors. This "electrical hole" must be effected exactly, otherwise the final result would appear somewhat like an unregistered two-tone block, and it is in this connection that no doubt the major difficulties will be encountered.

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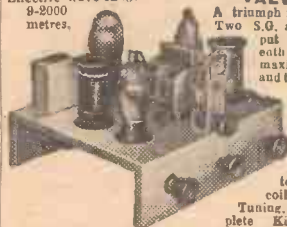
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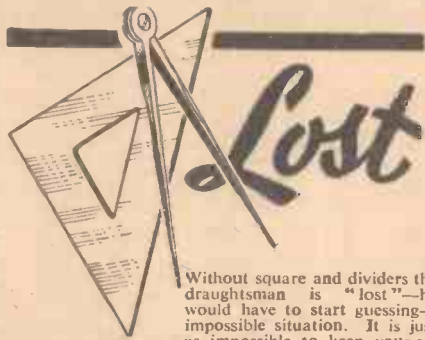
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0-60,000 "	
0-1,200,000 "	
0-3 megohms.	

RADIO CLUBS & SOCIETIES

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

NORTH MANCHESTER RADIO SOCIETY

REGULAR fortnightly meetings of the above society are now being held at 14, Fairfax Road, Prestwich, commencing at 3.30 p.m., the rooms being available for the use of members from 3 p.m. The membership fee is 5s. per year, payable in two half-yearly payments of 2s. 6d., and a small charge of 3d. is made at each meeting. The meetings so far fixed for the remaining part of the year are as follow: August 14th and 28th, September 11th and 25th, October 9th and 23rd, November 6th and 20th, December 4th and 18th. More dates may be added to these when the winter season commences. The society is always open to co-operate with other societies in respect of arranging any experimental tests, etc., or joint visits to places of interest. Arrangements are to be made for members to visit such places as Telephone House, Broadcasting House, airports, etc. Any further details required, and details on how to get to the meeting-room, can be obtained from the secretary, Mr. R. Lawton, 10, Dalton Avenue, Thatch Leach Lane, Whitefield, near Manchester.

CHADWELL HEATH AND DISTRICT AMATEUR RADIO SOCIETY

MEETINGS are now held at the Red Triangle Club, North Street, Romford, and the club is now called the Romford and District Amateur Radio Society. Meetings at 8.30 p.m. Tuesdays. Licensed members total 9 G's, 13 A.A.'s, and S.W.L.'s. 2CWX has applied for a G call, and Mr. D. Holt for an AA call. Inter-G fone QRM spoilt G8PL's QSO with YU2FU. 8PL is now WAC with 10-watts (GW). G3FT, using 9-watts fone, has QSO'd PY, W1 and W8. G8PF had a call from W8 on 7 mc, but the eternal QRM came up and spoiled the call.

Interested readers in Romford and District are always welcomed at the club meetings. Secretary, R. Heardow (G3FT), 3, Geneva Gardens, Chadwell Heath.

RADIO, PHYSICAL AND TELEVISION SOCIETY

ALTHOUGH this society has not held any indoor meetings during the past two months its activities have been by no means dormant. Several committee meetings have been held to discuss next season's programme, and it is hoped that the winter session which is to commence towards the end of September will be better and more interesting than ever. Before the commencement of next session, however, it is hoped to arrange several visits to places of scientific interest. Our recent 2.5 metres field day, held in the Dorking district, was very successful and well attended, and all present declared that they had spent a most interesting and pleasant day. New members will be very welcome. Further particulars may be obtained from the hon. sec. at the society's headquarters at 72A, North End Road, West Kensington, London, W.14.

EASTBOURNE AND DISTRICT RADIO SOCIETY

At the meeting of this society held at the Cavendish Senior School Science Room at 7.30 p.m. on July 11th, a written lecture was given, authorised by E. H. Page, of S. G. Brown, Ltd., on their Type "A" Adjustable Reed Headphones.

A thorough explanation of the theory of this type of instrument was given. By use of a D.P.D.T. switch a pair of these instruments were compared with a cheaper make. The Brown pair proved to be more sensitive, and of a higher-pitched tone with very good quality, though they would overload more easily than the other pair. The instruments were tested on a commercial superhet. Hon. sec.: T. G. R. Dowssett, 48, Grove Road, Eastbourne, Sussex.

EDGWARE SHORT-WAVE SOCIETY

ON June 30th, G6PM described and demonstrated his 25-watt transmitter. Several of his own inventions were examined, particularly his own testing meter. On July 6th, Mr. Gregory (G2AI) continued his lecture on the second stage of his transmitter.

A party of members visited Battersea Power Station on the afternoon of Saturday, July 9th. The Junk Sale, held on July 13th, resulted in money changing hands to the extent of £9.

Future dates being arranged are a visit to Rugby R.S.G.B., Film Night, Question Night and a Competition Night. Sunday morning meetings will not be held again until September. Sec.: F. Bell, 118, Colin Crescent, Colindale, N.W.10.

GRAVESEND AND DISTRICT AMATEUR RADIO SOCIETY

THE above society (G3GP) are holding their second 56 mc/s. Field Day on Sunday, August 14th, at Shorne Mill. Reports from listeners from any distance would be much appreciated, by post or over the air on 1.7 mc/s, as a receiver on this band will be standing by continuously.

All reports received will be acknowledged. Further information can be obtained from the hon. sec., E. C. Thwaites, "Tanfield," Cross Lane W., Gravesend.

(Continued on page 516)

Practical Television

August 6th, 1938. Vol. 3. No. 112.

AVOIDING FREQUENCY DRIFT

An Interesting Suggestion for Avoiding a Very Common Fault in Combined Receivers

THE modern television receivers are, in the majority, designed round the superhet circuit. In the existing B.B.C. television transmissions the vision signals are transmitted with a carrier frequency of 45 megacycles and the accompanying sound signals have a carrier frequency of 41.5 megacycles. As ordinary receivers for broadcast reception are very common, a distinct economy can be obtained in the design of a television

local oscillator, then the intermediate-frequency produced in the frequency changer will alter and the transmission will become inaudible.

The Aerial Input Circuit

Secondly, there is the use of the aerial input circuit of a normal radio receiver for the introduction of the television sound or other ultra-high frequency sound signal. If the normal broadcast receiver is used as an intermediate-frequency amplifier, second detector and output following a frequency-changer operating on the ultra-high frequencies, then, owing to the great selectivity of the broadcast receiver, local oscillator frequency "drift" will cause the sound signals to disappear.

This difficulty may be overcome by using an ultra-high-frequency superheterodyne converter adapted to be used in conjunction with a normal broadcast receiver, in which use is made of an intermediate-frequency channel which has a wide pass band in relation to the modulation frequencies to be transmitted by it in order that changes in the intermediate frequency produced by variations in the local oscillator frequency will not be detrimental to the

reception of the ultra-high-frequency transmissions.

As applied to the case in which the converter is used to feed low-frequency signals into the pick-up input circuit of the broadcast receiver, the intermediate-frequency channel of the converter is constructed

with an ultra-high frequency converter, the latter is designed with an intermediate frequency channel employing a wide pass band and the output from the second detector of the converter is used to modulate an oscillator, the output of which is fed into the broadcast receiver radio circuits. As the oscillator will be operating with a comparatively low radio frequency no trouble should be experienced from oscillator "drift."

How It Functions

In order to follow the scheme more clearly let us examine the accompanying illustrations, in which Figs. 1 and 2 illustrate particular embodiments of the idea.

Fig. 1 is a block diagram indicating the layout of circuits according to one arrangement. A dipole aerial 1 is shown connected by means of feeders 2 to the input circuit 3 of an ultra-high-frequency superheterodyne converter combined with a television reproducer. This input circuit may comprise one or more stages of radio-frequency amplification or it may be the input circuit of the frequency changer stage 4. The frequency changer 4 is supplied with oscillations from the local oscillator 5, which may be separate from or combined with the valve of the frequency changer. The intermediate frequency signals produced in the frequency changer are passed through the intermediate frequency channel 6, which according to the suggested scheme is constructed with a wide pass band, e.g., of the order of 100 kilocycles per second. This channel may or may not contain amplifying valves. The intermediate-frequency channel 6 feeds into a second detector 7, which may be of any convenient type of valve or metal rectifier. If desired, automatic-volume control potentials can be developed in the detector stage, or by means of a separate rectifier, to control the amplification of the previous stages. The output from the detector 7 can be passed either directly to the pickup terminals of the broadcast receiver 9, working in conjunction with the loudspeaker 10, or the detector output may be further amplified by an L.F. amplifier 8 before feeding into the pickup terminals of the broadcast receiver. Of course, 9 need not be a broadcast receiver, but can be an L.F. amplifier used for other purposes, such as for the reproduction of gramophone records. It is important to note that all the stages including and prior to 8 are contained in the ultra-high-frequency converter. If the latter is included in a television receiver, then the circuits for the reception of the vision signals may be separate from or combined with portions of the sound signal circuit. In the latter case, for example, the radio-frequency channel 3 may be common to the vision and sound signals, and similarly a common local oscillator 5 may be used to produce the intermediate frequencies, if I.F. amplification is used for the vision signal. The intermediate-frequency channel 6 can also be common to the vision and sound intermediate frequencies, or to the sound I.F. and demodulated vision signals if the vision signals have been detected prior to application to channel 6. As shown in the figure, the vision I.F. channel is common with that of the sound I.F. channel, and the vision reproducer V.R. is fed from stage 6. V.R. may comprise further vision I.F. stages, followed by a detector feeding a picture reproducer as, for example, a cathode-ray tube, possibly after some video-frequency amplification.

(Continued on next page)

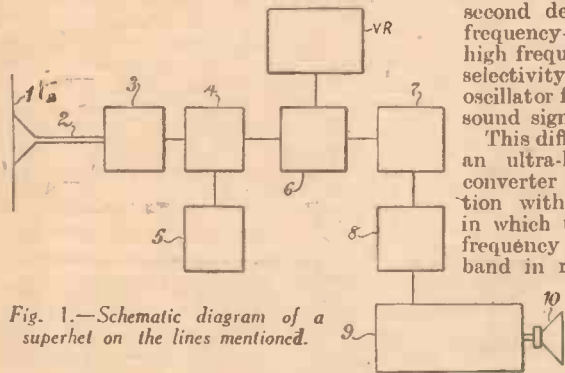


Fig. 1.—Schematic diagram of a superhet on the lines mentioned.

receiver if use is made of the broadcast receiver for the reproduction of the television sound transmissions. These remarks also apply to the reception of sound transmissions unaccompanied by vision signals on the ultra-high frequencies.

There are two convenient input circuits in a normal broadcast receiver which readily lend themselves to such use, viz., the gramophone pick-up input circuit and the aerial input circuit.

Dealing first with the use of the pick-up input circuit of a normal broadcast receiver, it is obvious that a television receiver using a simple valve detector (with, possibly, radio-frequency amplifying stages) operating on the carrier frequency could be used. While such a detector has many points in its favour, it suffers from the disadvantages that, unless it is pre-tuned, the tuning will be rather critical and also, as reaction will probably be used on the detector, it will be difficult to operate by the unskilled user. An alternative method is to use a superheterodyne circuit in the television receiver for the reception of sound transmissions, such a circuit comprising a frequency-changer stage (possibly preceded by radio-frequency stages) followed by one or more intermediate-frequency stages and a detector, the output of which feeds into the pick-up input circuit of the broadcast receiver. A circuit of this type with a normal selective intermediate stage has the disadvantage that unless special precautions are taken at the transmitter to keep the frequency of the carrier perfectly constant, and at the receiver to prevent any fluctuations in the frequency of the

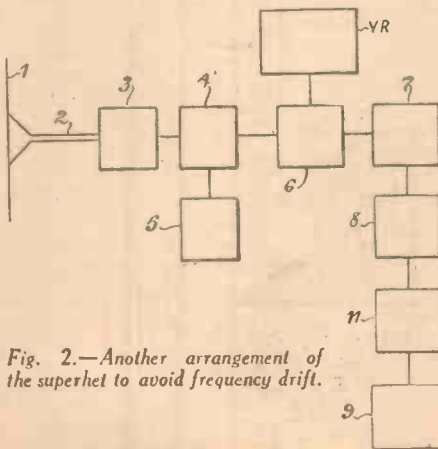


Fig. 2.—Another arrangement of the superhet to avoid frequency drift.

with a wide pass band, as, for example, of the order of 100 kilocycles per second, in order that any normal "drift" of the intermediate frequency produced in the frequency changer will not cause the sound signals to disappear.

In the case where the radio portion of the broadcast receiver is used in conjunction

PRACTICAL TELEVISION

(Continued from previous page)

The main feature is that the intermediate-frequency channel 6 for the sound signals has a wide pass-band. Such a band-width may be obtained by the use of bandpass filters, by damped tuned circuits, or by any other well-known means. It will be seen that should the intermediate-frequency alter for any reason, then the sound signal will still be audible as long as the intermediate frequency is within the pass-band of the I.F. channel.

An Alternative

In Fig. 2 is illustrated a modification of Fig. 1, the reference numerals for similar stages being the same in both drawings. In this arrangement there is added an oscillator stage 11, which is modulated by the signals detected by the second detector 7,

possibly after low-frequency amplification in stage 8. The output from the oscillator 11 is passed to the aerial input terminals of the broadcast receiver 9, the oscillator frequency being adjusted to be within the tuning range of the receiver. Alternatively, the oscillations may be fed into the intermediate-frequency stage of the broadcast receiver (assuming the latter is of the superheterodyne type), in which case the frequency of the oscillator 8 should be the same as the intermediate frequency of the broadcast receiver. In any case the oscillations from 11 have to be fed into the broadcast receiver prior to the input circuit of the latter's detector stage.

Various modifications are possible with this arrangement as outlined in the case of Fig. 1. As the oscillator 11 is working on a comparatively low radio frequency there should be no trouble from frequency "drift" and, therefore, the selective circuits of the broadcast receiver will not cause

the sound signal to disappear if the intermediate frequency produced in the channel 6 should "wander."

Methods of producing the oscillations in stage 11 and modulating them are many and varied and need not be described in detail. It is sufficient to say that any normal oscillatory circuit arrangement can be used and can include one or more valves. Similarly the detector stage 8 and oscillator 11 may be combined in one valve. Various types of modulation of the oscillator are possible as, for example, grid or anode modulation and systems whereby feed-back is used in order to increase the percentage of modulation. As it is important that the modulation percentage should be fairly constant with changing signal input levels, it may be necessary to incorporate a manual volume control in the ultra-high-frequency converter, or, better, an automatic volume-control system operating as mentioned in reference to Fig. 1.

In America

IT is understood that many Americans are pinning their faith in next year's New York World Fair as a suitable period for making a strong bid to start a television service in the United States. According to Dr. Young, who is to be Director of Radio at the Fair, and who is at present on a visit to this country, not only will 441-line pictures be shown on domestic receivers, but big-screen television is contemplated so that large audiences can be catered for. Added to this, it is revealed that an effort will be made to show colour television for the first time in that country. The exact method to be used is not yet known, but one scheme which has been suggested is to have two or more projection tubes with identical characteristics and exactly similar incandescent screens. On each of these tubes the same received picture will be reproduced simultaneously. Through the medium of different coloured light filters these pictures will then be projected on to a remote screen in such a way that they can be superimposed and focused accurately in the same plane. This will give the effect, as far as every observer's eye is concerned, of a brightly coloured picture with all its natural beauty. A scheme of this character certainly appears to have all the attributes of a satisfactory foundation, and the practical results emerging from its development will be watched with marked interest, especially as they suggest the use of incandescent screens instead of fluorescent ones for the C.R. tubes.

Television Contracts

THE Cinematograph Exhibitors' Association, while in no way opposed to television in cinemas, are anxious that their members should not fix up definite contracts for installation until the terms have been considered carefully by the General Council. At the moment they regard television as an interesting adjunct to their normal film programme and feel that if the whole position is regularised it will be beneficial to manufacturer and purchaser alike. This is quite a reasonable spirit in which to approach the new development, and there is no doubt that whereas in the early days the cinema industry regarded television as an unmitigated menace, it has now come to regard it as a possible means of increasing the magnitude of their audiences. A leading United States exhibitor on a visit to Europe, which has embraced France, Italy, Germany and England, quite definitely refers to the enormous interest shown by American exhibitors in television generally. He stated that it was the one

such items as a symphony concert or a talk.

Another Television Development

ALTHOUGH of late little has been heard of developments undertaken at the Farnsworth Television Laboratories, from information which has just come to hand it would appear that they have by no means been inactive. A new form of camera device is now being experimented with. This consists of an extremely fine-mesh image grid having over 150,000 perforations to the square inch made in the metal from which it is constructed. On one side of this is deposited first an insulating substance, and then innumerable

TELEVISIONS

topic of conversation on the other side of the Atlantic, but he admitted that it was far ahead in England, and it was hoped to take advantage of the experience gained here, when a start is really made in America.

Taking a Long View

THE B.B.C.'s director of television is renowned for taking a long view of the service for whose development he is responsible. Looking well ahead, he has



Miss Jasmine Bligh, television's charming announcer, in the television studio. One of the television cameras can be seen on the left.

suggested a scheme whereby sound and vision can be co-ordinated in a very thorough manner. He visualises two national programmes, one being for broadcast sound only, and the other for television, the programmes for which would be provided by regional transmitters. The regional transmitters would provide signals for their own area as well as serving the National transmitter, but the items would be selected with extreme care to provide well-balanced fare. In some cases partial illustration would be resorted to, say, in

photo-electric elements which form a complete mosaic, so that each element is insulated from its neighbours. In front of the other side is mounted an open-mesh fine wire anode. When this camera is in operation the scene focused optically on to the image grid causes an emission of electrons which in turn set up electrostatic charges on the meshed anode. This anode is then scanned by an electron beam from an associated cathode-ray tube, the resultant image signal being of high magnitude because of its supplementary secondary emission.

TERMS IN TABLOID

Inductance

INDUCTANCE plays a very important part in the design and operation of both radio receivers and transmitters. It is present in many forms. Tuning coils, H.F. and L.F. chokes, H.F., L.F. and mains transformers all depend on inductance for their operation.

To define inductance it is best to think of it as that which tends to oppose the flow of alternating current or, in a more general sense, that which resists the value and change of direction of flow of a current.

If a conductor is wound in the form of a coil and a current passed through it, it will be found that an electro-magnetic field is set up around the conductor. This fact can be proved by holding the conductor under a sheet of paper on which iron filings have been sprinkled.

The strength and direction of the field will depend on the strength of the current. The field will gradually build up to maximum as the current is switched on and then fade away when the circuit is broken.

Self-induction

It is also possible to prove that if an electro-magnetic field cuts a conductor a current will be set up in the conductor, the direction of flow depending on the direction of the field, but it will always be opposite to that of the original current.

If, then, an alternating current (A.C.) is applied to a coil, the field will be continuously building up and fading away as the current varies in value and changes its

direction. Remembering *self-induction*, it will be appreciated that this variation in the field will set up in the coil an electro-motive force which will tend to oppose the flow of the A.C. The more turns that are used in the coil construction, the greater will be the inductance and, likewise, the greater will be the opposition.

The frequency of the alternating current will also affect the inductance; therefore with certain components which carry currents of relatively low frequency, such as L.F. and mains transformers and L.F. chokes, it becomes necessary to insert a metal core inside the coil(s) to increase the inductive value.

The unit of inductance is the henry. This value exists when a current rate of change of 1 ampere per second produces an e.m.f. of 1 volt. This unit, except in the case of L.F. chokes, is too large for general work, therefore it is more usual to use the microhenry, which is one-millionth of a henry.

Transformers

By virtue of self-induction, it is possible to arrange two coils so that energy can be transferred from one to the other. If one is connected to a source of alternating current a field will be created around it, and if the other coil is placed within the effective range of that field a current will be induced in it having the same frequency as the first. It is usual to call the coil connected to the energising source the primary and the other the secondary.

It is this arrangement of coils which provides the transformers used for H.F., L.F. and mains work, and it should be noted that a step-up or step-down can be obtained by varying the ratio of the primary winding to that of the secondary. With certain forms of transformers it is often desirable to be able to control the amount of energy transferred from one circuit to another without affecting the actual ratio. In such instances the coupling between the two coils is made so that it can be varied, thus allowing a very even and smooth control to be obtained.

Generally speaking, it is very essential to see that all windings designed for inductance purposes have a low self-capacity, otherwise the effect of the inductance will be lost. This applies in particular to all components used on the high-frequency side of a receiver or transmitter.

If an H.F. choke is examined it will be found that it either wound in the form of a solenoid, as in the case of certain S.W. chokes, or that the winding is split into sections. This method of winding tends to reduce the self-capacity between the two ends, thus preventing any high-frequency currents from by-passing the winding, by taking the path offered by the capacity which would be present in a single pile wound coil. For the same reason, a similar method is often employed with coils and transformers, especially if one is concerned with frequency characteristics.

When considering inductances having iron cores, as in the case of L.F. chokes, transformers, it must always be appreciated that the presence of direct current will tend to reduce the total inductance of the component.

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REVIVAL OF 1914 SCRAPBOOK

ON the night of August 4th the B.B.C. will revive "Scrapbook for 1914," a programme that will include a vivid, impressive picture of the events which, twenty-four years ago, almost to the hour, preceded the declaration of war. When it was first broadcast four years ago the reconstructed scenes during the last hours of peace created a profound impression among listeners.

Only slight revisions have been made to the script for the revival, which will be presented by Leslie Baily and Charles Brewer. The broadcast will be "live"; the only recordings to be used will be of celebrities, such as Melba and Field Marshal Lord Roberts, who have passed away. For the rest, all those who, by their re-told memories of 1914, made the original programme so memorable, will be in the studio again.

Drama and Humour

Like all the programmes of the "Scrapbook" series—and there have been nearly twenty of them up to now—it is a sound-panorama of the whole year, echoing the tunes, recalling the events and re-building the drama, the humour, the passions and peculiarities of the time. But far more than most, its drama has a retrospective force that has only increased with the passing of two decades.

While the attention of the man in the street was distracted by suffragette "atrocities," the new ragtime craze, a sensational spy trial, and things like that, the threat of war crept nearer. And as the pages of the "Scrapbook" are turned, the almost macabre medley of emotions of those days will be crystallised by the Countess of Oxford and Asquith, who looked upon the British scene at the outbreak of war as wife of the Prime Minister of the day. She will tell how she watched the poignant and tense situation at 10, Downing Street, when Mr. Asquith waited in vain for a reply to the British ultimatum to Germany and how, as the minutes dragged into hours, she and her husband "sat

without speaking and listened to the distant sound of thousands and thousands of people singing and cheering outside the railings of Buckingham Palace."

Jubilation

Listeners will hear again something of that unthinking jubilation which sobered as it became depressingly clear that the War would certainly not be "over by Christmas."

By contrast, Gwendoline Brogden will sing again the recruiting song that she made famous in the Palace revue, *The Passing Show of 1914*, while Admiral Sir William Goodenough will re-tell the story of the visit—as guests of the Kaiser—of two British naval squadrons to Kiel Yachting Week in June that year. At the height of the festivities, the last friendly meeting of German and British naval men, news came of the murder of the Archduke Ferdinand of Austria at Serajevo. Sir William was at that time Captain of H.M.S. *Southampton*.

Then, in July, while pierrots at seaside concert parties were teaching the country to sing "Get Out and Get Under," civil war threatened in Ireland; a threat to be dwarfed into insignificance and quickly forgotten when, at the end of the month, Belgrade was bombarded by Austrian guns and the Russians began to mobilise.

On the Home Front

Harry Tate, who was doing his best to maintain the morale of the Home front in the autumn of 1914, will revive his sketch, *Fortifying the Home*, from a revue, *Business as Usual*. On the Flanders front, a few weeks later, they were beginning to talk about that strange episode, the Christmas truce. And as Charles Brewer himself took part in it, the event will be reconstructed with accuracy. Roland Herbert will also talk about ambulance work at Dunkirk.

During the programme listeners will also hear the B.B.C. Male Chorus and Augmented Variety Orchestra, conducted by Louis Levy.

figures of the entertainment world should certainly listen on August 10th to the story of this almost legendary figure of the amusement industry.

BARNUM THE SHOWMAN

BARNUM, the great American showman, is to be the subject of a radio feature in the Regional programme on August 10th. The author, Herbert Kendrick, has assembled a mass of vivid detail and amusing stories surrounding this great circus producer. The interest taken in the arrival of Barnum and Bailey's show in the provinces in England will be within the memory of middle-aged listeners. There must be many who flocked to see the "Wild Man of Borneo" and various similar side shows. One of Barnum's great publicity scoops was the introduction to Queen Victoria of his "General Tom Thumb," the midget decked out in the uniform of a Yankee general. Barnum was responsible for the boost that made Jenny Lind almost as great a figure in this country as Lily Langtry. Another big scoop, which caused a popular outcry in England, was his transporting of Jumbo, the London Zoo's favourite elephant, to the United States. Listeners who like broadcasts based on the biographies of the great

RADIO CLUBS AND SOCIETIES

(Continued from page 512.)

SLOUGH AND DISTRICT SHORT-WAVE CLUB

AT the meeting held on July 19th, it was decided that owing to the small attendance, the meetings should in future be held at members' houses. Several members very kindly volunteered to find a room for the meetings, and members will be informed by post of the addresses.

A 56 mc/s receiver, with its associated arial equipment, owned by 2FAU, was next demonstrated, signals being received from the harmonic of a local oscillator, and from another amateur station.

Mr. R. Sly then gave his postponed lecture on "The Superheterodyne Receiver," with the aid of blackboard diagrams.

The next meeting will be held at the QRA of 2DAJ, 20, Chalvey Rd. East, Slough, when a lecture on "The Small Receiver" will be given.—Sec., J. H. White, 20, Chalvey Rd. East, Slough, Bucks.

THE EAST SURREY SHORT-WAVE CLUB

THE frequency measurement lecture and demonstration which was given by Mr. Thompson (G5YK) on Thursday, July 21st, proved of great interest to those present. Will members please note that there will be no meetings during August, the next one being on September 8th.



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. G. H. (Swansea). The best method is to connect a low-resistance potentiometer or variable resistance across the speech coil winding.

G. E. P. (Newark). We regret that we are unable to trace the makers of the receiver in question.

F. B. (Belfast). The makers would be best able to solve your problem and their instructions should be followed. The side connection is the suppressor grid.

T. H. W. (Gheshunt). We would remind you that queries are limited to two per reader. The arrangement is in order and the values will depend upon the valves and H.T. available. They may be calculated from Ohm's Law. You can use the variable- μ valve as indicated. The output transformer would be suitable. Any reaction condenser may be used. The tuning indicator should be on the "earth" side of the anode load.

H. W. S. (Watford). Either .0002 or .0003 mfd. may be used in each case.

M. A. K. (Co. Leitrim). Our A.C./D.C. Two may be suitable, but we cannot state definitely in the absence of details of your particular local conditions. You would perhaps find that two valves are not sufficient.

H. G. S. (Highheadon). The connections were given in the issue you refer to. If these did not apply to your coil it is of a different type number and no connections can be given until the type number is known.

A. C. S. (Bromley). The leads should not be too long so that the resistance is comparable with the speech coil winding.

J. C. G. (Surbiton). We have not reviewed the set in question.

T. C. (Gateshead). We regret that we have not blue-prints of the apparatus in question.

R. W. H. (N.W.3). The aerials should be well separated, and although the wall idea is in order for the ordinary aerials, for the television aerial we would not advise it. In the former cases, also, impedance-matching transformers and a shielded lead-in would be preferable.

H. N. (W.3). We regret that we have no details of a set of the type mentioned. You would need more than two valves for a successful set of the type you refer to.

T. G. B. (South Harting). Our 12-watt amplifier is the most suitable. We cannot send C.O.D.

F. B. (York). It would be preferable to endeavour to get the set working properly rather than to add converters, etc. The type of set mentioned should give very good results when working properly.

A. B. (Dorking). The agent is E. Forbat, 28, Southampton Street, Strand, W.C.2.

A. P. (Erdington). The coils and frame would need stripping down slightly.

C. A. (Chingford). We cannot trace that an instrument of the type you require is on the market, but Electradix Radios may be able to supply parts and equipment for the purpose.

J. L. (Woodford). At your address the best plan would be to fit a wave-trap. This could easily be constructed and would give you the desired results.

R. N. H. (East Acton). Unfortunately the coils for the set you mention are no longer obtainable. In any case, we only recommend our receivers when they are built from parts which we specify and we have not tried your mains section and valves in this particular combination.

G. H. W. S. (Watford). Either .0003 or .0002 mfd. could be used—the maximum capacity not being critical.

J. I. (Penryn). The Centaur Three should meet your requirements.

D. S. (Huddersfield). You could not convert the set as you outline. What could be done is to fit a 1/1 transformer at the 'phone terminals and connect this to the pick-up terminals, but beyond this the best plan is to obtain a S.W. Converter to include in front of your second receiver.

R. F. (Leeds, 6.) The choke may be obtained from Messrs. Bulgin.

W. R. C. (Kew Gardens). The article was included in the issue dated June 5th, 1937, which is still available.

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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).

My Ideal One-valver

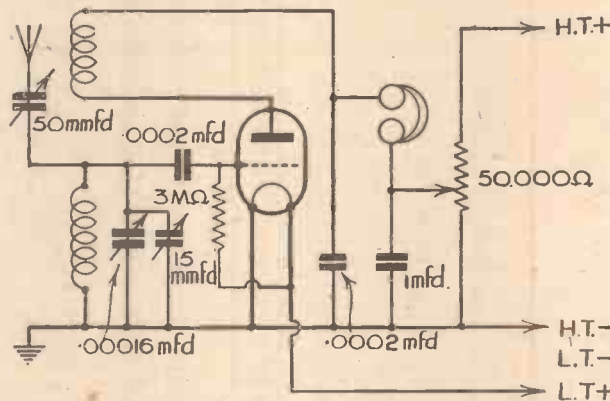
SIR,—With reference to your request for circuits which readers consider their ideal, I submit my simple one-valve circuit. I do not claim to have designed it, but I think it works very well. As can be seen it has potentiometer-controlled reaction which I consider is better than condenser control, because it does not interfere with the wavelength. The valve used is a Hivac D210 S.W. Thanking you for the many happy hours you have provided with the excellent articles published in PRACTICAL AND AMATEUR WIRELESS.—ROBERT L. KENYON (Dukinfield).

A Short-wave Four-valve Circuit

SIR,—Having read various articles on "Ideal Circuits," I enclose my favourite short-wave circuit. QSL cards verify 40-metre, 30-metre, and 19-metre reception, the latter being W2XAF, Schenectady, U.S.A. I receive regularly Moscow, Italy, France, Germany, Spain, Czechoslovakia, and America, also 80-metre band amateurs and 20-metre American amateurs. My coils are made with cardboard tubes on old valve bases, the H.F. winding being attached to a twin plug-in coil base which fits in an old holder. The H.F. chokes are home-made—100 turns on a lin. cardboard tube. The circuit which was designed to overcome short-wave reception troubles, embodies the following features:

Tuned H.F. coil winding (.0001 mfd. v. condenser to match .0001 mfd. band-spread), for selectivity; .0001 preset condenser (air spaced to prevent blind spots), also acts as volume control, a slight adjustment often making a station much louder. The 1 meg. grid leak across the first transformer secondary overcomes threshold howl, and decoupling condensers eliminate motor boating and hum from H.T. eliminator. A .25 meg. potentiometer is provided to feed first transformer and gives correct H.T. for detector valve, and smooth reac-

tion. There is also a .0001 mfd. by-pass condenser on detector valve. The 5-meg. grid leak from grid of detector to earth stops hand capacity. Resistances of 25,000 ohms and 100,000 ohms to the L.F. valves cut out distortion, and a 5,000-ohm resistance is provided in place of an



Circuit diagram of Mr. R. L. Kenyon's single-valve short-wave receiver.

H.F. choke, to eliminate interaction.—E. GOODEY (Faversham).

Suggested S.W. Club

SIR,—I have been a reader of your periodical for some years, and I have always found it most interesting and instructive, but I should like to see more articles on constructive matters published.

The articles on transmitting leave nothing to be desired, and are a great help to the prospective "G man"—radio, of course, and not crime!

I wish to start a Short-wave Club in this district, and I shall be glad if any readers in the locality who are interested in short-wave radio would communicate with me at the address given below.—R. E. FROST ("Kingston," Wivelsfield Road, Hayward's Heath, Sussex).

Amateur Transmitting

SIR,—Having progressed during the last seven years with my radio activities from a crystal receiver to the transmitting stage, thanks to the valuable help rendered by your splendid periodical, I am sorry to note the absence of letters from other transmitters.

At the time of writing I only hold an A.A. licence, but I hope in the not too distant future to become the proud owner of a "full" licence.

It would seem that so many enthusiasts do not realise the full value of an A.A. licence, otherwise I am sure that far greater interest would be shown in the matter. I am fortunate in having three other A.A. enthusiasts within easy reach of my station; therefore we are able to get together and spend many instructive and interesting hours carrying out experiments and swapping information. One point we all agree on, and that is, if all other A.A. or, of course, "full" licence-holders would make use of your letter page from time to time, a good deal of valuable information could be passed around, and an even greater interest built up by the co-operation of all concerned.

I would like to add my appreciation of the articles you have published on Transmitting; they have enabled me, as so many other articles in your pages have done, to get a more thorough understanding of the numerous items one comes up against when endeavouring to solve some of the problems associated with wireless. Thanking you.—A. A. (Greenwich, S.E.).

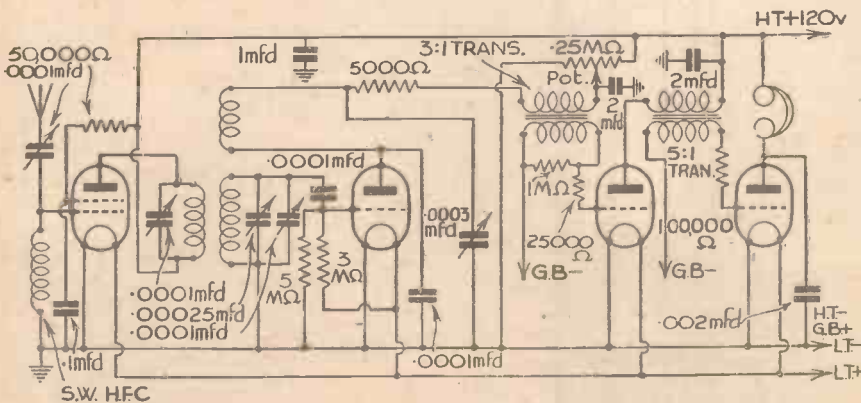
CUT THIS OUT EACH WEEK

Do you know

- THAT the H.F. and frequency-changing stages of a short-wave superhet are often stabilised by connecting the heater or filament to earth through a fixed condenser.
- THAT the substitution of a metallised valve for an ordinary one may result in losses due to the proximity of the metallic coating to some inductive component.
- THAT similarly, the introduction of screening round coils and similar items may result in losses.
- THAT the H.T. and L.T. batteries should always be kept in a cool place—clear of fires and radiators.
- THAT the grid-bias battery, although not delivering current, can dry up rapidly if kept near valves developing much heat.
- THAT for the above reason the G.B. battery should be tested periodically.

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

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent. Copyright in all drawings, photographs and articles published in PRACTICAL AND AMATEUR WIRELESS is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden.



Theoretical circuit diagram of a four-valve battery receiver described in Mr. E. Goodey's letter.



QUERIES and ENQUIRIES

Aerial Wire

"I wish to improve my aerial system and think that by replacing my single wire by a double arrangement with stranded cable I should get an improvement. The length available is not more than 30ft. from one end of the garden to the other and the room is 15ft. below. What type of aerial should I erect for my all-wave receiver in these circumstances?"—R. F. A. (N.3).

In view of your locality you would get the London stations quite well on the smallest aerial and if a very efficient arrangement was installed you might experience difficulty in restricting the locals to a narrow band unless a well designed and selective circuit was employed. As the receiver is for short waves also, a short aerial would be desirable, and as there is approximately 30ft. available, plus a 15ft. lead in, we suggest a single wire aerial, utilising good stranded cable. 7/22, preferably enamelled, should be quite suitable and a single unbroken length should be used from the far end right to the aerial terminal of the receiver. At least three insulators of the small type, or two of the special ribbed insulators should be included at each end.

Remote Control

"I have fitted an extension listening point in one room and this has proved so extremely satisfactory that I should like to have one in each room, but would prefer that each point should be arranged as a control point. That is, so that I could switch any point on from the receiver or switch the receiver on and off from the distance point. Is it practicable to carry out such a scheme, and if so, what is the simplest and most practicable arrangement which I could adopt?"—K. L. (Bangor).

HOME-MADE apparatus could be adopted in such a scheme, but if you require a neat assembly which could be erected with the minimum of trouble we suggest you consider the Bulgin remote-control apparatus. This is available as a complete assembly with control pushes, wall sockets and relay. Special multicable may also be obtained with which the various points may be linked up. It may be used with battery or mains receivers and should prove ideal for your requirements.

Decoupling Circuits

"I have built a simple four-valve battery set, H.F., Det. and two L.F. stages. I find a whistle on all stations and motor-boating when I use my mains unit. I understand that this may be cured by decoupling, but I am uncertain where such decoupling should be fitted in a circuit of the type mentioned. Could you help me by suggesting the best way of fitting this arrangement?"—O. S. P. (Liverpool).

IF the whistle is caused by L.F. instability it may be cured merely by reversing the secondary connections to one of the L.F. transformers. On the other hand, if

you fitted a decoupling resistance and condenser in the detector H.T. feed you might find that all forms of instability are cured. If this alone is not sufficient you should decouple also the H.F. stage, and beyond this we think that further decoupling would be unnecessary. The instability may, of course, be due to wrong component values or a bad layout.

Short-wave Coil Data

"I wish to wind a short-wave coil to tune from approximately 14 to 20 metres with a standard .0001 mfd. tuning condenser. Could you give me the best size of former, wire, and the number of turns for this particular coil?"—J. E. (Barking).

RULES

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

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

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

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

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

FOR a closed circuit with a .0001 mfd. tuning condenser a former $\frac{1}{2}$ in. in diameter should be used with 22-gauge wire wound to 18 turns per inch spacing. Nine turns, which would thus occupy a space of $\frac{1}{2}$ in. would tune approximately from 12 to 21.5 metres, and this should meet your requirements. If an aerial is to be coupled to the coil a separate coupling winding of three or four turns should be used, and two or three more turns would then be needed on the grid coil.

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Energising a Speaker Field

"I have a speaker with field winding, but as the set is already built I cannot include the field winding in the receiver. I believe, however, that it is possible to energise this from a separate source and I should be glad if you would tell me the best way of doing this."—D. L. E. (Eastleigh).

YOU give no details of the field and it is thus not possible to give exact details for the purpose you outline. Speaker fields are available with various resistances and suitable for energising with from 6 up to 200 volts. In all cases, however, a metal rectifier or mains unit with valve rectifier may be used for the purpose, and for the low voltages the special 6 or 8-volt rectifiers may be used, whilst for the high voltages types H.T.15, 16 or 17 may be used. Further details will be supplied upon receipt of details concerning the field winding.

Transformer Materials

"I am going to make up my own mains transformer taking data from your book on the subject. I cannot find any local man who sells Stalloy stampings or any other materials needed for this purpose and should be glad if you could give me the makers' names or any place from which all of the parts could be obtained."—H. E. (Plymouth).

STALLOY Stampings are supplied by J. Sankey & Sons, Ltd., of Bilston, Staffs. Paxolin strip or sheet may be obtained from Messrs. Peto-Scott, who can also supply the wire and stampings.

Multi-contact Switches

"I am making up an experimental unit in which I am desirous of carrying out multi switching on rather unusual lines. I have tried making up a switch unit, but not very successfully, although it seems to show that my idea would be workable. I wonder if there is any form of multi-contact switch on the market in which the contacts could be varied so that I could obtain my desired switching arrangement. It would have to be three-position and at least ten separate contacts."—J. R. T. (Hendon).

WE think the most suitable device would be the Magnum multi switch made by Burne-Jones Co., Ltd., of 309-317, Borough High Street, London, S.E.1.

Modulation Hum

"I have built a superhet with triode-hexode in the first stage and all mains operation. On the very short waves I get bad hum which seems to come in with the station, and I enclose my circuit and layout from which you may perhaps find my trouble. I have the suppressors across the mains section as usual."—J. O. (W.6).

THE trouble may arise in the frequency-changing stage and depends upon your connections. The cathode and heaters should not be earthed through the same lead as in your arrangement. Take one heater direct to earth and the other heater through a fixed condenser to earth. The cathode should be earthed direct through its biasing components. You should remember that the impedance of even a few inches of wire may be considerable at the very high frequencies.

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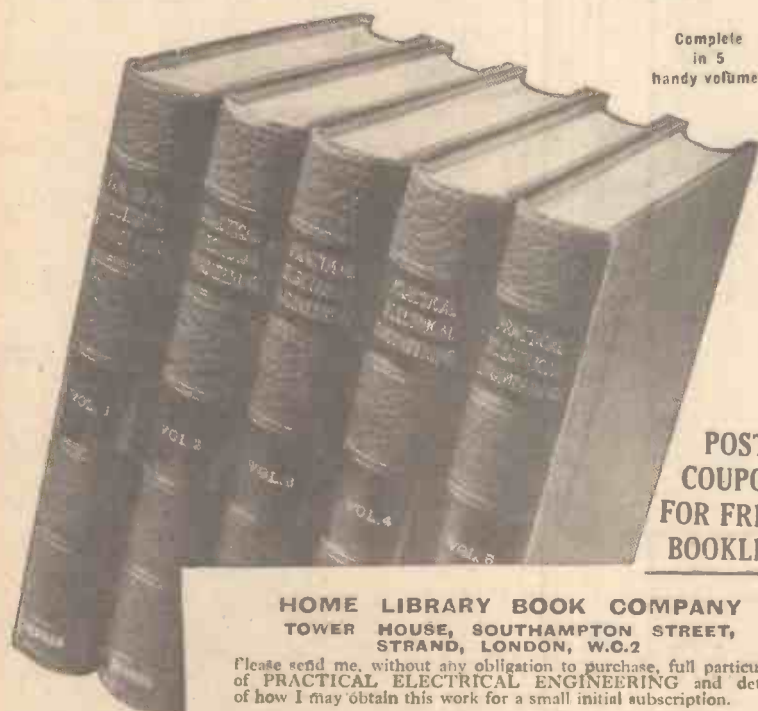
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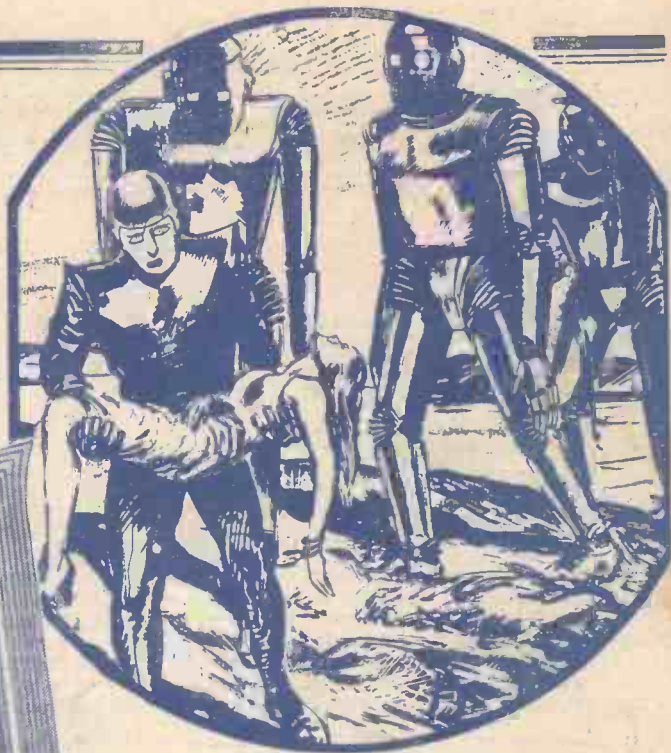
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RADIOLYMPIA—SOME OUTSTANDING EXHIBITS See page 530

Practical and Amateur Wireless

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EVERY WEDNESDAY

Edited by F.J. CAMM

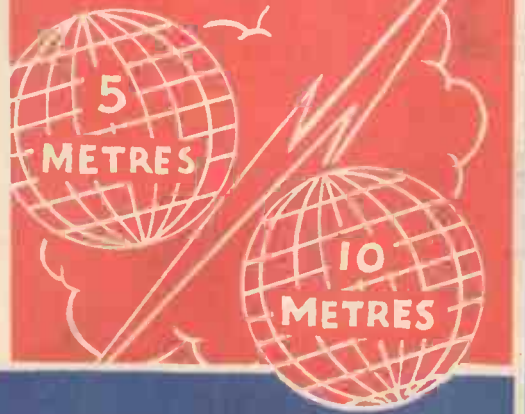
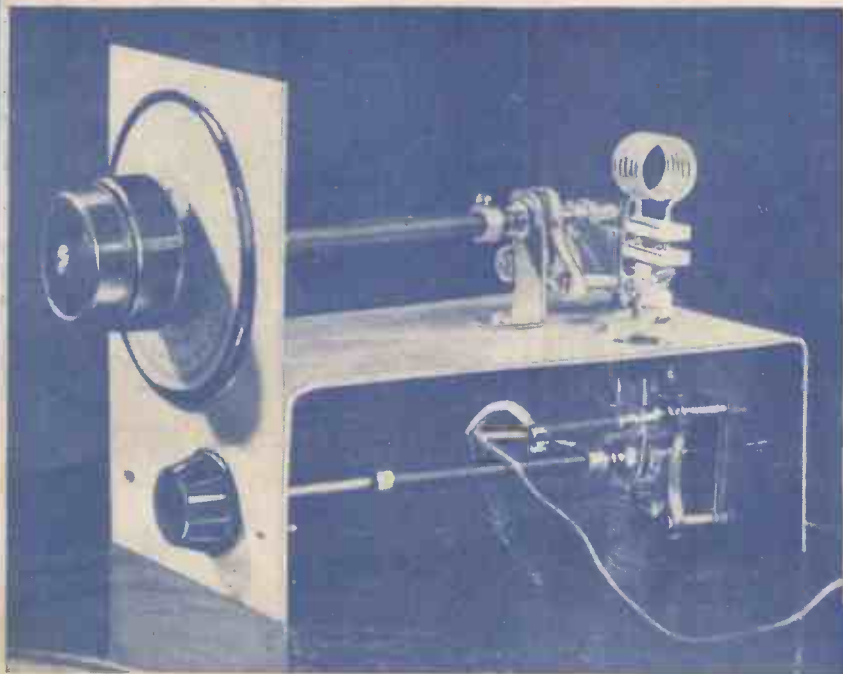
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August 13th, 1938.

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Edited by **F. J. CAMM**

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

VOL. XII. No. 303: August 13th, 1938.

ROUND *the* WORLD of WIRELESS

Radiolympia

THE turnstiles of Olympia will soon be rapidly clicking as the ever eager public pass through them into the vast halls to inspect and criticise the new models and components for the coming season.

What have the designers and manufacturers to offer this year? That is the question which all interested in radio are asking, and we shall provide comprehensive advance details, but there are certain to be last-minute surprises when the curtain goes up on August 24th.

Elsewhere in this issue will be found an article dealing with certain exhibits which have been taken at random from the vast quantity which will be on show, and our readers can rest assured that, as soon as the last-minute details are to hand they will be rushed into print. Next week we shall be giving some exclusive notes concerning components and receivers, and the issue following that will contain a Complete Guide to the Show. Make certain of your copies by placing your order now with your newsagent, and thus avoid disappointment.

New Time for News Bulletin

IN response to many requests, the B.B.C. have made arrangements for the third News Bulletin, at present broadcast on weekdays in the National programme at 10 p.m., to be advanced to 9.40 p.m., as from Monday, August 15th. This timing will continue on weekdays up to and including Saturday, October 1st.

New Polish Stations

ACCORDING to a recent report, the Polskie Radio development scheme, which includes increasing the power of the regional stations to 50kW and the remainder to 10kW, and the erection of special buildings for the main broadcasting stations, is well under way. The power of Poznan, Wilno and Lwów transmitters has been increased to 50kW, and that of Cracow to 10kW. A 50kW station at Baranowicze is now carrying out tests, and a 10kW station at Lodz will be on the air in the near future.

The Monkey That Couldn't Forget

AN amusing story was told in one of the Sunday papers recently. A little girl was so enraptured by a baby monkey

she saw on a street barrel-organ that her father bought the animal for her. It proved a delightful pet, but every time the wireless was turned on for music, the monkey rushed into the hall, grabbed a hat, leaped on to the wireless cabinet, and held out the hat with a pathetic look. If the family did not contribute pennies—which he handed to the little girl—he kicked up an awful din.

Berlin Radio Exhibition

THE German Radiolympia, which opened last week, occupies a larger area than any of the previous German

Foggia, Cosenza, and about half a dozen other small towns. Their power will be only 0.2kW. A new 1kW station at Cagliari will be the first station in Sardinia; and a new 1kW station is also planned for San Remo. Before the end of 1939 there will be nearly 50 Italian stations "on the air," including Addis Ababa and Tripoli.

Pye Television Training

A SERIES of evening training courses in television for service engineers is being run by Pye, Ltd. The courses will not be limited to their agents and their service men, but will be open to all those who are seriously interested in the subject from a servicing point of view.

The courses, of which there will be a series, commenced on August 8th, at 44, Gt. Marlborough Street. The sessions are held on Monday, Wednesday and Friday of each week, from 7 p.m. to 10 p.m. The syllabus is most comprehensive; the work each session being divided into the following approximate sections.

First hour: Lecture.

Second hour: Question time. Adjustments and measurements having a bearing on the subject of the lecture, including the assembly of aerials, measuring voltages, and bench tests of faulty components.

Third hour: Work on actual transmission. Experience of setting up and handling the receiver, etc.

It should be noted that these courses will not interfere with those which are held at Cambridge. In fact, they will still be open to those who have passed the preliminary London course.

Concert Party Broadcast

IN August, at the height of the summer season, the seaside concert parties are in full swing, and on August 15th a broadcast will be given from the Arcadia Theatre, Llandudno, when listeners will hear Catlin's Summer Follies, produced by Harry Bright. The cast includes Bunny Doyle (comedian), Luce Loupe (soubrette), Betty Jumel (comedienne), Nugent Marshall (singer), Alec Dane (character entertainer), Grace Clark and Colin Murray (Scottish entertainers), Doris York (soprano), Sydney Snape (baritone), Malcia and Robert Dorning (dancers), and the John Tiller Girls.

NEXT WEEK!

**ADVANCE OLYMPIA
SHOW DETAILS**

AND

**IMPORTANT
ANNOUNCEMENT**

CONCERNING OUR

**SPECIAL SHOW
NUMBERS**

radio exhibitions, and a huge theatre, capable of holding an audience of nearly 4,000 people, is used by the Berlin Regional for the performance, every night, of a popular radio revue. In an adjoining hall, hundreds of people can watch life-size television on screens measuring 30ft. by 17ft. For the first time in the history of German television, commercial television receiving sets are on view.

Italian Radio Hustle

UNDER the new broadcasting scheme, announced by the Italian Radio Broadcasting Corporation, a large number of small-powered regional stations are to be erected in various towns, including Verona, Padua, Venice, La Spezia, Aquila,

ROUND the WORLD of WIRELESS (Continued)

New York Television Exhibition

THE National Broadcasting Company of New York have recently installed a permanent television exhibition in Radio City. In addition to apparatus and exhibits, there is a large glass-walled studio where televised performances can be seen by visitors.

Radio Exhibition Dates

THE following list of radio exhibitions to be held in this country during the autumn may be of interest to readers:

London: National Radio Exhibition (Radiolympia). August 24th to September 3rd, Olympia.

Bristol Radio Exhibition. September 7th to 17th.

Manchester: "Evening Chronicle" Northern National Radio Exhibition. September 27th to October 8th, City Hall.

Nottingham Radio Exhibition. September 7th to 14th, Greyfriars Hall.

Scottish Empire Exhibition. Open until October 29th, Bellahouston Park, Glasgow.

Claude Dampier's River Holiday

THE popular radio comedian, Claude Dampier, has bought a motor-boat on the Thames, and has named it Mrs. Gibson. Whenever he can spare the time, he can be found aboard the vessel, with his partner, Miss Billie Carlyle, and his daughter Miss Dorothy Dampier, who has just returned from Australia after giving about 90 broadcasts there and is now enjoying a holiday. The illustration on this page shows Claude, and crew, on board the new craft.



Claude and Billie with Piddy, the broadcasting dog, hauling in the anchor on Claude's new motor-boat.

Church Spire with P.A. Equipment

WHAT is probably the only structure of its kind in the world, is the spire of a modern church in Prague, Czechoslovakia, which has been expressly designed for the accommodation of an electrical sound reproduction system. By means of a loud-speaker installed near the top of the spire, peals of bells are given out, which are "rung" from recordings.

"From the Esplanade"

THE band of the 1st Battalion of the King's Own Scottish Borderers will broadcast a programme entitled "From the Esplanade" on August 19th, from the bandstand, Paignton.

Broadcasting House Extension

WE are informed by the B.B.C. that a start is to be made shortly on clearing the site in Portland Place, in readiness for the extension to Broadcasting House.

INTERESTING and TOPICAL NEWS and NOTES

Several months will be occupied in the work of demolition and preparing the site for the new building which, it is hoped, will be ready for occupation towards the end of 1940.

The extension is designed as an office building above the ground floor level with a Control suite on the seventh floor and a restaurant on the eighth floor; a light-court will occupy the centre of the extension.

Torquay Municipal Orchestra

MUSIC by Albert Ketelbey will be broadcast from the Pavilion, Torquay, on August 14th, in a concert by the Torquay Municipal Orchestra and Choir, led by Harold F. Petts, and conducted by Albert Ketelbey and Ernest W. Goss.

"Songs I Like"

THE next artist in the series entitled "Songs I Like" will be Frank Titterton (tenor), who began his distinguished career in Birmingham. As well as singing his favourite songs Mr. Titterton will indicate why they appeal specially to him. This programme will be repeated the following afternoon.

Douglas on the Air

THE Isle of Man will again feature in Northern programmes on August 15th, when Mantovani and his Band will be heard broadcasting from the Strand Palais de Danse at Douglas.

Melton Town Band

FOUNDED in 1865 as a volunteer band, the Melton Town Band has had only four Bandmasters in its long career. It will broadcast for the first time on August 19th in the Midland programme. Its chairman and honorary conductor is H. V. Dyson, a brother of the composer, Dr. George Dyson. Melton Mowbray, where the band comes from, is famous for its hunting and for its pies. For the interludes of the programme, Alex Penney, the Derby soprano, will be the vocalist.

Variety from Oxford

HALF-AN-HOUR'S variety will be broadcast from the New Theatre, Oxford, on August 17th. The bill there during the week includes Leonard Henry, Peroy and Mary Honri, Carlos Ames (harp), James Stewart (tramp pianist), and Harold Walden.

SOLVE THIS!

PROBLEM No. 308

Smithers had a 4-valve battery operated receiver, employing one S.G. stage. Results were not too good; in fact, the reaction condenser had to be turned up to obtain reception free from instability. When testing he found that by using it as a 3-valver, with the aerial connected to the lead normally connected to the top of the S.G. valve, that results were far superior in every way, and that reaction worked perfectly. What was his trouble?

Three books will be awarded for the first three correct solutions opened. Address your envelopes to the Editor, PRACTICAL AND AMATEUR WIRELESS, Tower House, Southampton St., Strand, London, W.C.2. Envelopes must be marked "Problem No. 308," and must be posted to reach this office not later than the first post on Monday, August 15th, 1938.

Solution to Problem No. 307

Arthurs overlooked the fact that the primary tapping leads were formed by bringing out loops of the winding; therefore, when he cut them off, he actually severed the loops, thus breaking the primary winding. The following three readers successfully solved Problem No. 306, and books have accordingly been forwarded to them: W. H. Mason, 56, Gillesgate, Durham; J. N. Hubberd, 8, St. George's Place, Llandudno, N. Wales; and W. J. Tonkib, 90, Windmill Road, Gillingham, Kent.

Cricket Interval

FOR this month's "Cricket Interval" on August 18th (Midland Regional), Denis Morris has an interesting team. Gordon Salmon, the old Leicestershire cricketer, will give his impression of that county's match against Kent. W. A. Oldfield, who kept wicket for Australia in several tours, will discuss the prospects for the final Test Match; and Marjorie Pollard, who has captained the England Women's XI at cricket, will review this season's women's cricket. She broadcast last year a description of the first Women's Test Match, England v. Australia, at Northampton. Opportunity will be given for members of cricket clubs in the studio audience to ask questions at the microphone. The programme will be repeated the following afternoon.

A Push-pull Battery Amplifier

This Article Describes an Efficient Unit for the Quality Reproduction of Records

HIGH quality with economy, coupled with simplicity of design, are the salient features of this amplifier. Batteries have been chosen for the supply of power for the following reasons: (1) simplicity is fundamental in designing a quality amplifier; (2) batteries are the only naturally smooth source of power; (3) they are obtainable everywhere, and can give ample power with economy.

The Circuit

This is a modification of a very simple Class A push-pull circuit recommended by PRACTICAL AND AMATEUR WIRELESS. The pick-up is a No. 11 H.M.V. head mounted on a home-made counterbalanced arm as illustrated on page 301 of the November 27th, 1937, issue of PRACTICAL AND AMATEUR WIRELESS. The leads are connected to the grid of the first low-frequency valve, and the -3.0 volts tapping of the grid bias battery through a 250,000 ohms potentiometer.

The scratch filter, which is seldom required, is shunted across the input, the most logical position, and the best values have been found to be .001 mfd. and 250,000 ohms for the condenser and resistance respectively.

The L.F. valve, a Mazda L2, was chosen for its low consumption and low gain—the latter characteristic being in the interests of quality.

The input transformer is a Varley DP.6, ratio 1:5, and is direct coupled, again for efficiency and simplicity. Since the primary winding can carry a maximum current of 10 mA, and the actual current is only 2 mA, there is no question of low-note loss through magnetic saturation of the core. The anode resistor of 10,000 ohms, and decoupling condenser of 2 mfd., complete this stage.

As a precaution against possible parasitic oscillations the secondary winding is connected to the grids of the output valves through 1,000-ohm resistors.

The independent centre tapings of this winding, intended for separate biasing if necessary, are linked together in this circuit since, as a refinement, a pair of matched Mullard PM202 output valves were supplied by the makers. These valves were chosen for their relatively high efficiency and low consumption of H.T. current.

The output transformer is a Varley DP.47, ratio 1:50, and provides the correct matching to the 3.3 ohms speech coil of the Celestion Junior Auditorium cabinet speaker. The whole amplifier, including the output transformer, is built on a mahogany base and incorporated in the cupboard in the base of an ordinary pedestal gramophone.

Motor and Pick-up

Here it must be emphasised that a really good clockwork motor is essential if all traces of "wow" due to fluctuations of speed is to be avoided. The motor used in this instance is a Garrard Junior B. Again, correct tracking of the pick-up,

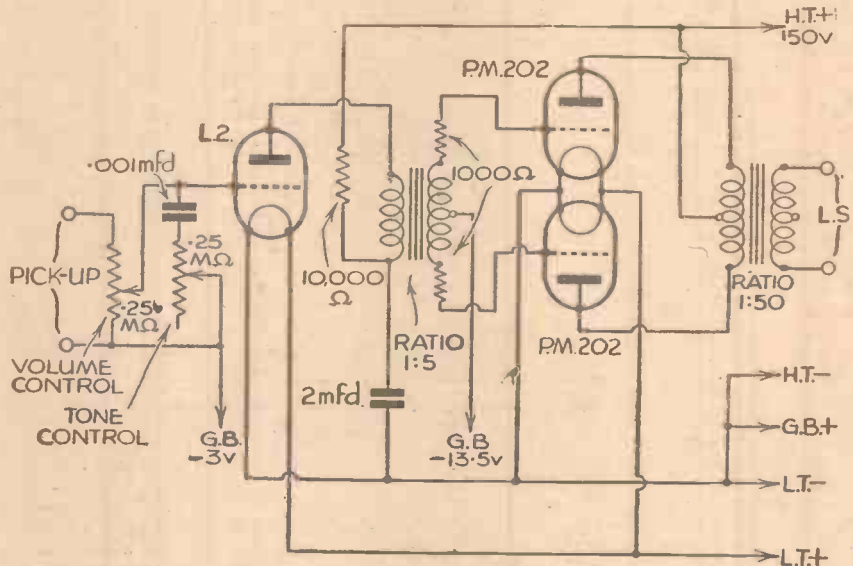
is projecting. This is very important in the case of fibres which are shortened with sharpening.

Since the output transformer is incorporated in the amplifier, the speaker—which, of course, is a separate unit—can be placed anywhere in the room as determined by experiment. The writer has found that excellent results are obtained with this unit suspended from the picture rail in the angle of two walls, and facing the centre of the room.

It is generally understood that one must pay for quality, and that to have quality with a battery circuit expense is exorbitant. It is, however, the opinion of the writer who, incidentally, is on the mains, that this circuit, with its 3/4 watt output gives ample volume in a room 15ft. by 15ft. for a reasonable expense for construction and running costs. An H.T. battery usually costs 10s. 6d. for the best results with most battery receivers. The cost of £1 for a battery for this quality amplifier I think will be considered reasonable.

Auxiliary Battery

A 9-volt auxiliary battery of the G.B.



The theoretical circuit showing the location and form of volume and tone controls embodied.

absolute freedom of both pick-up arm joints and dynamic levelling of the turntable are of vital importance for quality.

Needle length is critical, and is determined only by experiment. A small "thimble" made from brass rod, and used for locating the needle in its socket, will ensure that exactly a pre-determined length

type in series with the H.T. supply may be utilised with advantage to maintain the H.T. voltage which gradually falls with use, but it must be remembered that the auxiliary battery being of smaller capacity than the main battery will run down much faster in proportion, and will need renewing once or twice during the life of the main unit.

The L.T. consumption is 0.5 amps., and the overall H.T. consumption is 23 mA with 150 volts H.T., -3 volts grid bias to the L2 valve and -13.5 volts grid bias for the output valves.

The overall output characteristic of this amplifier is unusually good, being limited only by the response characteristic of the pick-up.

Universal Thorn needles give the best results with average orchestral recordings, but for heavy orchestral works, and organ toccatas, etc., H.M.V. High Fidelity needles give undoubtedly excellent results, provided that each needle is used for not more than six sides.

With the combination of the above components one has an amplifier which can be installed with ease anywhere and which—by experience—will delight the most musical.—E. R. J. R.

PUSH-PULL BATTERY AMPLIFIER COMPONENTS

Pick-up—
H.M.V. No. 11.

Valves—
Input—Mazda L2.
Output—Mullard PM202.

Transformers—
Input—Varley DP.6.
Output—Varley DP.47.

Speaker—
Celestion Junior Auditorium. Speech Coil
Impedance —3.3 ohms at 200 cycles.

CURRENT CONSUMPTION

L.T.—0.5 amps.
H.T. (L2 with -3.0 volts G.B.) = 30 mA.
H.T. tapping 150 v. and -12.0 G.B. = 23 mA.
H.T. tapping 150 v. and -13.5 G.B. = 19.5 mA.
H.T. tapping 144 v. and -13.5 G.B. = 19.5 mA.

(N.B.—In all the above tapings the L2 takes 2 mA approx.)

GANGED CONTROLS

A Few Suggestions Concerning Some Unusual Ganging Arrangements which Offer Scope for the Experimenter : By L. O. SPARKS

EVERY constructor has ideas about simplifying the controls on his receiver, but whether he tries them out, and whether he is able to obtain the success he anticipates, is often another question.

In many instances, failure is due to attempting the impossible, while with others, a lack of knowledge regarding the operating conditions of the circuits concerned and wrong application of an idea can be stated to be the cause.

Ganging tuned circuits is no longer a question of experiment; modern matched coils have eliminated the difficulties which used to be experienced when coils were tied down to exacting values as regards their inductance. Other ganged controls are not unknown in commercially produced receivers, but the constructor appears to have left the matter severely alone.

With a simple receiver of the Det. L.F. type, there are, usually, three variable factors to be considered, namely, the tuning condenser, the reaction control, and a series condenser in the aerial circuit.

Tuning and Reaction Controls

Of these, the most common desire is to gang the tuning with the reaction control; the object being to obtain perfectly even reaction effect over the complete travel of the tuning condenser, thus allowing the receiver to be maintained at just the right degree of sensitivity.

To achieve this, it would appear that it is only a matter of ganging the tuning and reaction condensers together, so that the reaction is increased as the tuning condenser closes and the wavelength increases.

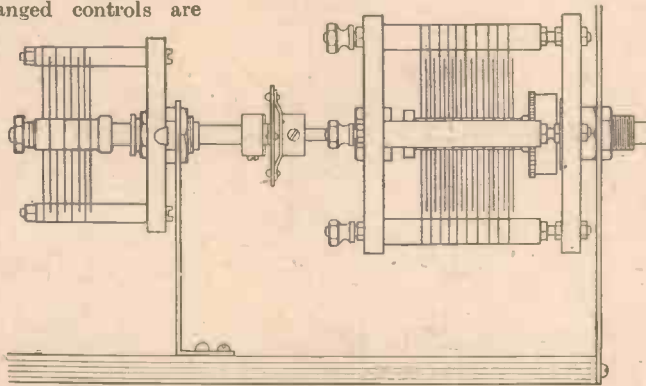
This method would be quite satisfactory if the constants or characteristics to the two circuits were identical. Unfortunately, this is not so. It will usually be found that too much or too little reaction is gained during the travel, so it becomes necessary to attend to other items.

Firstly, when the tuning condenser is fully opened, i.e., minimum wavelength, the circuit will oscillate most easily. The reaction can, therefore, be so adjusted that the circuit is sensitive at this point and that its maximum setting will be just below that required to produce oscillation at the other end of the tuning scale. This adjustment can be made by paying attention to the reaction winding; removing a few turns or increasing its spacing with relation to the grid windings. As, however, canned coils are rather difficult to tamper with, it is better to approach the problem from another angle.

The value of the reaction condenser can be reduced; a differential type employed or, better still, a further ganging arrangement can be employed.

Many, if not most, circuits embody a by-

pass condenser between the anode of the detector valve and earth. Its object being to provide an additional path for the unwanted H.F. currents which get through to this point. A certain portion of these H.F. currents are, of course, used to provide the reaction effect by being fed back into the grid circuit via the reaction condenser and coil. If the by-pass condenser is too small, fierce reaction will often result, but if, on the other hand, the value is too great the reaction circuit will be rendered ineffective. From this it is apparent that good use can be made of the additional path to provide a means of controlling the effectiveness of the reaction control.



Showing the coupling and supporting bracket required for a simple combination.

In place of the more usual fixed by-pass condenser, insert a variable one. A little experimenting will soon reveal that a setting can be reached which will give a smooth and even control over the whole of the reaction and tuning range.

The matter can then be taken a step further. The variable by-pass control can be ganged with the tuning and reaction, the coupling being so arranged that the capacity of all the condensers increases and decreases together.

It will, no doubt, be necessary to make adjustments regarding the setting of each one with relation to the others. For example, if condensers having 360 degrees rotation are used for the two reaction controls, it will be possible to set them any desired amount out of step with each other.

A general idea of the two arrangements are shown in Figs. 1 and 2.

Variable Selectivity

Another problem which continually crops up is the most satisfactory setting of an aerial series condenser for the whole of the medium wave-band.

This opens up another possibility of ganged control. Experiments with the aerial series condenser coupled to the tuning condenser can be both interesting and productive of easier operating conditions.

With this combination, it must be remembered that a simple tuned circuit is usually less selective at its minimum wavelength or the minimum setting of the tuning condenser. This fact necessitates, therefore, that the aerial series condenser will have to be in operation at the lower end of the tuning scale, and come out gradually as the tuning capacity is increased. In other words, it will have to be coupled the reverse way round.

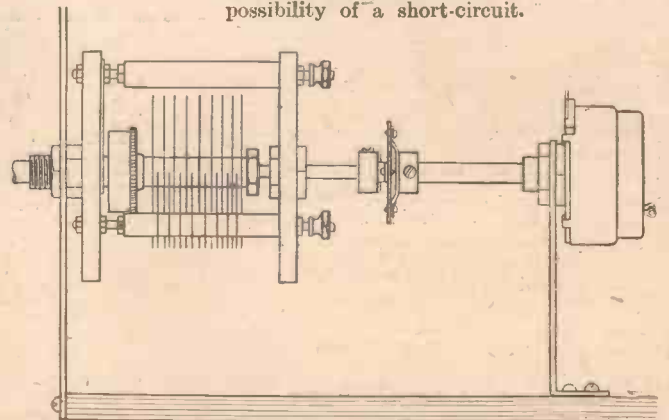
The effect of the aerial condenser will be to reduce the damping of the aerial system, and this will again introduce another factor which will have to be considered, especially if the first experimental suggestions are in use. The reduction in aerial damping will tend to make the circuit oscillate more readily, so attention will have to be given to the reaction circuit, or the adjustment of the anode by-pass control.

It is not a difficult matter, if one has any mechanical ability, to devise different forms of couplings in place of the usual semi-rigid types. Some arrangements might call for a coupling which only takes up the drive after a given travel of, say, the tuning condenser, while others might require a step-down gearing which can often be obtained from a slow-motion drive out of the junk box.

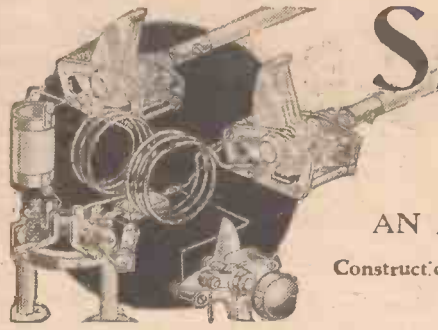
H.F. Control and Reaction

With variable Mu and S.G. valves, the bias or screen voltages often play an important part with the reaction circuit in obtaining the utmost efficiency out of the receiver. This applies in particular to the reception of powerful stations, such as the locals, and to securing the highest degree of selectivity.

Combining the reaction control with that used for the bias or screen voltage regulation presents, therefore, yet another line of experimental work. Care must be taken to see that the spindles of the potentiometers are not alive, or else that insulating couplings are used, otherwise there will be a possibility of a short-circuit.



In this illustration, a reaction condenser coupled to a volume control is shown.



Short Wave Section

AN AERIAL-COUPLER TUNER

Constructional Details of a Novel Tuning Device are Given in This Article

WITH many short-wave sets aerial tuning is invaluable. It is particularly useful in the case of electron-coupled H.F. stages in superhets with poor selectivity. In addition, it will very often increase considerably the short-wave efficiency of an all-wave set with an indifferent short-wave range.

The tuner illustrated works extremely well on all types of aerial, both doublet and single, or unbalanced doublets of the

preferably of copper foil, but aluminium or leadfoil can be used. This screen is a cylinder totally enclosing the coil except for the line where its edges should meet. They do not actually meet, as a gap of $\frac{1}{16}$ in. is left. Holes can also be cut to accommodate terminals, etc.

The screen is tied on with fine string to keep it in position, and the aerial coil of thirty turns of bell wire is wound tightly over the whole. It is centre-tapped to the screen, and it is wise to leave a connection for an earth wire if the screen is aluminium. The ends of the coil are secured preferably to terminals with soldering tags. A spot or two of glue will fix the end coils to the

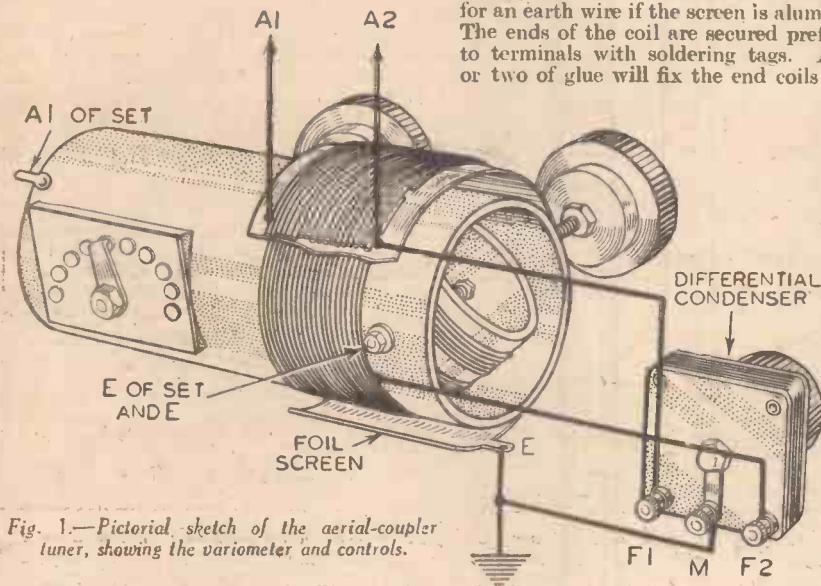


Fig. 1.—Pictorial sketch of the aerial-coupler tuner, showing the variometer and controls.

Windom type. It consists of a simple transformer with a tapped secondary, a variometer for fine control, and a differential condenser for balancing the two coils.

The basis of the tuner was one of those old tapped broadcast coils with variometer reaction. It can, however, be made of ordinary formers and materially smaller, but one of these old tuners has the necessary switching and variometer, and saves a lot of trouble. It is stripped of all wire, and re-wound with thirty turns of single cotton, rubber, and wax-covered bell wire. This is obtainable at any ironmonger's, and though some other gauge might be preferable, this wire is very practical, and when close wound is practically self-spaced.

Coil Windings

Winding is begun at the variometer end of the former, and tappings are taken at every three turns down to the 10-point switch. All points should be soldered. The variometer is wound with 15 to 20 turns of bell wire, or 12 turns of 22 enamelled wire, if it is desired to go to high-frequencies, and connected to the end of the coil beyond the last tap.

Screening

The coil is now bound with insulating tape, and screened with a Faraday screen,

aluminium screen if there is any tendency to slip.

A differential condenser of .002 mfd. or .001 mfd. a section can be used, but the value is not critical, and a cheap solid-dielectric type is good enough. It has its central moving vanes connected to earth, while the fixed sections are connected respectively to the high-potential ends of each coil.

The arrangement is best mounted in a box or on a panel, and should be provided with a 90 degrees scale for the condenser and the variometer, and a numbered scale for the tapping switch.

Operation

This tuner has virtues not usually found in aerial couplers, for it can be used as a sort of "band-spreader," and a station which has not been obtainable with your ordinary aerial and set will often come in as loud as the National! It is also useful for cutting out mush. The technique of how to use it depends largely on the set and aerial in use, but in general it will be found that there is a "best" tap for each band or even portion of a band. The best thing to do is to set all three controls in the centre position, tune the set to a well-known station, and when it is picked up adjust the

tapping knob to maximum, and then the differential condenser; lastly fine tune on the variometer. This will probably have an optimum position which gives you the wanted station, not necessarily at the loudest, but the clearest and most selective point. It does not follow that your dial readings will be the same as they have been, and this again depends on the type of set.

There is plenty of room for experiment to find out the best coil sizes, number of turns, etc., but it is a simple matter, and a crocodile clip to bared twisted tappings is an easy way of finding an optimum if the order of winding the two coils is reversed, and the centre-tapped aerial coil put inside the other. In the same way both coils can be tapped, and it would be advisable to short the unused portions with a "stud" switch similar to that used to cut out "dead end" losses. Alternatively, "Clix" sockets and plugs can be used.

Probably many readers will welcome this bell-wire tuner which only takes an evening to make. Some experienced amateurs may re-design it to make it smaller and better, and that is all to the good, but it is a device that at present you cannot buy, and will have to make for yourself—but it is worth it.

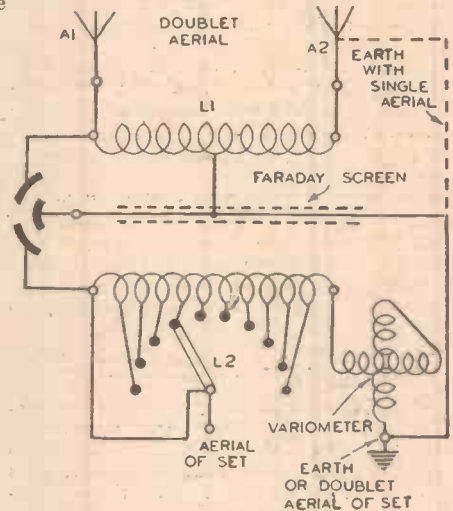


Fig. 2.—Circuit diagram of the aerial-coupler tuner.

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Leaves from a Short-wave Log

Radio Noumea

NEWS reaches us that the little broadcasting station FK8AA installed at Noumea (New Caledonia)—lying half-way between the coast of Queensland (Australia) and the Fiji Isles—is to see its power increased to 100 watts. The wavelength is 49 m. (6.122 mc/s). So far, *Radio Noumea* supplies only two programmes weekly, namely on Tuesdays and Saturdays between G.M.T. 08.00-09.30; it opens with a French news bulletin, and the main radio entertainment consists of gramophone records. Address for reports: M. Charles Gaveau, Poste de Radiodiffusion, FK8AA Noumea (New Caledonia).

Altered Wavelength

RADIO FORT-DE-FRANCE (Martinique), previously logged on 30.93 m. (9.675 mc/s), is now to be found on 31.27 m. (9.594 mc/s) with a power of 200 watts. The broadcasts take place daily between G.M.T. 16.15-17.45, and from 23.00-01.00, and open with seven chimes which precede the call: *Ici Radio Fort-de-France*. Announcements are made in French and Spanish by a man, and in English and German by a woman. Address: Etablissements Séri, Route de la Dillon, Fort-de-France, Martinique.

A Correction

UNDER "More Cuban Notes" in our issue, July 16th, the wavelength of COJK, Camaguey (Cuba) was erroneously given as 34.36 m.; this should read 34.63 m. (8.663.9 mc/s). The full address for reports is now advertised as Jones, Castrillon y Cia, P.O. Box, Camaguey, Cuba.

Cincinnati's New Frequency

THE Crosley Radio Corporation has constructed a 10-kilowatt transmitter for the relay of the WLW, Cincinnati, radio programme. The channel adopted is 25.27 m. (11.87 mc/s). So far the short-wave programmes have been broadcast on 49.5 m. (6.06 mc/s).

Two More American S.W. Stations

W3XAU, Newtown Square (Pa.), proposes to transmit special programmes on 11.66 m. (25.725 mc/s) in connection with the studios of WCAU, Philadelphia. W9XA is the call of a new station in course of erection at Kansas City (Missouri); the power will be 1 kilowatt. When completed the transmitter will work on 11.34 m. (26.45 mc/s). Address: Commercial Radio Equipment Company, Kansas (Mo.), U.S.A.

Delete from Your List

SINCE the German *Reichsfunk* took over the Austrian Broadcasting system, transmissions from OER2 and OER3, on 25.42 m. (11.8 mc/s) and 49.41 m. (6.072 mc/s) have been suspended.

CB615, Santiago (Chile), previously working on 48.78 m. (6.15 mc/s) has also been permanently closed down.

Short Waves from Iraq

A 5-KILOWATT station is now being built at Bagdad-Chiftlig; the following call-signs and channels have been allotted to the transmitter: HNI, 16.84 m. (17.815 mc/s); HNH, 19.81 m. (15.145

mc/s); HNG, 25.59 m. (11.724 mc/s); HNF, 30.98 m. (9.683 mc/s); HND, 62.8 m. (4.777 mc/s); HNC, 86.26 m. (3.478 mc/s), and HNB, 129.8 m. (2.312 mc/s).

New Schedule of Radio Vatican

THE summer broadcast schedule of HVJ, Vatican City (Italy) is now fixed as follows: Weekdays: 19.84 m. (15.12 mc/s), G.M.T. 15.30-15.45, and from 19.00-19.15 on 49.75 m. (6.03 mc/s). Languages used are: Italian (Monday); English (Tuesday); Spanish (Wednesday); French (Thursday). At G.M.T. 15.30 (Friday and Saturday), a broadcast is given in Italian; at G.M.T. 19.00 on Friday in German, and on Saturday at the same time

Lisbon on Two Channels

FOLLOWING many tests two channels have been permanently chosen for the summer broadcasts: CSW3, 30.18 m. (9.94 mc/s) for transmissions destined to India and Eastern Africa, from G.M.T. 17.00-19.00; from 22.00-23.00 for European listeners, and from 23.00-01.00 daily for North and South America. Broadcasts through CSW2 on 27.17 m. (11.04 mc/s) for the Portuguese Colonies are given between G.M.T. 19.15-21.45 daily.

Foreign Broadcasts from U.S.A.

W3XAL, Boundbrook (N.J.), on 16.87 m. (17.78 mc/s), and W8XK, E. Pittsburgh (Pa.), on 19.72 m. (15.21 mc/s), now transmit special radio talks daily from G.M.T. 18.00-19.00 in Italian; 19.00-20.00 in German; 20.00-21.00 in French; 21.00-22.00 in Spanish, and 22.00-23.00 in Portuguese. To make sure of identification it is necessary to listen for the



Members of the Bradford Short-wave Club photographed on Sunday, July 31st, at Shipley Glen, Yorks, with transmitting and receiving apparatus, on the occasion of their first day after acquiring their amateur transmitter's licence. Their call-sign is G3NN.

in Dutch. On Sundays and Holy Days at G.M.T. 10.00, transmissions are made in Latin and French on 31.41 m. (9.55 mc/s).

station calls at the beginning or end of the broadcasts.

And from France

ALTHOUGH Italian stations are stated to top the list in respect of transmissions in foreign languages it should be pointed out that for some time *Paris Mondial*, the French short-wave Colonial transmitter has given out daily news bulletins in French, English, Spanish, Portuguese, German, Arabic and Italian; moreover, certain special "propaganda" broadcasts are also made in Japanese, Greek and Turkish.

Time Signals from Eiffel Tower

EVERY day special time signals are put out by the French military authorities through the Eiffel Tower (Paris) station at G.M.T. 10.26 on FLA, 21.5 m. (13.953 mc/s), as well as on 26.5 m. (113.21 kc/s) and again from G.M.T. 23.26 on 21.5 m., 32.5 m. (9.23 mc/s), FLE, 73.5 m. (4.081 mc/s), and on 26.5 m. simultaneously. As it is desired to ascertain whether these broadcasts on short waves are well received, reports of reception by the general public will be welcomed. Address: M. le Chef d'Exploitation, Station Militaire de la Tour Eiffel, Champ de Mars, Paris (France).

RADIOLYMPIA

AUGUST 24th to
SEPTEMBER 3rd, 1938

OUR STAND
No. 9
GROUND FLOOR

ON YOUR WAVELENGTH



Nearly Here

A FEW days after reading these notes—less than a fortnight—Radiolympia will open its portals. It will in many respects be a vastly different Radiolympia. In the first place a cabaret will not be there. I welcome this, because it attracted the wrong sections of the public. It attracted the gaping, crooner-struck, acrobatic - lunatic - conductor - admiring, slushy-melody-humming members of the public, who are not in the least interested in radio except in so far as it propagates crooning. This year the useful experiment is being conducted of attracting visitors for what the Exhibition itself has to show. The resulting gate in my view is bound to be less, but manufacturers who have spent considerable sums of money in buying space at the Show, having stands erected, and generally making the Exhibition what it is, apart from the cost of attendants at the Exhibition, are entitled to expect from Exhibition authorities that they will at least use their endeavours to attract the right type of public—the public which will at least look at a wireless set, and may buy one, not the public which pays for its entrance into the Exhibition, slyly sidetracks the Exhibition itself and slides into the cabaret. Exhibition organisers should realise that manufacturers do not exhibit for the fun of the thing. They expect the public to be attracted to the Exhibition, not away from it. It is this latter which the cabaret most effectively does. Now many of the radio artistes, excellent though they may be from a microphone point of view, are not of the glamorous type that you like to meet in the flesh, and it probably did radio a lot of harm for the public to see them in person. You will remember that Lord Northcliffe subscribed to the view that belief in the printed word would be shattered for ever if all journalists and authors were lined up in Hyde Park for the public to see.

I do not think that the posters are likely to attract visitors. This year's poster is some futuristic combination of an eye and an ear, but it is a puerile effort, and amateurish. Every year I have criticised these Radiolympia posters. It seems to me that those responsible are unaware of the fact that a poster must struggle for existence

By Thermion

against dozens of others. It must be brighter. It does not get the story over quickly so that those who run may read. What is wanted is something on the lines of, "Beer is Best," "Eat More Fruit," "Drink More Milk," not a murky splotch of printers' ink which in my view is a waste of money and certainly lacking in artistic merit. A sufficient number of exhibitions have been run for the Exhibition authorities to have learned their lesson.

Do not forget to book the date—August 24th to September 3rd. I hope to see you there.

Another One of Those

R. H., of Kingswood, Bristol, sends me the following letter:

"Your recent attack on 'so-called radio dealers' was forcibly brought home to me this morning while visiting a shop belonging to a big radio retail firm.

"I asked for a neon tube for the tester described in PRACTICAL AND AMATEUR WIRELESS; they showed me a bee-hive tube, and while this was going on, a lady entered and asked for a condenser similar to one her husband had taken out of a set; it was clearly marked 1 mfd. yet he gave her a 4-mfd. condenser and assured her it would be quite all right.

"Afterwards I asked him for some 22 S.W.G. wire for winding a transformer, but he only had 28 S.W.G., and said that would do just as well."

A Wireless Pioneer

ON Monday, August 1st, Mr. C. E. Rickard completed 40 years' service with the Marconi Company.

Mr. Rickard joined the Marconi Company in 1898 as a technical assistant to the late Marchese Marconi, being the third earliest of Marconi's English collaborators, the others being the late Mr. G. S. Kemp and Mr.

P. W. Paget, who celebrated his fortieth anniversary with the Marconi Company recently.

Mr. Rickard was associated with the late Marchese Marconi in all his early experimental demonstrations in wireless telegraphy, including those given by the Marconi Company to the General Post Office and to the British and United States Naval and Lighthouse authorities.

In later years Mr. Rickard has been associated with the construction of wireless stations and the development of wireless services in all parts of the world, and has taken part in practically every International Conference on wireless matters. He is therefore one of the best-known living wireless engineers.

For many years Mr. Rickard carried out the duties of Chief Engineer and Technical General Manager of Marconi's Wireless Telegraph Company, with which he is still actively associated. He is also a Director of the Marconi International Marine Communication Company.

His friends wish him many years of continued service in the cause of wireless which he has served so well during the last 40 years.

Television Classes

I AM glad to see that television classes are being started for radio retailers. How many of my readers must have wished that they had started classes for dealers in the early days of wireless. Even to-day the average dealer knows very little about wireless, and not a few of my readers, I understand, run a profitable sideline by servicing sets in their spare time for dealers.

The Loch Ness Monster

I UNDERSTAND that the Loch Ness Monster is to be sought in its Scottish haunts by the B.B.C. microphone on August 21st. John Pudney, who is attracted by the mysterious, is firmly convinced that the Monster does visit and has visited Loch Ness for hundreds of years. Mr. Pudney is proceeding to Fort Augustus shortly with a complete recording unit, and is even prepared to interview the Monster should he be so accommodating as to appear during the period of this visit.

With Commander Gould, who has

written books on the Monster's appearances, John Pudney will interview and record the comments of many of the local people who have seen the Monster over a period of years. The whole evidence of this strange creature's visit is to be assembled for the radio public to judge whether it is truly a monster, an apparition, or a great sea reptile. St. Columba, while preaching, had brought to him a man bitten by a beast in Loch Ness. The Saint healed him with his touch. Commander Gould is supplying the translation of this occurrence for the programme. The producer, John Pudney, is particularly anxious to obtain information of any practices or customs attributed to the water kelpie.

The story of the Loch Ness Monster "broke" in the newspapers in 1933 and became front page news. This publicity filled the Loch and the Highland glens of the neighbourhood with curious people wishing to see the Monster. Witnesses of this period are to record their experience, and the programme will end with a summary of the evidence for and against.

This feature is not only being made in Scotland, but all those taking part will be Scots or Gaels. The whole programme, when polished up, will be transferred from the recording van's records on to a film sound-track and broadcast on August 21st.

The "Inner Life"

THE following is extracted from "In Defence of Letters," by M. Georges Duhamel.

"The book is being ousted from its rightful place in the life of mankind by the cinema, the radio, and the newspaper. These, though they each have a legitimate use, are the enemies of reflection, individuality, and freedom—and therefore of culture. 'For many people, in future, wireless will take the place of an inner life.' Books, on the other hand, 'are the friends of solitude. In solitary reading a man who is seeking himself has some chance of finding himself; he chooses, and he chooses for himself; he escapes from the poisonous air of propaganda.' The entertainment we get by turning on a tap is chosen for us and demands little or nothing from us in the way of collaboration, and 'a system of culture from which meditation and choice are omitted is the exact negation of what we have hitherto called culture.'"

Parachute Jumping Broadcast

MANY air-minded young listeners would no doubt like to volunteer to jump with a parachute from an aeroplane for the B.B.C. on September 24th. But on this occasion the B.B.C. have engaged the services



An Elusive Fault

A RECEIVER was recently tested to find out the cause of intermittent instability. When switched on, the receiver behaved in a normal manner until it was lightly tapped, or a loud passage reproduced by the speaker, which was housed in the same cabinet.

All components were tested; connections examined and terminals checked for tightness, but still the trouble continued. It was not until voltage and current tests were applied across sections of the circuit that the cause was revealed. In the anode circuit of the detector was the usual H.F. by-pass condenser, which, incidentally, was of the flat terminal type and screwed to the chassis. The wire from the anode to one side of the condenser was finished off with a perfect loop and fitted under the terminal head. Unfortunately, however, the loop was not held down by the terminal head, as that was prevented from screwing right down by a burred thread. In certain positions, the loop was making contact, but any vibration was sufficient to cause it to break the circuit. The terminal was removed, the thread cleared and a perfect contact secured.

Layout

CONSIDERABLE trouble can be saved by paying attention to the preliminary work when designing a receiver. Before making or ordering the chassis or base-board, all the components should be located on a sheet of paper, or, better still, cardboard. This will enable the exact size to be determined and, what is even more important, the most satisfactory placing of the components to allow efficient and neat wiring to be obtained.

This essential procedure was omitted recently by a constructor who was making an elaborate receiver; when he came to the final wiring he found that it was necessary to re-arrange the location of three components and, as the existing layout allowed no alternative placing, he was forced to scrap the work and start all over again.

of two expert parachutists, a man and a woman. It was hoped that the parachutists would be able to broadcast their experiences as they floated to earth, but this has been found to be impracticable.

All arrangements are subject to alteration on test, but at the moment the plan of operations is that the B.B.C. commentator, the two parachutists, and the pilot will discuss on the ground, before they go up, what they propose to do. The parachutists will explain for listeners the working of their gear and will recapitulate with the pilot how they propose to carry out the jump.

To add interest to the proceedings, John Snagge, B.B.C. commentator, proposes to ask the parachutists to attempt a competition as to who gets nearer a particular mark. The jumps will be made successively and not simultaneously. Listeners will hear the aeroplane taking off and the parachutist giving instructions to his pilot to take up a position which he judges the best in relation to the mark for beginning the descent. Arrived at his position in the air, the parachutist will tell the pilot when he is about to jump and listeners will hear his shout that he is away. The B.B.C. commentator on the ground will then take over and describe the descent, and will be able to tell listeners how far the parachutist landed from the target. Then, on the conclusion of the two jumps, there will be a final talk at the microphone to complete this novel broadcast.

Tour of the B.B.C. Theatre Organ

I AM informed that listeners have asked so many questions about the working of the B.B.C. Theatre Organ that Reginald Foort has decided to broadcast all the answers—with illustrations.

On the evening of August 11th, in the National programme, he will take listeners on a personally conducted tour, so to speak, of the giant instrument which is used in St. George's Hall—the console on the stage, the blowing apparatus beneath it, and the four wooden chambers containing all the pipes and gadgets on parts of the balcony.

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By F. J. CAMM.

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Sources of Loss

The "Experimenters" Discourse on the Efficiency—and Lack of Efficiency—of the Modern Receiver, Pointing Out that Many of the Losses are Due to the Need for Extreme Selectivity

A PERFECT machine—one that is 100-per-cent. efficient—cannot be made, and a wireless receiver is a machine with a very low percentage efficiency. Some readers might object to the use of the word "machine" in connection with a radio set, but the word is justified if we take the broad meaning of it, which is "a contrivance for converting one form of energy into another." A collection of valves and associated components is supplied with direct, alternating and high-frequency currents; these are used to produce sound by the mechanical vibration of a diaphragm.

And if we take as an example of a typical receiver a four-valve mains-operated super-het we can soon find that the power consumption, in the form of high- and low-tension current, is in the region of 40 watts. For this input we seldom obtain a signal output much in excess of three watts. Even then the so-called signal output is the maximum possible undistorted output—not the average output obtained while the set is in operation. Additionally, that output is the amount applied to the speaker transformer, prior to its conversion into sound energy. If an accurate measurement could be made of the average sound energy it would probably be found to be only a fraction of one watt.

One per cent. Efficient

Thus, it would be true to say that a typical modern radio receiver, if considered as a machine, has an efficiency of no more than one per cent. In reaching this conclusion we have ignored entirely the input in the form of H.F. signal energy, but this is so extremely small in comparison with the direct and alternating current input as to be negligible for calculation purposes.

We still say, and rightly, that the present-day receiver is a highly efficient instrument. Compared with many of its predecessors it is, but by comparison with an electric motor, heat engine, or an A.C. transformer the efficiency is remarkably low. Thus, an electric motor may have an efficiency of upwards of 60 per cent.; a heat engine has an efficiency of about 20 per cent.; and a good mains transformer an efficiency of 80 per cent. or more.

Another Viewpoint

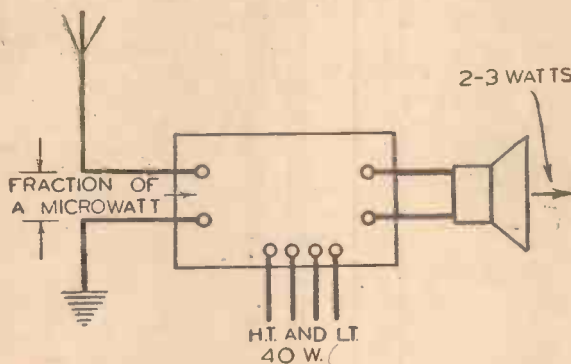
But if we were to consider the relation between the signal input and the signal output we should find that the amplification afforded was a matter of millions. Most of us are satisfied to think of the subject in this light, merely considering the incidental (although essential) input as the energy used in causing the input signal energy of, perhaps, a small fraction of a millionth of a watt to be amplified and converted into sound.

This does not mean that we should be satisfied to sit back and forget about the

lack of efficiency in other directions. One method of increasing the percentage efficiency is by reducing the number of valves, using one filament or heater to operate in conjunction with two or more sets of electrodes. Valve-makers were not slow to take advantage of this possibility by

by The Experimenters

producing multi-electrode valves such as the pentagrid, double-diode triode, double-diode pentode and the like. It is questionable, however, whether this was a wise move. Although resulting in a certain saving of current (which is generally very cheap anyway), it tended to complicate receiver design and to introduce small H.F. losses. Besides that, it made service work more difficult and valve replacement more



Diagrammatic comparisons between input and signal output.

expensive. One is therefore inclined to wonder whether or not the American idea of using a large number of "single-duty" valves is not better than that which has gained ground in this country of making one valve do as many jobs as possible.

Single- or Multi-purpose Valves?

This leads to another side of the efficiency question. In American sets the individual valves are rarely operated at full efficiency, even though the valves themselves are, as a class, less efficient (that is, they give a smaller output for a given input) than their British counterparts. It is probable, however, that a soundly made British receiver with a large number of moderately efficient valves would be more reliable and consistent than is the modern set as we know it.

One trouble is that if you operate a valve "all out"—that is, so that it operates at its highest possible efficiency—there is always a danger of its becoming unstable. If it is unstable, distortion or difficulty of receiver control arises; and when steps are taken to correct those troubles losses are automatically introduced which might well offset any advantages provided by the greater initial efficiency.

Proof

One of the greatest causes of low efficiency in H.F. circuits is the need for an extremely high degree of selectivity. If tuning is sharpened beyond certain limits efficiency loss is inevitable. You can easily prove this by making a single-valve receiver, using a large open tubular coil, wound with fairly heavy gauge wire and connecting the aerial lead-in through a condenser of, say, .0003-mfd. capacity to the "grid" end of it.

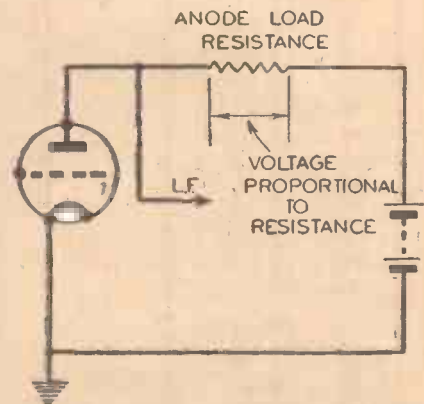
Change the coil for a compact, modern band-pass filter consisting of two screened coils, when it will be found that signal strength and range of reception are enormously reduced. In fact, the addition of an H.F. valve between the detector and aerial circuit—this time consisting of a tapped and screened coil or H.F. transformer—will do no more than bring sensitivity and signal strength to their former level. But whereas the first set would be useless for other than local-station reception, or the reception of one or two distant stations well separated in wavelength from any others in operation, the second set would be a practical proposition, bringing in a large number of transmissions all round the dial.

Aerial-system Efficiency

Another usual method of increasing selectivity is by shortening the aerial. Compared with the "standard" 100ft. aerial of ten years ago, an aerial suitable for to-day's conditions is no more than 60ft. in total length. The shorter the aerial, the greater the selectivity—but the lower the sensitivity or pick-up. These simple facts help to explain why many modern receivers sometimes appear to be far less efficient than their counterparts of the 'twenties. If they are less efficient it is because they are immeasurably more selective, as they must be to be of any real value.

Experiments seem to demonstrate that one of the most satisfactory methods of increasing efficiency of the receiver installa-

(Continued on page 535)



For maximum signal voltage the anode load should be chosen with care to suit the "optimum load" of the valve.

Radiolympia—Advance Details

A Brief Survey of Some of the New Exhibits to be Seen at This Year's Radio Exhibition

ONLY ten days remain before Olympia will reveal the new designs and the latest radio products of the British manufacturers.

As in previous years, much speculation and many opinions are in the air as to what will form the outstanding feature of the Exhibition this year. In many cases manufacturers are still adopting a certain hush-hush policy regarding their new lines. However, at the time of going to press

with ten press buttons, three of which serve as wave-band switches for ordinary manual tuning, and the remaining seven as pre-tuned station selectors. It is interesting to note that on the pre-tuned positions variable permeability tuning is used in the oscillator section instead of the usual trimmer condensers; also a special dual inductance circuit eliminates separate wave-band switching and provides increased frequency stability. As quality reproduction is one of the essential requirements with any modern radio receiver, resistance-capacity coupling is employed between the L.F. amplifier and the output valve, which, incidentally, has an output of approximately 8 watts.

For those requiring a battery-operated model, the Bush B.A. 51, which, as the illustration shows, is a very attractive proposition, is available for 9½ guineas complete with batteries. The circuit employed is of the all-wave superhet type, and in the interests of economy it is so arranged that the current consumption is well on the low side.

Portables

The demand for portable receivers is still considerable and the makers of the Bush products have not overlooked the fact that users of such apparatus will wish to secure the benefits offered by the push-button tuning. This is proved in a practical form by their P.B. 50, which is the type number of an interesting A.C. mains-operated portable embodying a superhet circuit for the medium and long waves only.

In this design reception is by automatic press-buttons only; it provides eight



This charming listener evidently appreciates Charlton Higgs' model shown here.

many advance details are to hand and they prove that push-button tuning is undoubtedly going to form one of the main attractions, while television will play a more important part in this annual display of radio than ever before.

Push-button Tuning

Without discussing the merits of the various forms of push-button tuning, it is evident that this feature has something definite to offer the casual listener. It does remove the troubles usually associated with the tuning of a sensitive high-gain receiver and thus allows any and every member of the family to receive their favourite station by simply pressing a button.

In spite of the fact that this system offers so many advantages, it is pleasing to note that prices have not soared as one might have anticipated. To select a model at random, namely, the Bush P.B.51, which is a six-stage all-wave superhet for A.C. mains, employing their simplified form of push-button tuning, we find that the price is only 10½ guineas.

Five alternative programmes can be received by this tuning, or the normal manual control can be used at will, thus combining the benefits of individual selection with an efficient pre-selector device.

Another of their models is the P.B.53, an A.C. operated five-valve superhet receiver covering the normal all-wave band. This is listed at 12½ guineas and is provided



A battery-operated all-wave superhet by Bush Radio, Model B.A.51.

alternative programmes which, within certain limits, can be those of your choice. The only manual controls left for the listener to operate are in the form of a combined tone and on-off switch and a volume control. The output is rated at 3½ watts, and the price is 9½ guineas.

On the Charlton Higgs stand will be seen a very distinctive receiver which is illustrated herewith, and although it is in the medium price range, its design, workmanship and performance is claimed to be equal to a great many of those which, because of price, would come within the luxury class.

The makers' specification informs us that a six-valve all-wave superhet circuit is used, together with an advanced method of high-speed automatic volume control.

One notable feature in this design is the size and clearness of the tuning scale, the pointer actually travels 278°.

Push-button tuning of the preset, drift-compensated type is incorporated, and six preset positions are given. The cabinet is strongly built and piano-finished on beautifully-matched inlaid walnut veneers, cross-banded at each end. The price of this model is £11 19s.

Visitors to the Exhibition will not fail to be impressed with the extensive range of products displayed and offered by the General Electric Company. It is not possible for us to cover, even briefly, the complete range; therefore, we have selected three models which are illustrated in these pages.

Commencing at the bottom end of the price scale, their

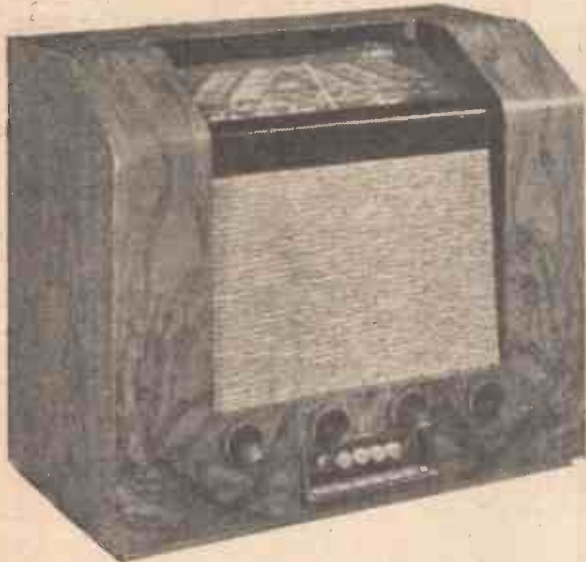


The Bush P.B.51 enables push-button tuning to be enjoyed for 10½ gns.

A.C.5 at £7 19s. 6d. offers a very interesting proposition.

A powerful two-band five-valve superhet for A.C. mains is the circuit description. It is claimed to be outstanding for range and selectivity, the chassis and speaker being housed in a beautifully-modelled walnut-finished bakelite cabinet. The makers' "Chromoscopic" scale, which is calibrated with station names and wavelengths, is also fitted, and the speaker is designed to handle the output, which is in the neighbourhood of 3 watts.

The first of their models in the



The "Touchtune 5." An A.C. three-band superhet with push-button control.

press-button class is the Touchtune 5, this again being for A.C. mains operation and of the five-valve three-band superhet type.

The automatic tuning system allows any of five chosen stations to be obtained instantaneously by pressing a button.

Facilities for using an extension speaker and pick-up are provided, while as with the other models, the "Chromoscopic" is included in the specification.

Radiograms

For the record-enthusiast, G.E.C. are providing a radiogram for A.C. mains operation embodying their Touchtune or push-button tuning. The chassis and circuit details are identical with those of the model described above, with the addition, of course, of the electrically-operated gramophone motor and its associated pick-up arrangements.

The cabinet, which is of richly-finished walnut, is of ideal proportions for the modern home.

There are many instances where a listener, who is also a record enthusiast, has already an efficient table-model receiver with which he is quite satisfied, and does not, therefore, wish to have to replace with a radiogram.

For those placed in these circumstances, Cosmocord have produced, amongst other items, two "Playing Desks," which should have a wide appeal.

One type, namely model 876, is shown here, and it is so designed that a table-model radio receiver can stand on top of it and thus form a neat and well-finished radiogram.

The case is well constructed and has a

medium walnut finish, and it is so arranged that easy access to the turntable and pick-up arm is possible. Each model is complete with swivel-head, pick-up, volume and speed controls, automatic switch, needle cups and a 12in. turntable. In spite of this attractive specification, the price is only £4 7s. 6d.

From the various specifications given, it is apparent that the demand for All-wave receivers is still as great as ever, in fact they will be more in evidence than last year. Considerable progress has been made with the development of the short-wave section in such receivers, and the additional attraction of short-wave listening must no longer be looked upon as merely a sales promoting stunt. The latest receivers can, and do, bring in the stations and, providing conditions are at all reasonable, they compare favourably with the transmitters on the more usual medium- and long-wave bands.

So many people overlook the fact that time and weather conditions play a very important part in the satisfactory reception of S.W. stations; similarly, enough consideration is not always given to local conditions, and the efficiency of the aerial and earth system; therefore, it is not fair to condemn any All-waver without, at least, giving it a reasonable trial under average conditions.



The compact Cosmocord playing desk.

Making Comparisons

The arrangements at Radiolympia this year for the testing or, more strictly speaking, the comparison of receivers gives the intending purchaser the best chance he has yet had at any Exhibition of getting a fairly accurate idea of the capabilities of any receiver.

In previous years, one has only been able to judge the loudspeaker fitted to a receiver, as the signal was supplied by a special amplifier the output of which was common to all Stands. This year, however, more satisfactory arrangements have been made, and modulated high-frequency signals will be fed to the



Radiogram enthusiasts will appreciate this "Touchtune" model by the G.E.C.

Stands at certain strengths, which will allow one to judge not only the quality of the output but also the sensitivity of the pre-detector circuits. This system will place the receiver as nearly as possible under conditions equivalent to normal working arrangements, thus allowing those interested to judge for themselves the value of the salesman's claims.

Television

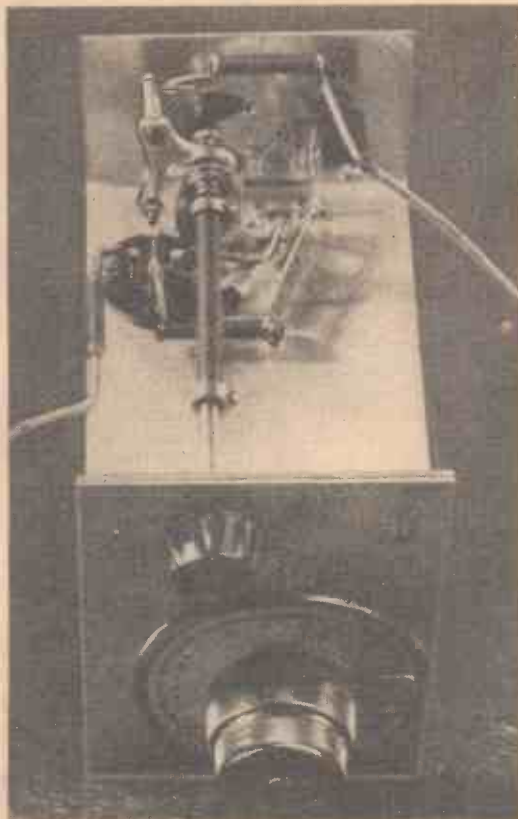
Never before has television had such a chance to convince the public of its merit as it will have at Radiolympia this year. Elaborate arrangements have been made for demonstrations, so that every visitor will have a reasonable chance of seeing actual transmissions under comfortable conditions. For those who care to accept the standing invitation of the B.B.C. to "Come and Be Televised" they will be able to be interviewed each morning, before the camera. As natural colouring is not suitable for television subjects, each visitor who plucks up enough courage to undergo the ordeal will, of course, have to be made up in the usual studio manner.



The G.E.C. model A.C.5 for those who require a low priced A.C. operated set.

EFFICIENT long-distance reception on the ultra-short waves requires a multi-valve receiver, generally of the superhet type, particularly where the television signals are concerned. Frequently, a special converter is built using a triode-hexode frequency changer, with a broadcast receiver providing the intermediate and output amplification. This is a good method of receiving ultra-high-frequency stations, but it has its disadvantages. For one thing, it requires the use of a large number of valves, choice of a suitable I.F. frequency, and also each station is tuned in at two places on the dial.

It is a surprising fact that a large majority of short-wave listeners use receivers of the simpler kind of the detector, L.F. or H.F.



This sub-chassis view of the ultra-short-wave detector unit shows the simple wiring connections and panel controls.

det. L.F. variety, and for the above-mentioned reasons have so far left the ultra-short waves alone. In this article is described a simple ultra-short-wave adapter which can be added to the L.F. portion of any set, and will give stable reception between 5 and 10 metres.

Electron-coupled Circuit

The theoretical circuit is shown in Fig. 1 and is somewhat interesting, as it combines an electron-coupled oscillator with a battery triode, but feed-back is controlled by the conventional anode to earth capacity. The circuit and constants were evolved after considerable experimenting, and the circuit may be tried out without any fear of difficulty of obtaining or controlling oscillation down to below 5 metres.

Since a battery valve is used it is necessary in the electron-coupled circuit to maintain both sides of the filament at a potential above earth. This is done by tapping the

negative side to the centre of the tuning coil, and inserting an ultra-short-wave H.F. choke in the positive lead. The 10,000 ohm resistance in the anode of the valve acts as an H.F. choke, and deflects energy back through the reaction condenser to the grid circuit by means of the tapped portion of the coil. The input side of the anode resistance is bypassed by a .0003 mfd. condenser. The tuning condenser C has a value of 25 micro-microfarads, the reaction condenser also having the same value. Plug-in coils are used, as three coils are necessary to completely cover the 5 to 10 metre range. The make of coil specified is supplied with a base.

There is little difficulty about this ultra-short-wave adapter, but it must be remembered that care, both in construction and operation, must be used; "haywire" hook-ups will not give results on the ultra-high frequencies.

Constructional Details

Turning to the practical construction of the unit, it will be seen that a small home-made chassis is used, consisting of a strip of 16-gauge aluminium 14 by 5in. The aluminium is bent at right angles 3in. from each end to form the chassis. This can be done in a vice, or with the help of a piece of wood. The small panel, also of aluminium, measures 7 by 5in.

A one-inch diameter hole must be drilled out for the valveholder, this being done with a carpenter's bit; also the smaller holes for mounting the other components of which the positions can be seen in Fig. 2. There is a single earth terminal mounted at the back of the chassis. The reaction condenser is mounted underneath the chassis in such a position that one side of the fixed vanes comes as near to the anode pin of the valveholder as possible. It may be noted, also, that the bolt holding the fixed vanes of the reaction condenser is withdrawn and pushed through the reverse way (care being taken to replace all the spacing washers) so that the bolt, or soldering tag, can be soldered direct to the valveholder anode pin.

The tag of the moving vane of the reaction

LIST OF COMPONENTS

- Two 25 micro-microfarad tuning condensers—Premier Supply.
- One 6-turn ultra short-wave coil—Premier Supply.
- One ultra-short-wave H.F. choke—Eddystone.
- Two extension outfits—Eddystone.
- One .0003 condenser—T.C.C type M.
- One .0001 non-inductive condenser—T.C.C.
- One 2 megohm resistance—Erie.
- One 10,000 ohm resistance—Erie.
- One 4-pin chassis mounting valveholder—Clix.
- Strip of aluminium for chassis and panel, wire, etc.
- One valve—Hivac D210.

AN ULTRA-S DETECTO

In this Article the Construction of a Receiver for Reception Between 5 and 10 metres

condenser is wired direct to earth. Here, it must be mentioned that although the chassis is at earth potential, it is advised that all the earth wiring is taken direct to the earth terminal. Since the bypass condenser is anchored direct to the earth terminal, there are only three other wires

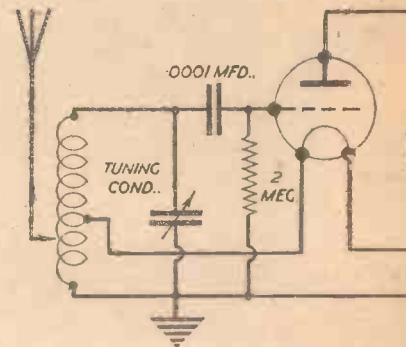


Fig. 1.—Theoretical circuit diagram

IMPORTANT BROAD

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, August 10th.—Promenade Concert (Bach), Part 1, from Queen's Hall, London.

Thursday, August 11th.—At Your Service, Madam, musical comedy.

Friday, August 12th.—The Barber of Bagdad, comic opera.

Saturday, August 13th.—Promenade Concert, Part 1, from Queen's Hall, London.

REGIONAL (342.1 m.)

Wednesday, August 10th.—Barnum, the Greatest Show on Earth, feature programme.

Thursday, August 11th.—Concert Party programme, from Broadstairs.

Friday, August 12th.—Three Sea Plays—No. 3, H.M.S. Q5, compiled from Captain Gordon Campbell's own story and other documents.

Saturday, August 13th.—Wembley European Swimming Championships Final.

MIDLAND (297.2 m.)

Wednesday, August 10th.—Elgar: Choral programme.

Thursday, August 11th.—Water Polo: Cheltenham v. Coventry, a commentary from Sandford Park Pool, Cheltenham Spa.

Friday, August 12th.—A Concert by Warwickshire artists, from the Pump Room, Leamington Spa.

Saturday, August 13th.—Instrumental concert.

SHORT-WAVE OR UNIT

Construction of a Simple Adapter for and 10 Metres is Described

to earth, one from the tuned circuit, one from the grid resistance, and one from the reaction condenser. The anode resistance is wired between the top fixed vanes of the reaction condenser, and the other side of the bypass condenser. From this latter junction is taken the screened output lead.

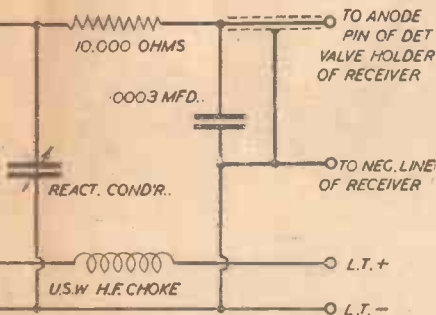


Diagram of the ultra-short-wave detector unit.

CASTS OF THE WEEK

WEST OF ENGLAND (285.7 m.)

Wednesday, August 10th.—Dorset Dialogue, a conversation about Dorset life, custom and tradition.

Thursday, August 11th.—The National Town Criers' Championship, an eye-witness account from the Football Ground, Bridport.

Friday, August 12th.—Variety from the Hippodrome, Southampton.

Saturday, August 13th.—The Forest of Dean, a programme on the life and customs of the People of the Forest.

WELSH (373.1 m.)

Wednesday, August 10th.—Choral programme.

Thursday, August 11th.—Music Making on Bamboo Pipes, from the George Hostel, Normal College, Bangor.

Friday, August 12th.—Songs by Modern Welsh Composers.

Saturday, August 13th.—Rhyll on Parade, from the Pavilion Theatre, Coliseum and Queen's Dance Hall.

NORTHERN (449.1 m.)

Wednesday, August 10th.—The Northern Muse: A Festival of Northern Dialect Poetry and Song—4, Derbyshire, Lincolnshire and the Isle of Man.

Thursday, August 11th.—Concert Party programme from the Floral Pavilion, New Brighton.

Friday, August 12th.—Northern Concert Party Cavalcade.

Saturday, August 13th.—Music at Twilight: Instrumental concert.

All the underneath chassis wiring is clearly shown in Fig. 2.

Looking at the unit from the front, the right-hand side of the coil base is taken to the fixed vanes of the tuning condenser. The other side of the coil base is taken to the moving vane, also a lead is taken from this side of the coil base to connect with the negative terminal of the accumulator. The soldering tag to the moving vane of the tuning condenser is located at the back of the condenser, so the connection here was made by soldering a short length of flexible wire direct to the front of the spindle in "pigtail" arrangement.

Coil and Valve

The coil has to be centre-tapped, so a short piece of 18-gauge wire was soldered to the coil, and a crocodile clip was connected to the wire coming through the chassis from one side of the filament. It is important to note the filament wiring, and not take the leads from the L.T. battery direct to the filament pins of the valveholder, as is usually the case in a battery set.

The valve chosen for this adapter was of medium impedance, special detector kind, and was found perfectly suitable for this ultra-short-wave unit. There should be little difficulty in operating the adapter. The detector valve of a receiver is removed, and the anode lead from the unit is plugged in to the anode pin of the detector valveholder in the receiver. A connection is also made to the negative line. The L.T. positive and negative leads are taken direct to the battery, and these leads should be as short as possible. It is not advised that the unit should be used in the conventional way, that is, by taking all leads to a four-pin plug to the receiver detector valveholder. The unit can be used with a mains receiver, but it is necessary to keep the unit well away from the mains transformer, or any A.C. wiring.

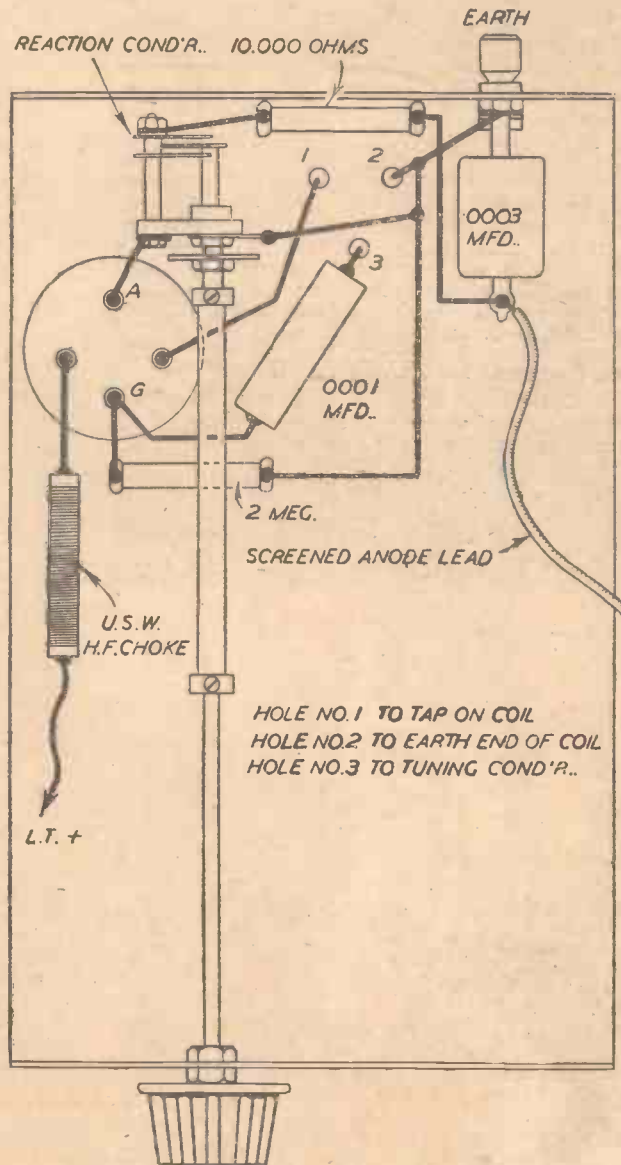
A separate connection to earth should be taken direct from the terminal on the unit. It will be seen in the circuit diagram that the aerial is shown taken direct to the grid coil. Due to the electron-coupled circuit this is quite satisfactory, and a long outdoor aerial can be used in this way without preventing the

valve from going into oscillation. It will be found that oscillation is fairly constant over most of the dial, except at the lower end of the tuning range, when it is necessary to increase the reaction condenser considerably to obtain oscillation. A full H.T. voltage can be used, and indeed this is advocated. The valve will go into oscillation smoothly irrespective of the H.T. voltage, another tribute to this particular circuit.

The 6-turn coil specified will only cover the two television frequencies, so if it is desired to cover from 5 to 10 metres 4- and 7-turn coils will have to be obtained. With the 6-turn coil the sound part of the television transmissions came in at 75 degrees on the particular dial used, which is a Utility 100 to 1, or alternatively, with the moving vane of the tuning condenser a little less than half in.

Regarding results, it must be remembered that with a simple detector L.F. arrangement it will not be possible to obtain loud volume on ultra-short-wave signals, except from very local stations.

Fig. 2.—SUB-CHASSIS WIRING DIAGRAM



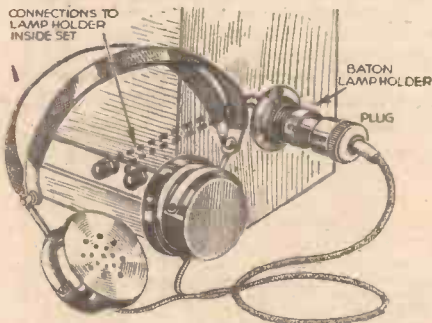
A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Quick-change 'Phone Connector
I HAVE three radio sets and only one pair of headphones, and I found it very awkward to keep uncoupling the 'phones from one set to connect to another. I therefore hit on the following idea. I obtained three batten lamp-holders and

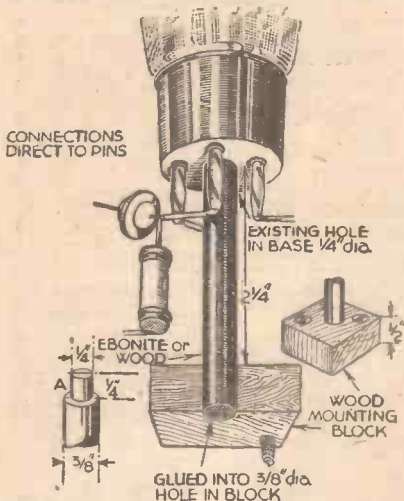


A method of using lamp-holders and adapters for 'phone connectors.

screwed one on the side of each set (see sketch). I then connected the lamp-holder to the 'phone terminals of the set, and attached an ordinary lamp adapter to the headphone leads. It is now a simple matter to quickly change from one set to another.—J. ENTWISTLE (Darwen).

Valve Support for U.-S.W. Experiments

IN the majority of valves where there is no centre-pin, there is to be found a hole of approximately $\frac{1}{4}$ in. in diameter, this normally being used for the centre-pin when



This dodge for supporting a valve is useful in U.-S.W. experiments.

required, and I decided to take advantage of this hole in my experiments on the U.-S.W. bands.

From the accompanying sketches it will be seen that the idea has proved very useful, whilst the method of support is sufficiently rigid and easily assembled. Importance is

THAT DODGE OF YOURS!

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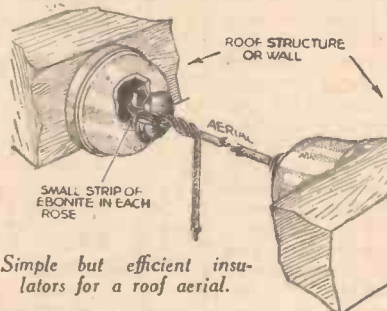
SPECIAL NOTICE

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

attached to the actual length of the pip "A," as the valve pinch is near this hole, and in using a longer pip and forcing this home, the valve envelope may be either worked loose or even broken. The diameter of the hole in the valve base should be checked, as also the depth, and the application of a little adhesive will ensure a sound fitment.—T. G. SELWORTH (Luton).

Insulators for a Roof Aerial

HERE are two simple but efficient insulators for roof aerials. It will be seen that they consist of two electric



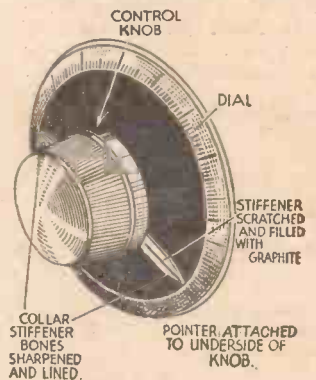
Simple but efficient insulators for a roof aerial.

light porcelain ceiling roses. They are screwed onto opposite walls, and the aerial is then put through the hole in the cup-like portion of the rose, and round a small strip of ebonite, and brought out through the hole and twisted, leaving one end long enough for the down lead. The aerial should not be fixed to the terminals on the rose, as this does not provide such a long leakage path to earth.—E. RUMBLE (Balcombe).

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GROUND FLOOR

Improving A Control Knob

HERE is a dodge I adopted for adding a pointer to an existing control knob, in order to save expense. I obtained two collar stiffeners (or collar bones) and shaped one end of each to a fine point.

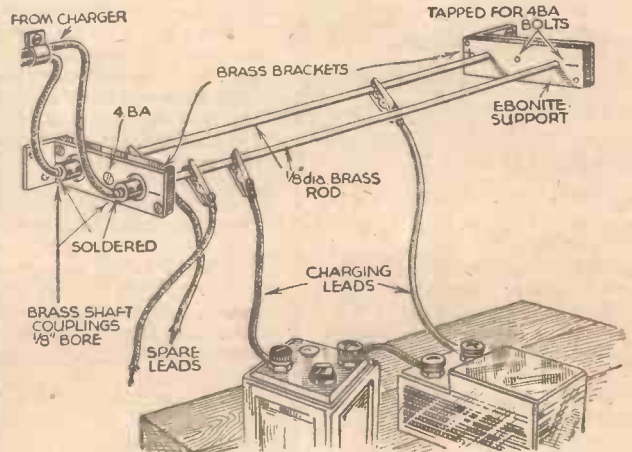


Adding a pointer to a control knob.

Then with the help of some "strong" adhesive I glued each piece to the bottom side of the knob, as shown in the sketch. A straight line can be scored down the middle of each of the pointers, and some graphite from a pencil rubbed into them.—R. POLLOCK (Broxburn, West Lothian).

A Novel Bus-bar Connecting Fitment

A NEAT and simple fitment of the type illustrated will prove useful to those enthusiasts who do their own charging. Although I use $\frac{1}{4}$ in. brass rod for the bus-bars, lengths of brass curtain-rod will serve the purpose admirably. They are provided with threaded ends which lend to different ideas on the method of end-clamping. Since I have fitted up this arrangement, not only has it facilitated the charging of a large car accumulator which I use, but by a suitable switching circuit at the charger, I have been able to branch the mains for certain experiments.—G. L. LAWRENCE (Southall).



A novel bus-bar connecting fitment for home charging.

SOURCES OF LOSS

(Continued from page 529)

tion is by experimenting methodically with the aerial-earth system. Some day we shall probably find that our conceptions of aerial design are all wrong. A considerable amount of research work has been done in recent years, but much of this has been directed toward making the pick-up system free from interference. When there is legislation compelling all users of electrical apparatus to fit suitable suppressors to it we shall have a chance to pursue our experiments in aerial design in a more logical manner, seeking for efficiency instead of being compelled to make that subordinate to freedom from interference.

Avoiding Coupling Losses

In the meantime every constructor can do useful work by trying alternative aerial positions and making sure that the earth lead is the best possible. A high-resistance earth connection can be the cause of heavy signal losses.

As far as set design is concerned, the constructor can do much by taking care that the interval coupling circuits are as efficient as possible. That valves are extremely good cannot be denied, but they must be properly used. The anode-circuit load must be high in relation to the impedance of the valve. If you draw a valve with a resistance in its anode circuit, as shown in an accompanying diagram, it will be seen that if the value of the anode resistance is doubled the signal voltage developed across it is doubled; Ohm's Law tells us that. In practice it is found that, for triode and H.F. pentode valves, the resistance, or impedance to H.F. or L.F., in the anode circuit should be approximately twice the A.C. resistance of the valve. In the case of power valves and pentodes the makers invariably state the optimum load, which is the most suitable value of anode-circuit impedance. Only when this value is used will the circuit operate at maximum efficiency.

It is largely because of the losses which must be introduced to bring about complete stability in a multi-H.F. receiver that the superhet has gained so rapidly in popularity. With this type of circuit high selectivity can be obtained without a very great sacrifice in efficiency, whilst simplicity of control is greatly enhanced. At the same time it is possible, in the laboratory at any rate, to make a "straight" set which is appreciably more efficient than a superhet with the same number of valves. Perhaps future developments will be such that a highly efficient circuit of that type will return to favour and once again bring about the decline of the superhet.

PROGRAMME NOTES

"General Release"

MARTYN C. WEBSTER will compère one of his "General Release" programmes of current film music for Midland and Regional listeners on August 15th. Reginald Burston will conduct the Midland Revue Orchestra, and the singers will be Marjorie Westbury (soprano) and Harry Porter (tenor) and a trio.

"Sport in the Midlands"

FOOTBALL will make its first appearance in the programmes this season on August 20th, when E. A. Eden, Secretary of the Birmingham County F.A., will describe the League Benevolent Fund Match between West Bromwich Albion and Aston Villa. The other feature of "Sport in the Midlands" (which is now resumed as a weekly feature) will be an eyewitness account by Harry Walker, of the Midland Festival of Diving at Gosford Park Swimming Pool, Coventry.

"Terror from the Sea"

"TERROR from the Sea" was broadcast in the West of England programme on March 8th, and it will be repeated in the Regional and West of England programmes on August 20th. The play, which has been freely adapted by Froom Tyler, from Eden Phillpotts' novel, "The Owl of Athene," is described as "a fantasy, a thriller and a parable." It begins in the Land of the Gods, and is continued on Earth; the time is somewhere in the Future. It is the story of the war that did end war, and of the terrible struggle between mankind and vast hosts of giant crabs. The world-wide menace of the marine monsters has the effect of uniting the nations under one leader. This remorseless invasion goes on until a certain young pharmaceutical chemist invents a liquid gas which enables men to vanquish "the last invader," and the decisive battle of this nightmare takes place off Weston-super-Mare.

"A Garden Tour"

V. SACKVILLE-WEST will give the last of a series of four talks describing some of the famous West Country gardens she visited on a recent tour in "A Garden Tour: Devon and Cornwall," on August 18th for Regional and West of England listeners.

"Water Polo"

WATER Polo enthusiasts will have an opportunity of hearing an interesting broadcast on August 11th when Harry Walker will give a commentary on the water polo match between Cheltenham and Coventry from the Sandford Park Pool, Cheltenham Spa.

"How to Look at Ships"

COMMANDER J. M. SCOTT, R.N., King's Harbour Master at Plymouth, will give a talk entitled "How to Look at Ships" in the West of England programme on August 12th, and in the Regional programme on August 13th. From his office in the Longroom, overlooking Plymouth Sound, Commander Scott can see every day the largest liners in the world, and the greatest men-of-war. In this talk he is going to explain how to tell from the look of a ship what kind of a vessel she is, and on what sort of job she is likely to be engaged.

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BROADCASTING 30 YEARS AGO

By AUSTIN C. LESCARBOURA

In 1908 Broadcasting Required as much Muscle as Brains, what with Cumbersome, Temperamental Equipment that would Work Continuously at least for a Few Minutes

"FOR Pete's sake, change the tune!" Thus, read our first unexpected "fan" communication scrawled in pencil on a U.S. Signal Corps telegraph blank handed us by the grinning operator in khaki.

"Just picked up from the U.S.S. *Pennsylvania*," he added verbally. "She's now passing the Hook on her way out to sea. Wireless operator telegraphs he has the wireless room packed with officers and men listening to your music. They've been snatching his earphones one from the other. Says you're getting out in fine shape."

So we had become wireless entertainers. Broadcasting was born. And transcribed programmes had made their debut. All because, for the past ten minutes or more, we had been playing the familiar clanging strains of the Anvil Chorus from Verdi's opera *Il Trovatore* on our trusty Edison phonograph, over and over again, thereby giving our tired voices a merited rest from the shouting of test numbers and "How do you get me now?" queries into the huge horn of the microphone.

The Time, 1908. The Place: Fort Hancock's wireless station at the tip end of that lanky peninsula known as Sandy Hook which sweeps northward from the New Jersey coast. *The Players:* Two engineers of the Telefunken Wireless Telegraph Company of America, one being your humble author, and a Signal Corps wireless operator. *The Plot:* A would-be serious attempt to span by wireless telephone conversation some eighteen miles of space as the crow flies between Fort Hancock and Fort Wood on Bedloes Island, in the very shadow of the Statue of Liberty. A contract for \$25,000.00 was to be the reward for a successful five-minute talk between the two points.

Such is the simple truth of the early struggles of radio broadcasting. My first job after leaving technical school was the taming of a new-fangled wireless telephone transmitter just arrived from Germany. It came in several crates. Also, the instructions in substantial technical German. But the descriptive text proved too formidable for our schoolboy German, and so we simply followed the pictures and diagrams in assembling the latest wireless rig from across The Pond.

The Transmitter!

In due course we had a mighty imposing assembly set up. The wireless telephone transmitter was of the electric arc type. In fact, there were ten arcs to generate the oscillations, arranged in two banks of five arcs. Each arc consisted of a tall copper can filled with water, for the top electrode, and a large carbon button held on a metal strip, for the bottom electrode. Pressing down on a handle at the end of each bank, caused all carbon electrodes to be brought in contact with the copper tanks, thereby striking the arc. A thumb nut on each handle could be regulated to set the gaps for all the arcs of the bank, and to feed the carbons towards their cans as the former slowly wore away.

Mounted on a colossal oaken table with a tall back, the ten shiny cans and the ten metal strips carrying the carbon buttons

looked more like an organ than anything else. And when the boiling water in the copper cans sent up clouds of steam, we had the makings of a steam calliope, visually speaking. On the rear board were several huge measuring instruments indicating the power supply voltage, the conditions within the closed oscillating circuit, and the output to the antenna circuit. Also a big loose-coupler with a fixed coil and a movable coil whereby to transfer the radio frequency energy from the closed oscillating circuit to the open antenna circuit. Finally, there was a microphone socket with its huge fibre horn coming right out to the front edge of the table.

Talk about present-day microphone fright. In those early days a performer or speaker would have been justified in fainting right on the spot when facing that four-foot horn and a vast array of electrical equipment including ten spluttering, smoking and smelling arcs.

"Lights Out"

It was a cold winter, back in 1908-9. So cold that the grease in the motor-generator bearings became as thick and unyielding as glue. The motor-generator, a huge seven-horse-power Crocker-Wheeler affair intended to convert the Army Post's 110-volt D.C. supply into 600-volt D.C. for our ten arcs in series, had to be started the first thing upon arriving on the job. We threw the switch and swung the starting-box handle. The motor-generator wouldn't move. What with stiff grease and weak power supply, the armatures wouldn't turn.

Whereupon our sergeant-operator friend-in-need would get busy on the phone, calling up various places about the Post and requesting "Lights Out" in order that we might get our motor-generator turning. Then, with sufficient power supply assured, we would mobilise several husky soldiers for a tug-of-war with that stubborn electrical mule. Several turns of rope were wrapped around the protruding shaft. The soldiers pulled on the rope. And lo! the cursed thing would start up, virtually thawing out its bearings, and in time providing the necessary electrical diet for the ten hungry arcs.

So far, so good. We had power. The next thing was the taming of the ten arcs. Each spluttered and fumed in its own way. Each had to be critically adjusted to the right arcing distance. As often as not, when all would be behaving fairly well, one would suddenly go off on a bat and had to be pampered and coddled and brought back again into the fold.

The oscillating circuit meter indicated the antics of our arcs. With patience and coaxing, we finally achieved a stabilised meter reading, whereupon the stage was just about set for our wireless conversation. Without loss of precious time a carbon button microphone—in the form of a neat flat cartridge—was slipped into the holder and the four-foot fibre horn swung into position. Then we started talking over the air.

For want of something better to say, we kept counting numbers from 1 to 10 and back to 1 again, over and over again, with "How do you get me now?" repeated at

frequent intervals. Every once in a while we tried "This is Fort Hancock calling Fort Wood via experimental wireless telephone." As with present-day broadcasting, it was a one-way conversation. There was no immediate answer from the party at the other end. Occasionally the sergeant-operator jotted down a brief report he picked up via wireless telegraph from Fort Wood. But since the wireless telegraph didn't do so well either getting through that maze of conflicting signals in the New York area, we generally got our answers by Western Union or Postal Telegraph, and detailed reports many hours later when we returned to the home office in New York that evening.

It all seemed so silly, this business of calling numbers hour after hour. "1, 2, 3, 4, 5. How do you get me now? 1, 2, 3, 4, 5—5, 4, 3, 2, 1. Fort Hancock calling Fort Wood. How are we coming in?" And so on and on. Little wonder that we included in our equipment an Edison phonograph and a choice collection of cylinder records. Those records were chosen not for their musical or entertainment value, but for their acoustical wallop. That's why the Anvil Chorus record was our favourite, for those clanging sounds wobbled the modulation meter at least two degrees beyond the next best noise-maker. In order not to lose too much of this precious noise, the phonograph horn was stuck as far into the huge microphone horn as possible.

Now the contract we were aspiring to called for a continuous conversation of at least five minutes' duration, before Signal Corps officials. But what a goal that was! At the end of two or three minutes, the modulation meter would no longer flicker in step with our shouting. That meant no further modulation of the outgoing waves. Or, in other words, the microphone was "shot."

Running Hot

The four-foot horn was taken down. The cover came off the microphone holder. We reached in for the hot microphone cartridge with a pair of pliers, and dropped it in a pail of water, where it sizzled itself cool, and then to the junk pile. A fresh microphone cartridge was shipped into the holder, the horn restored, and the conversation resumed—provided the arcs were still behaving themselves—all in the space of a minute or two. But since the terms of the contract called for a continuous five-minute operation, we had to start all over again in establishing our endurance record on the air.

Some days we were fortunate—up to a certain point. Each microphone lasted for several minutes before its demise. The arcs could be adjusted continuously by turning the thumbscrews, thereby maintaining an even gap and eliminating frequent striking. But then our tuning condenser would go bad, and that meant shutting down for the rest of the day. This tuning condenser was an elaborate variable-plate job in paraffin oil. It handled several thousand volts. Occasionally a spark would jump from rotor to stator plates, forming a carbon speck that shorted the condenser.

(Continued on opposite page)

RADIO CLUBS & SOCIETIES

Club Reports should not exceed 300 words in length and should be received First Post each Monday morning for publication in the following week's issue.

BRADFORD SHORT-WAVE CLUB

RAIN did not damp the enthusiasm of the members of the above club, who assembled at Dobrudden Farm, Baildon, to participate in the Annual Field Day held on July 30th-31st 1938. Tests were carried out with a portable transmitter, which was kindly loaned by Q2HT. It was worked by G8UP, under the portable call G8UPP, which was answered by G3KB, who gave valuable assistance to the club in the tests that were carried out between these two stations.

As the club is not licensed for portable apparatus, the club's call, G3NN, could not be used, but tests will be carried out every Friday evening, under this call, using the 160 and 40 metre bands. Anyone who hears these transmissions should send their reports to the Bradford Short-Wave Club, Bradford Moor School, Killingham Road, Bradford, Yorks. Information regarding the club can be obtained from the secretary, S. Fischer, "Edenbank," 10, Highfield Ave., Idle, Bradford, Yorks.

WORTHING AND DISTRICT SHORT-WAVE CLUB

THE last meeting of this club was held at our new H.Q. in the Committee Rooms of The Literary Institute, Montague Street, Worthing. It was decided at a committee meeting to hold the meetings every fortnight on Thursday evenings at 7 p.m.

Owing to private reasons our secretary has been forced to resign, and all inquiries should now be sent to Mr. D. Boxall, "Braeside," Greenland Road, Durrington, nr. Worthing. A very interesting and instructive talk was given by a member on Practical Fault Finding, and this was very helpful to many junior members.

BRENTWOOD AND DISTRICT RADIO SOCIETY

THE first D.F. contest in which Brentwood members had ever taken part, and which was so smoothly organised by their hon. sec., 2CYW, was held on July 24th. Over 30 people participated, and cars assembled at Shenfield Station, from Brentwood, Ilford, Southend, and Romford Societies. The transmitting car, staffed by G2WG, G3CQ, and G8TV, left for the chosen site (Mill Green, nr. Ingatstone), and started work under the call G8KMP, at 11 a.m. Each receiving car was issued with an envelope on which was written the destination at which the party had to commence taking bearings, while inside was the location of the TX. Listening was begun at points at a radius of about ten miles round the TX.

The first to reach the transmitter was G6CT, from Southend, who arrived at 2.20; Mr. Kelly, from Ilford, was second; and Brentwood and Romford tied for third place at 3.10. At 5 p.m., all parties proceeded to the Rendezvous Café, in Brentwood, for tea and a conversation. Several well-known amateurs were present, and short speeches were made by G6UT, who presented the cup (given by G8KMP) to the winners, G2KT, the Brentwood president, 2CYW, G6CT, 3CQ, 3FT, and others.

EASTBOURNE AND DISTRICT RADIO SOCIETY

AT the general meeting of this society, held in the Science Room at the Cavendish Senior School, on July 25th, at 7.30 p.m., Mr. F. E. Wingfield explained the society's 5-metre transmitter, designed and built by himself, which is under his supervision until the society has obtained its licence.

The transmitter consisted of one 6A6, in push-pull, tuned plate tuned grid oscillator; choke modulated with a 6L6 in Class A, H.T. being fed by an 80. Mr. G. Catt then proceeded to give an account of the Super-generative Quench receiver, and also demonstrated a 3-valve one of his own.

Full information for joining the society can be had from the hon. secretary, T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

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BROADCASTING 30 YEARS AGO

(Continued from facing page)

Nothing less than taking the condenser apart, cleaning the plates with fine emery-cloth at the site of the spark, and filling with fresh paraffin oil, would restore this particular Humpty-Dumpty.

Our efforts continued through 1909 until the following winter. We tried, tried, tried. Once we held a steady conversation for six minutes. The contract loomed in sight. But the ranking Signal Corps officer who was to pass on our technical merits didn't happen to be on the job just then, so it didn't count. Finally, we dismantled the transmitter, placed it on the overgrown tug-boat, and brought it back to our New York shop, where it finally sold for junk.

Our German confrères across the ocean couldn't understand our failure. With an exact mate to our transmitter, they had demonstrated wireless telephony to the German army over a distance of some 100 miles. Perfect results. And we—bah! Couldn't even cover 18 miles!

The sequel to that story is simply this: Our intelligent German friends stretched their transmitting aerial parallel with a telegraph line running between the two points. Likewise with the receiving antenna. Of course, they covered almost six times as much distance as we did.—*Radio News.*

TELEVISION PROGRAMMES

"Tele-Crime"

A NEW kind of television programme will be tried as an experiment on Saturday evening, August 13th, when a "Tele-crime" is presented. Viewers will be put in the position of detectives unravelling a murder mystery which develops almost before their eyes. They will not see the murder committed, but enough evidence will be placed before them to show who is the guilty person. Very few characters will be introduced, and at the end a detective will question the suspects. After a brief pause, in which viewers will be able to decide who is the guilty party, the detective will put forward the correct solution.

If the experiment is successful, these ten-minute "Tele-crimes" may be a regular feature. The "Tele-crime" on August 13th will be concerned with "The Back-Stage Murder" in which a star is found dead in a dressing-room.

The "Tele-crime" will be produced by Eric Crozier.

"Is Life Worth Living?"

THIS extravaganza, by Lennox Robinson, which was presented on August 8th, will be repeated in the afternoon on August 19th. This amusing play by the director of the Abbey Theatre, Dublin, tells of the efforts of a troupe of earnest reformers to shake the Irish village of Inish out of its complacency. Usually, the theatrical summer season at Inish has consisted of rude, low comedy, but the reformers succeed finally in introducing dramas that anatomise the soul of man. The simple folk who have been normal for years begin to develop hidden sorrows or wild passions. They hurl lamps at their wives and buy poison to murder their aunts. Then John Twohig, the pavilion proprietor, decides that this introspective drama must go, so he pays off his actors and imports a circus. "Is Life Worth Living?" will be presented by Eric Crozier.

PATENTS AND TRADE MARKS

Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents, of 5, Chancery Lane, London, W.C.2, who will give free advice to readers mentioning "Practical and Amateur Wireless."



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.

B. D. (Hull). No, the arrangement will not be satisfactory. We would suggest that you follow the maker's specification and use the valve in the normal manner.

R. P. (Liverpool). From the details supplied it is impossible for us to give you any exact information. We can only render assistance if sufficient details are provided for us to form an opinion.

M. E. J. (Hants). The coil will be quite all right for the circuit mentioned but you must not expect a high degree of selectivity with a single-tuned circuit.

H. L. (Glasgow). L.F. instability appears to be the cause of the trouble. Check up the output valve; if a transformer is used, change over the connections to the secondary or insert an H.F. grid stopper in the output stage.

G. C. W. (Hove). The Argon Charger will suit your purpose. It is fully described in the issue for May 25th, 1938.

M. B. (Glos). A simple detector and L.F. stage form a very useful combination for short-wave work, providing an efficient aerial is available and that phones are used while logging the stations.

F. P. (Hendon). The issue in question is no longer available, therefore we are unable to meet your request in this instance.

2 FDF (Chertsey). The L.T. winding will not be satisfactory for two of the American valves. One would no doubt be all right. We cannot undertake to provide constructional details of components to individual requirements. Messrs. Premier Supply can supply small L.T. transformers for the valves specified.

W. F. (Avoch). The circuit appears to be quite satisfactory. You may find it an advantage to use a higher anode resistance for the detector valve. Automatic bias is obtained by inserting a resistance between the H.T. and L.T. negatives. The value will depend on the total current flowing in the receiver and the number of volts required for bias.

G. R. (Exeter). Without more details of the receiver we cannot state the exact modifications necessary. It will, however, be necessary for you to remove a few turns from the medium-wave section of the frame aerial and, possibly, from the H.F. coupling coil.

O. P. (Dorset). The eliminator is not supplying sufficient current for the receiver. You must adjust the operating conditions of the circuit so that the current consumption is reduced or cut one valve out of circuit. A larger mains unit would be the most satisfactory way out of the trouble.

L. S. (Bromley). Messrs. B.T.H. can supply a most efficient transverse current microphone. The price is reasonable and in appearance it is very neat.

W. P. (Hayes). It would seem that the volume control is at fault. As the receiver is a commercial model, we would suggest that you have it examined by the makers.

H. O. (S.W.1). The resistor is evidently of too low a current rating. You should use the two-watt type. The coupling is in order though we would suggest a simple tone control to govern the frequency response of the speaker.

C. D. (Manchester). Try placing your aerial higher and make the horizontal portion and the down-lead from one length of wire. The join might be responsible for the trouble.

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SMITH'S AND FERRANTI ELECTRIC CLOCKS

TWO attractive folders, issued by the Sun Electrical Company, Ltd., show a range of the latest Smith's and Ferranti electric clocks respectively. Several designs of Smith "Seetric" clocks are listed in glass and chromed metal combinations. There are also the "Nitelite" alarm clocks, incorporating an ingenious arrangement which provides for the dials of these models to be floodlit at will, without any separate connection, or battery.

The Ferranti range includes several popular models in chromium, green, amber and ebony finishes, and also several designs with oak, walnut, and mahogany cases. The Paris alarm, a pleasing electric timepiece, is one of the latest additions to the range. It is available in ivory, or rich colour bakelite case, and the price is now reduced to one guinea.

LATEST PATENT NEWS MUSIC BROADCASTS

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

TELEVISION.—Castellani, A., and Safar-Soc. Anon. Fabbrica-Zione Apparecchi Radiofonici. 484003.

Cathode rays in a tube T with a centring screen A are periodically deviated at a uniform speed over a relatively long band L of adjoining photo-electric elements inside the tube (Fig. 1). Lateral deflecting-plates P are so energised by impulses in the form of saw teeth from a generator L', Cf, G that

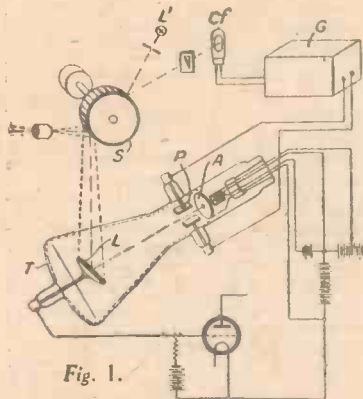


Fig. 1.

the return of the cathode rays to the beginning of the band is instantaneous. The band comprises laminae of silver, nickel or molybdenum arranged side by side with the interposition of sheets of mica, and the exposed surface of the laminations is coated with photo-electric substances. A rotary mirror drum S effects the framing analysis, while the tube effects the line analysis under the control of light incident on the drum from a source L'. Kinema films may be transmitted.

CATHODE-RAY TUBES.—Zeitline, V., Zeitline, A., and Kliatchko, V. 484181.

An oscillation generator consists of a cathode-ray tube in which is mounted a perforated disc D (Fig. 2), the beam passing through the perforations being interrupted



Fig. 2.

by the solid parts of the disc; a single or double row of holes may be used. The interrupted beam is suitably focused on to an output electrode or electrodes I. The beam may be deflected over the disc by electromagnetic or electrostatic means and a control grid g is mounted in front of the cathode.

CATHODE-RAY TUBES.—Farns-Worth Television, Inc. 484186.

In a cathode-ray tube used for television a grid 16 (Fig. 3) placed directly in front of the luminescent screen 21 is scanned by a high velocity beam supplied by a gun mounted at the end of the envelope; the gun consists of the indirectly heated cathode 5 control electrode 4 and anode 2. The grid is formed of nickel wire insulated by magnesium oxide. Two sources 34 of low-velocity electrons, each consisting of an indirectly heated cathode 26 and grid anode 34 (Fig. 4), are mounted within the enlarged part of the envelope and flood the

grid with electrons to charge its surface negatively; the scanning beam will cause secondary emission from elementary areas of the grid 16, changing the space charge around this area and allowing low velocity electrons to pass through the grid, possibly with some of the high velocity beam, to bombard and light up the screen 21. This screen is of refractory material and may be in sheet form or made of knitted fabric. Leakage of electrons will take place through the insulating coating of the grid to the nickel underneath; the modulating effect of the signal current will cause variation in the secondary emission and in the

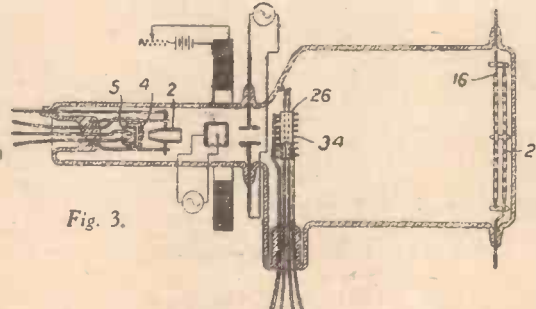


Fig. 3.

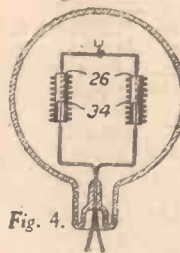


Fig. 4.

space charge effect. When the scanning beam leaves an elementary area, the leakage will gradually bring the area to a datum level during which period a varying amount of electrons will be able to pass through the mesh of that area. The modulating control may be applied to the grid 16 in which case the high velocity beam from the cathode 5 is not modulated.

RADIOLYMPIA AUG. 24 to SEPT. 3

NEW PATENTS

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

Latest Patent Applications.

- 21416.—Berry, R. J. (Lorenz Akt.-Ges.).—Television receivers. July 19.
- 21398. 21262.—General Electric Co., Ltd., and Easley, D. C.—Television receivers. July 18.
- 21506.—White, E. L. C., and Chasmar, R. P.—Television receiving systems. July 20.
- 20291.—Lorenz Akt.-Ges., C.—Television receiving apparatus. July 8.
- 20292.—Lorenz Akt.-Ges., C.—Television receiving apparatus. July 8.
- 20276.—Scophony, Ltd., and Rosenthal, A. H.—Television receivers. July 8.
- 20278.—Scophony, Ltd., and Rosenthal, A. H.—Cathode-ray tube apparatus

A NEWCOMER to the Promenade Concerts—which enter upon their second week on August 15th—will be Walter Morse Rummel, the well-known American pianist, who will be the soloist in Beethoven's third Concerto, broadcast in the National programme on August 19th. Walter Rummel comes from a family of four generations of musicians, of whom several were famous pianists, and his mother was the daughter of S. F. B. Morse, the inventor of the telegraphic code. Rummel is also a composer, and has written, among other works, a Pianoforte Concerto, based on the rhythm of the S O S signal invented by his grandfather. Born in Berlin, he studied the piano with Godowsky, and began his career as a pianist in 1923, touring Europe, Africa and America. In 1932 Rummel undertook the great task of performing all the most important works in the literature of the piano, from Bach to Ravel, in a cycle of fifteen concerts which took place in Paris. In 1935 he inaugurated in Geneva a series of concerts commemorating the fiftieth anniversary of the death of Liszt. Walter Rummel now lives in Brussels, where he teaches, and he was appointed by the Belgian Government as one of the judges in the International Music Competition Festival which was held there last May.

Young Composer's Concerto

ANOTHER newcomer to the Proms will be the young British composer, Benjamin Britten, who will be making his first appearance at these concerts as solo pianist in his own Concerto, which will be performed and broadcast for the first time on August 18th, on the National wavelength. Benjamin Britten is a native of Norfolk, having been born at Lowestoft in 1913. He became a scholar of the Royal College of Music in 1930, studied there under John Ireland for composition, and Arthur Benjamin for piano, but his chief musical education has been with Frank Bridge, with whom he has studied since the age of twelve. Britten has written incidental music to films, stage plays and radio plays, and many of his works have been performed on the Continent at Festivals of the International Society for Contemporary Music.

for television, etc., systems. July 8.
20636.—Scophony, Ltd., and Rosenthal, A. H.—Cathode-ray tube apparatus for television, etc. July 12.

Specifications Published.

- 488644.—Radioakt.-Ges. D. S. Loewe.—Television transmission tubes.
- 488948.—Radioakt.-Ges. D. S. Loewe.—Grid control of cathode-ray tubes.
- 488843.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Television receivers.
- 488419.—Radioakt.-Ges. D. S. Loewe.—Television scanning means.
- 488188.—British Thomson-Houston Co., Ltd., and Gabor, D.—Cathode-ray devices.
- 488268.—Marconi's Wireless Telegraph Co., Ltd.—Television and like systems.

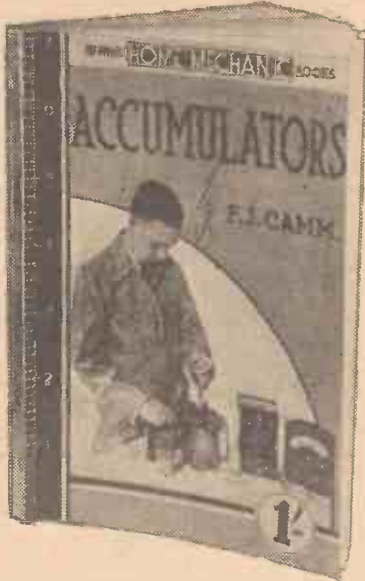
Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

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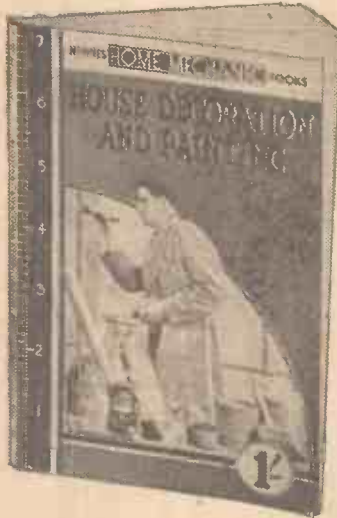
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TERMS DEFINED

Capacity or Capacitance

ANOTHER component which is as vitally essential to a radio receiver and transmitter as an inductance is the condenser. Although a pure inductance has to possess very low self-capacity, it is necessary, in the case of tuned circuits, to use additional external capacity by employing condensers.

A condenser can be defined as that which is able to receive and retain a charge of electricity or, in other words, *electrostatic energy*.

The amount of energy which any one condenser will hold depends on the size and construction of the condenser.

A condenser consists of two or more metal plates, each of which is separated from its neighbour by some suitable insulating material or medium. This insulating medium is known as the *dielectric*, and it can be formed from such substances as mica, glass, bakelised paper or, as in the case of variable condensers, air, to mention only the most usual.

By virtue of their construction, i.e., no direct electrical connection between the two plates or set of plates, no *direct* current will flow through a condenser, but if such is applied to the plates, then the component will become charged.

The ability to receive and hold a charge in this manner is due to electrons and protons present in the conductors; the electron being the smallest possible quantity of negative electricity while the proton is its positive counterpart. When electrons are in motion, it is stated that an electric current exists, or, conversely, an electric current is

due to the flow of electrons. When a voltage is applied, therefore, to the condenser, one set of plates receives additional electrons, and the other becomes deficient. The former will be in a negative state and the latter in a positive.

If the dielectric and construction is perfect, the condenser will hold its charge until a path is provided between the plates. If a piece of wire is joined to the two points, the additional electrons on the negative plate will flow or surge along the wire to the positive plate and constitute an electric current, as explained above.

The name condenser only applies to the actual component. When one wishes to speak of the ability of a condenser to take a charge it is usual to refer to the *capacity* or *capacitance*.

Dielectric Constants

The capacity of a condenser depends on the nature of the dielectric, the number of plates in each set or section, the area of the plates and the distance between each plate. As the nature of the dielectric plays such an important part in the resultant capacity, a table has been prepared showing the relative values of the different materials to air, which is taken as the standard or unit. Such values are known as the *dielectric constants* of the materials. There are numerous types of condensers, but they can all be covered by two main headings, namely, variable and fixed.

The variable types are used whenever it is required to tune the associated circuit by varying the capacity in or across the circuit. These are so designed that one

set of plates is free to be rotated so that they interleave with the other set which is fixed.

The shaping of the plates, or vanes, governs the law which any particular condenser will follow as regards its variation in capacity with relation to the movement of the moving vanes.

For circuits requiring a constant capacity, condensers having a fixed value are used.

With these types, great care has to be taken in their construction to see that no variation can take place as regards the factors which control their capacity, otherwise, their value would vary over wide limits and render them unsuitable for some of the many uses to which they are put.

It is usual for the makers to specify definite voltages for the safe working of different types, and on no account should these figures be ignored, as a breakdown in a condenser might result in serious harm to the associated components.

Measurement of Capacity

The Unit of capacity is the *farad*. This, however, is far too large for radio work, so this is divided into a *million* parts and the term *microfarad* applied to the new units thus formed. For high-frequency work, microfarads are often too large, so these are, in turn, divided by a million and we obtain the micro-microfarad.

It has been explained that a condenser will not allow direct current to pass through it, but it must not be thought that the same law applies to alternating currents.

With A.C. the plates will become alternately charged positive and negative which, in effect, will be equivalent to the alternating current passing through the condenser. Considerable use is made of this property in radio apparatus, but more about that and the resistance a condenser offers to A.C. in a future issue.

Bernhard Monshin : A Brief Biography

BERNHARD MONSHIN, who is appearing in "Maritza" at the Palace Theatre, had his first violin lesson at the age of five. Up to the age of ten, he was asked to play at many concerts, and after this commenced hard and serious study, under a famous professor of violin. At the age of fourteen he won a scholarship at the Royal Academy of Music. He competed against people up to the age of twenty-one years. He was the youngest entrant.

During three years at the Academy he gave two violin recitals. Students still remember his performance of the difficult violin solos, "Zigeunerweisen" by Sarasate, and the "Airs Honorais" by Ernst. At the age of seventeen he formed his first orchestra, which started at the famous Kit-Cat restaurant in Haymarket, London. The orchestra was the "Rio Tango Orchestra." After a short stay there he decided that his experience and knowledge of popular music was not to his satisfaction, and so joined various orchestras as violinist, to discover more about the popular side. Then re-formed the "Tango Band," and did quite a number of broadcasts and films with the band.

After a number of appearances he received an offer to conduct an orchestra in the leading hotel of Reykjavik in Iceland, and when leaving for that country he was given a personal letter of introduction from the B.B.C. to the "Icelandic Broadcasting Co.," and shortly after his arrival there was broadcasting regularly with his orchestra. He returned to



A recent photograph of Bernhard Monshin.

England in the beginning of 1938, and was immediately booked for a broadcast to the "Empire" with his "Rio Tango Band," in which his old friend, Monte Rey, was featured.

Immediately after this he was engaged to play at the Crystal Palace Exhibition, and once again with his "Rio Tango Band." People seemed to remember how well this band appealed to the public.

Now he has an important part in one of the best shows that has ever been put on in the West-end of London. The show is "Maritza."

Monshin was complimented by Kalman, the composer of the music, who is Hungarian. When first introduced to Kalman he could not believe that Monshin was English, as he played the violin and acted his part so much like a Hungarian.

Miss Mara Lossef, who is the leading lady in "Maritza," always calls him "My Zigeuner Maestro." She, too, could not believe he was an Englishman.

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

Edited by F. J. CAMM

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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).

An A.C. Two-valver

SIR,—The accompanying circuit is of a simple A.C. two-valver, which I recently built for a friend who does not care for difficult tuning. The auxiliary grid volume control on the H.F. pentode detector is delightfully smooth, and by careful selection of the fixed reaction condensers, is almost uniform over the whole band.

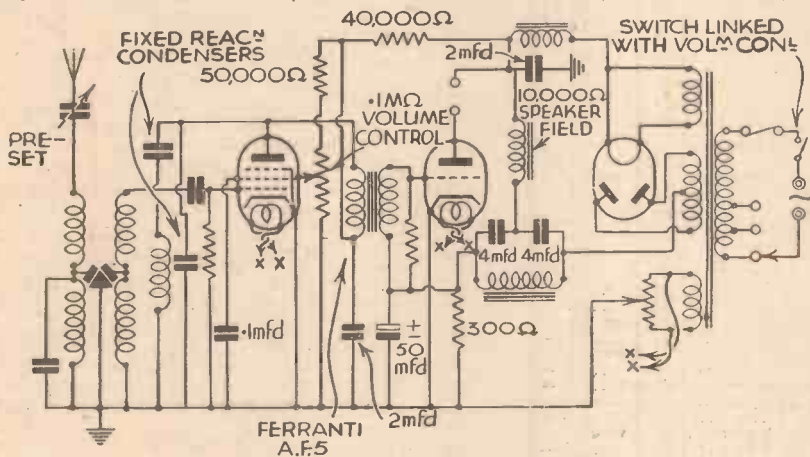
Incidentally, the receiver was very inexpensive to build, using components which can be obtained very cheaply through the advertisement columns of PRACTICAL AND AMATEUR WIRELESS.

The valves used are Cossor (M.S. Pen.

valves, providing means of drawing any required curve or curves (3 meters in use at a time); valve voltmeter; detector for noisy components; usual tests for resistors, volume controls, condensers both fixed and variable.

As I have my own 32v. lighting plant, which I service myself—there is a "mains" section—for testing lamps, filament and current, L.T. accumulator charging, and so on.

Three sets of leads for using with a receiver—test prods, crocodile clips and valve adaptor, these are interchangeable, provision for shunting a condenser across the current meter, also for earthing valve



Theoretical circuit diagram of Mr. J. R. Leeming's A.C. two-valver.

and 41M.P.) and Clarion 250 x 2, 60 mA rectifier.—JOHN R. LEEMING (Blackburn).

An Experimental Test Panel

SIR,—The following particulars of a test panel I propose to construct may be interesting to other experimenters.

I already had two good meters, but was tired of messing about with odd bits of wire, nails, batteries, and so on littered all over the bench and leaving no room for the set under test, not to mention that I nearly ruined one of the meters; luckily it was the shunt resistance that "went," and now reads reasonably exactly to 10 mA instead of 100 mA.

My chief aims were that the panel should be:—

- A. Comprehensive.
- B. Flexible.
- C. Simple to use.
- D. Low cost (apart from the meters I already had).

A. Comprehensive.—This I think I have achieved as between the various meters I shall have—10 ranges for D.C. current; 6 ranges for D.C. volts; 3 ranges for A.C. volts, low and high value ohmmeters; rough valve test (see "Wireless Encyclopaedia"); complete tests of all battery

grid through a condenser when set is on test, and also for a series condenser when using as output meter if necessary.

B. To make it really flexible I have used a system of banana plugs and sockets, with no switches except an on-off in each meter positive line; this switchboard contains 40 sockets and 26 plugs, so that almost any combination is possible of the components mounted on the board. Actually, for any of the tests mentioned above, the maximum number of plugs that require using is eight, in many cases one or two only. Plugs not being used will be accommodated in a separate set of holes, to avoid mistakes. Meter selector switches are also replaced by plugs and sockets, so that actually almost all the components can be used independently, if necessary, a useful item when experimenting, and the nearest supply depot is 1,700 miles away.

C. It is simple to use, as all plugs are lettered A to Z, and sockets 1 to 40; a list of tests with the requisite plug and socket connections is ready, so that to make any test a few seconds will suffice, even if exterior batteries have to be connected. (A 4½v. battery is included on panel.)

D. Low cost was the last item, but as I have used a lot of junk, I think about 30s. to 40s. will complete it, this including

a 1 mA rectifier for the A.C. ranges, and 4 potentiometers.

It now remains to build it, and this will be rather a complicated job, but once done it should be worth it.

My best wishes to PRACTICAL AND AMATEUR WIRELESS.—F. LAWSON (Las Palmas, Canary Islands).

Component Construction

SIR,—I would like to have a little "grouse" concerning one section of amateur work which I feel does not receive sufficient consideration.

Please don't think that I do not appreciate the great task you have to satisfy all your readers; I do feel, however, that there must be quite a large number who, like myself, would like to be in the position to construct certain components themselves.

Perhaps I have been exceptionally unfortunate, but many times I have had to kick my heels while waiting two and sometimes three weeks for orders to be completed. When one is eager to finish off a job, this delay is not only very annoying, but it also robs one of many hours of interesting and instructive amusement.

A year or two ago you published a series of constructional articles dealing with components. They were most useful, and I, for one, greatly appreciated them. Would it not be possible to repeat a similar series, bringing the designs up to date as much as possible, consistent with the facilities available to the average home constructor? If other readers feel the same as I do, perhaps they will add their voice to my plea.

Thanking you for the valuable help you have rendered in the past, and wishing PRACTICAL AND AMATEUR WIRELESS every success.—V. C. T. (Blackheath).

[What do other home constructors think of this suggestion?—ED.]

CUT THIS OUT EACH WEEK.

Do you know

—THAT outside aeriols can collect quite a large charge of static electricity during summer storms.

—THAT it is always advisable to fit a lightning arrester and earthing switch outside the house; and that the earth connection to it should be as short and direct as possible.

—THAT the efficiency of an aerial is often reduced, during summer months, by the growth of foliage and branches of nearby trees.

—THAT insulators, unless cleaned from time to time, have a habit of becoming coated with grime and carbon deposits which tend to reduce their insulating properties, especially when they are wet.

—THAT an examination of the complete aerial system during the summer months, and the repair or replacement of any doubtful parts, is likely to prevent a lot of disappointment during the winter, when the aerial is subjected to severe weather.

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.

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QUERIES and ENQUIRIES

Amplifier Output

"I have an A.C./D.C. 8-watt amplifier unit. I wish to enlarge the output to something in the neighbourhood of 20 to 25 watts by using an additional unit which will be operated from A.C. mains; the output of the existing amplifier will form the input to the additional unit.

"My present output valves are P 3580's in push-pull. I don't know the output transformer ratio, but the speech coil of the speaker has a resistance of 2 ohms. What modifications will be necessary to the existing amplifier in order to make such an idea practicable, and what are the best valves for such an output, triodes or pentodes?"—H. L. (S.E.27).

BEARING in mind the present output, it will be necessary to use a large triode to handle the signal without distortion or overloading. For the same reason it will be advisable to embody a suitable volume control across the input.

The existing transformer should be replaced with one having a ratio of, say, 1:1, and it should be noted that a good component will be essential.

The output of the triode will have to be fed into two large power triodes in push-pull (Class A), and we would suggest Osram D.A.30's with a P.X.4 preceding them. A separate rectifier will, of course, be necessary, and particular attention will have to be given to the layout and choice of components. Unless you have had a fair amount of experience building and testing such amplifiers, we would suggest that it might be more to your advantage to build a fresh amplifier according to a valve-maker's specification. In this direction Messrs. Tungram, of Tungram House, Theobalds Road, W.C.1, might be able to assist you.

Frame Aerials

"Could you tell me whether there is any rule regarding the difference in the windings of the aerial and reaction circuits on a frame aerial? What is the best size of frame to use for medium and long waves? What is the difference between headphones of 120 ohms and 2,000 ohms resistance, and which is the better?"—G. S. (Kingston).

THERE is no rule governing the frame windings mentioned. For the grid circuit, it is safe to use the following figures as the basis of your experiments. For the medium waves, 75ft. of 24 S.W.G. D.C.C. wire, each turn being spaced, at least, the thickness of the wire; 200ft. of 34 S.W.G. D.C.C. will be required for the long waves, this section being wound with the turns touching. It is usual to place the reaction winding between these two sections, the actual spacing and number of turns being determined by experiment. For the reaction winding, it is advisable to use finer wire, say, 36 S.W.G. D.S.C. or enamelled. The size of frame is so often governed by the size of the case; however, an average size, bearing in mind efficiency, is in the

neighbourhood of 16in. by 14in. The difference between the headphones is the value of resistance and the fact that they are designed for use with different types of circuits. For radio work, when normal output systems are employed, those having the higher resistance are the more satisfactory.

Argon Charger

"I started to make the Argon Charger, but I now find that no power points are provided in the house wiring. Therefore, as I do not like to connect it to the lighting circuit, will you let me know if it is possible to alter the circuit? As regards the three wires provided on the primary of the mains transformer, will you explain how these are connected? I understand that two wires have to be connected to the mains, but am not sure of the third. Does one go to earth?"—E. H. G. (Staffs).

RULES

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

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

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

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

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

THE consumption of the Argon Charger is so low that it will be quite in order to connect it to the lighting circuit. A power supply is not essential.

Three wires are provided on the primary winding to enable the transformer to be used on mains of a different voltage. One pair is used for supplies of 200/220 volts, while for 230/250 volts the other tapping is required. The specified makers supply a diagram showing the correct connections. On no account should one wire be connected to earth.

American Receivers

"I have an all-wave American receiver which operates off A.C./D.C. supplies. In one side of the mains lead is a kind of resistance wired like a spring. If I disconnect the lead at the adapter and put a lamp of 230 volts across it, I only get half the glow obtainable when the lamp is plugged into the mains. Now, what I would like to know is, if that lead broke in the middle would I be able to repair it, like an ordinary lead and obtain the same results? Could I fit a length of twin flex in place of the existing lead?"—E. J. (Salford, Lanes).

ALL American receivers are designed for use on mains of 110 volts, which is the standard supply in that country. When they are required to be used on 200/250

volt supplies, as in this country, it becomes necessary to insert a suitable value of resistance to bring about the essential voltage drop, and this resistance is usually embodied in the mains leads. It is formed of a fine resistance wire wound round a flexible insulating core. When a break in the resistance element takes place, it is often rather difficult to repair and, what is even more important, a certain amount of the resistance is sometimes lost during the repair, through the wire breaking or being cut off, and this immediately affects the voltage arriving at the receiver. It is best to secure a new lead. On no account should ordinary twin flex be used.

Battery Portable

"I wonder if you would be so kind as to let me know whether you have, or where I could get, a wiring diagram of a small portable battery set of, say, three or four valves for medium waves only, and to be as simple as possible. I would like the receiver to have the largest output that can be obtained from such a circuit and use, of course, a self-contained aerial. I only require English stations, but they must be at good volume and the circuit as sensitive as possible."—W. W. (Surbiton).

WE have not published any blueprints of a portable receiver designed only for medium-wave reception. In the circumstances, we can only suggest that you study our blueprint list and select a model most suited to your requirements. With the "straight" type of portable, i.e., Det. and L.F. stages, it would only be a matter of ignoring the long-wave section of the frame aerial, but with those embodying a stage of H.F. amplification, it would become necessary to use a special coil for the H.F. coupling in addition to the above modification. You could use a standard dual-wave coil and short-circuit the wave-change switch connections if you particularly wish to cut out long waves.

S.W. Design

"I am considering planning the layout of a four-valve short-wave receiver, but as there are several items about which I am not too clear, would you mind answering the following queries: Which is better, chassis or baseboard? Is a metal assembly more efficient than a wooden one? Should the H.F. stage be tuned or untuned? I take it that it is better to use one H.F. stage, detector and two L.F. stages, than a detector and three L.F. stages."—Q. A. E. (Staffs).

THE question of chassis or baseboard is one on which opinions differ according to individual tastes. It all depends on the design of the receiver. With the suggested arrangement we would advise the use of a chassis, as such will enable neater wiring to be obtained and the better placing of the components. A metal assembly is more efficient for the short waves, provided, again, that care is taken with the location of all inductances. We would not advise the use of a detector followed by three stages of L.F. amplification. You would be asking for trouble. A tuned stage of H.F. amplification enables a better degree of selectivity to be obtained, and a worthwhile amplification will be given by the circuit on wavelengths of 25 metres and upwards.

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

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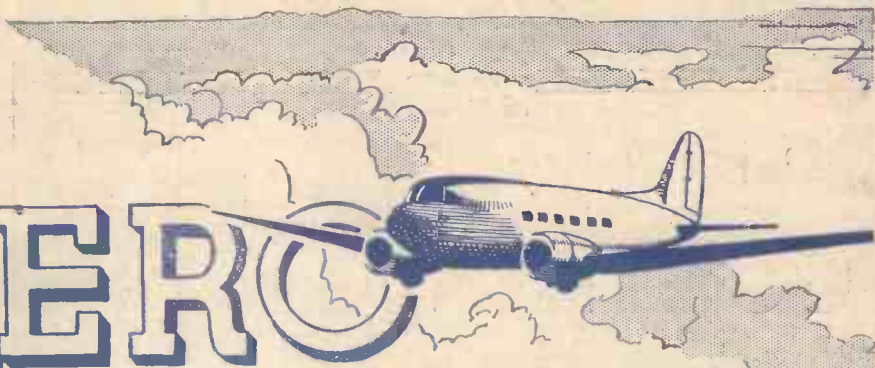
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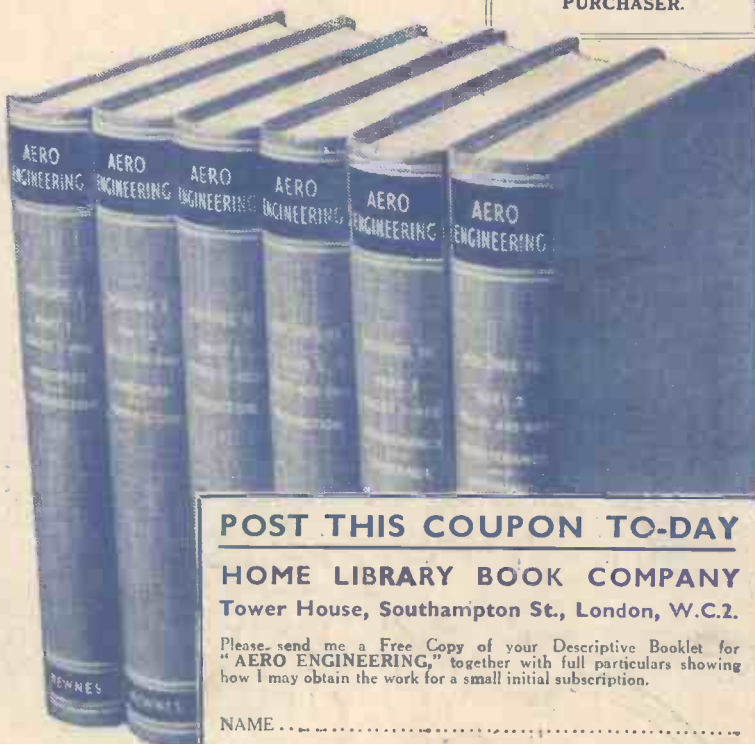
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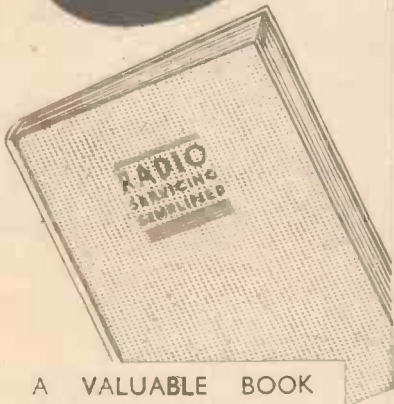
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Practical and Amateur Wireless

Edited by **F. J. CAMM**

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

VOL. XII. No. 303. August 20th, 1938.

ROUND *the* WORLD of WIRELESS

Radiolympia Secrets

AS the approaching Exhibition draws nearer, rumours and scars become prominent regarding the items which various manufacturers will exhibit. Many details are obviously kept closely guarded until the doors open, in order that exclusive rights may be obtained by various manufacturers, and surprises are generally sprung on us at the last minute. So far, there appears to be little to stir the imagination, although the rumour of television receivers at a ridiculously low figure is already spreading as fast as a bush fire. Before hopes are raised it must be remembered that there are some very expensive items in the modern television receiver, and the cathode-ray tube alone is the result of many years of expensive research work and thus cannot be sold for a mere song. No doubt low-priced receivers will be available, but the hopes of seeing, as some rumours will have it, full-size C.R. tube television sets at £5 or £6 are, we are afraid, figments of the imagination. Further details of some of the exhibits are given in this issue, and next week we shall give our full Guide to the Show with a classified analysis of all of the firms exhibiting.

Marconi Memorial

IT is announced that the War Office have granted permission for a memorial to Marchese Marconi to be placed on their grounds at Lavernock Fort. The site is near the spot where Marconi's aerial was erected, and the iron support of this is still in existence. The memorial is to take the form of a granite block suitably engraved and is being erected by the Rotarians of Cardiff, Barry and Penarth.

Motor Cycling at Donington

THE jubilee of the invention of the pneumatic tyre is the occasion of a special motor cycling contest on August 27th, at Donington. The principal event, the 500 race, will be the subject of a running commentary by Graham Walker in the National programme on this date. On the same day in the Northern Ireland programme, Raymond Glendenning will describe the Graigantlet Hill Climb, when veteran motor-cars of pre-War days will show their paces at the Ulster Automobile Club Annual Hill Climbing Contest. This should provide amusement for spectators and listeners alike.

Hospital Half-hour

THE North will, in August, introduce a new kind of programme, and a new character. John Selby, a Northern announcer, has had the idea, since he took over gramophone record programmes, of presenting light broadcasts of records in a special feature intended for invalids and listeners in hospitals in particular. The first of three programmes, called "Hospital Half-hour," will be broadcast on August

parades, which will be carried out in co-operation with the Fashion Group of Great Britain, will feature exclusive models by some of the leading British designers to-day. Winter and spring fashions will be shown, and it is estimated that clothes to the value of £30,000 will pass through the studio between August 24th and September 3rd, the closing day of the Exhibition.

C. H. Middleton, the famous broadcaster, will be televised each morning, in the second week (August 29th to September 3rd), with a reconstructed corner of the Television Garden, which regular viewers have so often seen at Alexandra Park.

Another "King of the Keyboard"

EDDIE CARROLL is to broadcast on August 15th as one of the "Kings of the Keyboard."

He has decided to feature in his programme the most popular tunes of the moment, together with several of his own compositions, including, "Harlem," "The Lady Craves Attention," "Still Waters," and a new tune, composed while he was on holiday in Killarney, which was given its title, "Colleen's Dream," by the Lord Mayor of Dublin, whom Carroll met on his way home.

Sport in the Midlands

THE survey of the week's sport in the Midlands will, on August 27th, include eye-witness accounts of the league match between Birmingham and Sunderland, of the first day's play of Worcestershire v. Northamptonshire, and of the Five-miles National Grass Championship of the National Cyclists' Union. Captain H. A. Gilbert, the old Worcestershire slow bowler, will describe the cricket; the cycling event, to be run at Gloucestershire Constabulary Sports ground at Gloucester, will be by William Oakley, a well-known Midland cycling journalist and broadcaster.

Fund for Cottage Hospitals

THE fourth and last of the appeals on behalf of the Road Accidents Fund for Cottage Hospitals will be given by a Grateful Patient who has benefited from one of the Hospitals concerned as the Week's Good Cause on August 21st. Appeals have been made on four consecutive Sundays for a Joint Fund for the maintenance costs of the smaller Cottage Hospitals.



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OUR STAND: No. 9 GROUND
FLOOR—SAME SITE AS LAST YEAR!

18th. It is hoped that all listeners will be entertained by the gramophone records played, but that patients in hospitals who listen will enjoy them especially. The Hospital Half-hour will be presented by one who prefers to be known simply as "Tubby," a man who has himself been a hospital patient for a considerable period in the past, but who is now out and at work again, and anxious to pass on some of his new-found cheerfulness.

Television at Radiolympia

MORE than 120 mannequins will parade before the television cameras at Radiolympia in the "Forecasts of Fashion," which are to be televised from the glass-walled studio in the National Hall. The

ROUND the WORLD of WIRELESS (Continued)

Relay Station for Djedeida

WORK has been started on the construction of the new 30-kilowatt broadcasting transmitter at Djedeida, some 15 miles from Tunis. For the relay of the Paris (P.T.T.) programmes a receiving station is to be installed at about one mile from the Tunis transmitter, to which it will be connected by land-line. The station is so designed that an increase of power to 40 kilowatts will be possible, when desired.

New Turkish High-power Stations

THE two new high-power broadcasting stations which are being erected at Etimessoud, near Ankara, will be formally opened on October 29th, to celebrate the fifteenth anniversary of the Turkish Republic. The daily programme of broadcasts will cover a 20-hour schedule and will include, over and above the usual oriental concerts, opera, dance music, and radio entertainments of a purely western type. The studios will be under the supervision of a woman announcer, Mademoiselle Hadjimihal, who is a fluent speaker in the Turkish, English, French, and German languages. Broadcasts from the Ankara stations will be carried out simultaneously on long and short-wave channels.

Germany's 35s. Radio Set

THE fifteenth German radio show opened in Berlin on August 5th, and the surprise of the Show was the 35s. radio set. Dr. Goebbels, Propaganda Minister, opening the exhibition, announced that 100,000 of the new "People's Radio" sets are ready for distribution. The cost of 35s. also includes a loudspeaker.

North Sea Radio Beacon

AT a recent meeting of the River Tyne Improvements Commission, a scheme for the erection of a radio beacon at the mouth of the River Tyne was discussed, and seems likely to be adopted.

Radio Engineering Training

IT may interest several readers to know that the next session of the Marconi School of Wireless Communication, Chelmsford, commences on September 12th. Students are accepted for courses in various branches of radio engineering.

Car Radio Campaign

ACCORDING to a recent report the Post Office and the B.B.C. are considering ways and means for greatly increasing the number of cars equipped with radio. One scheme under discussion is the introduction of special programmes for car users.

INTERESTING and TOPICAL NEWS and NOTES

Exide Accumulators at Bretonneux

THE following letter, praising the merits of Exide accumulators, was recently received by The Chloride Electrical Storage Co., Ltd., from the Marconiphone Co., Ltd. "On behalf of my Company, I wish to thank you for the exceptional service you rendered to us in hiring a bank of accumulators for use abroad, on the occasion of the

further forms can be issued. Those listeners who still have forms to return are asked to fill them up and send them in as soon as possible. All those who have helped in this piece of listener research are asked to accept the B.B.C.'s warm thanks for their co-operation.

Mr. Lance Sieveking's New Appointment

WE understand that Lance Sieveking, Features and Drama producer, has been seconded to the Canadian Broadcasting Corporation for six months and will leave London early in October. Mr. Sieveking joined the B.B.C. in 1926. After serving in various capacities and producing such programmes as "Kaleidoscope" and "The End of Savoy Hill," he joined the Drama Department in 1933. Listeners will remember among his outstanding productions Lord Dunsany's "The Use of Man," Mr. Sieveking's own "Wings of the Morning," Patrick Hamilton's "Money with Menaces" and the recent "A Voyage to Lilliput."

Australian Short-wave Transmission Schedules (September, 1938)

VK2ME (Sydney), 31.28m.
Sundays (Sydney time): 3.30 p.m.—5.30 p.m. (05.30-07.30 G.M.T.); 7.30 p.m.—11.30 p.m. (09.30-13.30 G.M.T.).
Mondays: 12.30 a.m.—2.30 a.m. (14.30-16.30 G.M.T.).
VK3ME (Melbourne), 31.5m.
Nightly Monday to Saturday (inclusive) (Melbourne time): 7 p.m.—10 p.m. (09.00-12.00 G.M.T.).
VK6ME (Perth), 31.28m.
Nightly Monday to Saturday (inclusive) (Perth time): 7 p.m.—9 p.m. (11.00-13.00 G.M.T.).



Dr. Goebbels, Propaganda Minister, making his speech at the opening of the 15th German Radio Show in Berlin on August 5th. On the right is seen one of the new 35s. radio sets.

Unveiling of the Villers-Bretonneux War Memorial by His Majesty The King on July 22nd.

"As usual, your accumulators gave faultless service and though they were used continuously before the Ceremony, during the Ceremony, and after for a period exceeding five hours, to say nothing of the rehearsals on the previous day, they had as usual our confidence and fully merited this, and as a result helped us to receive the highest praise for our amplification work.

"As you know, all our work with accumulators is carried out with your batteries only, and we have never had any cause for complaint."

B.B.C. Questionnaire

OVER 30,000 copies of the B.B.C. questionnaire form about the kinds of programmes listeners like, and summer listening habits, have already been issued to listeners who have applied for them. As the work of analysis has now begun, no

SOLVE THIS!

PROBLEM No. 309

Mackay had a three-valve mains set which had given good results for some time, but suddenly fell off. He made tests and found that the bias-resistor on the L.F. valve had broken down, but he did not have a replacement available. As he particularly wished to hear a special item he looked round for some means of getting the set to work. He found an old G.B. battery which read a total of just over 4 volts, and as the L.F. valve required 4.5 volt bias he decided to use this. To avoid disturbing things too much he decided to connect the battery in series with the grid, and therefore joined it between the coupling condenser and grid, but it failed to function. Why was this? Three books will be awarded for the first three correct solutions opened. Address your envelopes 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. 309 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, August 22nd, 1938.

Solution to Problem No. 308

In the receiver which Smithers built the H.F. stage was unstable and the general instability resulted in the inferior results. When the H.F. stage was cut out the remaining stages functioned properly and gave the improved results.

The following three readers successfully solved Problem No. 307, and books have accordingly been forwarded to them: G. Garrett, 45, Dale Road, Luton; F. Sargent, 131, Huntingfield Road, Putney, S.W.15; S. Anderson, 80, Woodside Green, South Norwood, S.E.25.

What Will Radiolympia Offer the Constructor?

An Advance Tour of Radiolympia, with a Brief Description of the Various Stands Displaying Components

SEVEN more days of feverish activity on the part of the exhibitors and those responsible for the wonderful organisation, display and attractions of Radiolympia 1938. Last-minute releases, sudden modifications, and the springing on the public of some startling development or feature will surely form part of the opening day's wonders as in the previous years.

Most of the advance information is now available for publication, but in spite of



The W.B. occasional table, with built-in loud-speaker, will be one of the novelties of the show.

this, it is impossible to say what might be revealed when the dust sheets are removed and the public surge into the huge halls of Olympia.

So far as the ordinary listener is concerned, the usual confusing mass of models will be placed before him in neat and artistic array; confusing by reason of the quantity and the vast number of models to select from.

Prices will still be most reasonable; in fact, they are approaching dangerously near the too cheap limit. However production costs are lowered, there comes a limit when it is not an economical proposition to the producer or the purchaser. Reliability and quality have a certain minimum value, and below that one can only expect inferior goods and performance.

Television, Push-button Tuning, and All-wave receivers are the headlines of the manufacturers' programme for 1938-39.

Television will occupy the centre position on the stage this year, and everything will be done to bring it well to the fore and in contact with the average listener rather than the select few who could afford it last year.

Unfortunately, however, for the average listener, prices are likely to be beyond the pockets of the majority of the public, so

they will have to be content with seeing its possibilities and hoping for the time when it will become as much a part of the home as the radio receiver is to-day.

Production costs, installation charges and servicing are all items which are bound to keep the prices up for a while yet, but considerable improvement has been made in all these items since last year, and it is evident from the good work some manufacturers are doing that every attempt is being made to allow the man-in-the-street to be able to share the additional interest and amusement which can be offered by television.

Receivers

Push-button, Bush Button, Touchtune and Teledial are but a few of the names which will be familiar to all visitors after a few hours in the Exhibition. They all indicate some form of automatic tuning which is going a long way towards ousting the rather troublesome manual tuning controls.

It is a development which offers some practical improvement, though it is far from new. For any member of the family to be able to select and receive any one of, say, four, eight or ten previously chosen stations with no more trouble than the pressing of a button, will mean a great deal to the person selecting a receiver for normal domestic use.

No longer will there be the disappointment to certain members of the family because they could not tune in the station they required, and what is even more important, no longer will a high-gain superhet be tuned to that "just off the mark" spot which can cause such annoying results to all around.

Push-button tuning is rather late in coming, bearing in mind what the amateurs have done in the past—but better late than never.

The Constructor

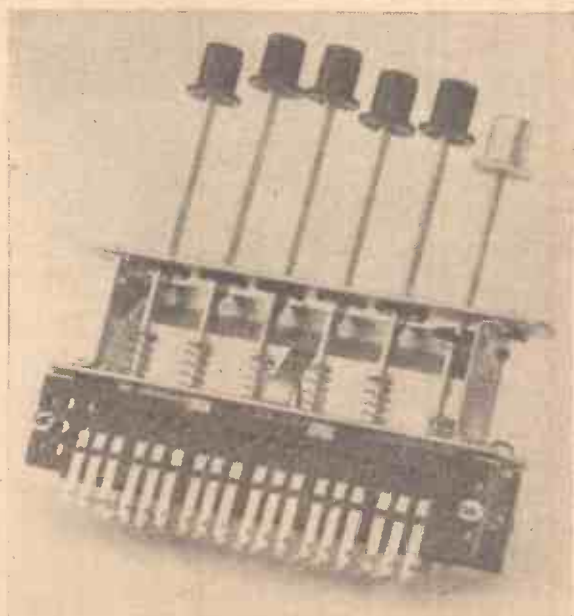
How [is] the constructor catered for is the main question which will interest our readers and all those who have the welfare of the constructive element at heart. Will he be pushed to one side and more or less ignored, or do the manufacturers realise at last that the amateur is still far from dead, in spite of the poor encouragement he has received from certain sections of the trade?

Well, we must wait and see, but judging from details

to hand, several manufacturers will be putting up a gallant show of components and those items vitally necessary to the continuance of the constructor movement, so let us make an advance tour of their stands. All the valve people will, of course, be displaying their complete range of products, which the constructor can still obtain quite easily. Speaking of these manufacturers, it should be recorded that their technical members are usually very willing to render any assistance regarding the use, operation and characteristics of their products, thus placing the user in the position of being able to get the best out of his purchases. Messrs. Bulgin, a firm now too well-known to the constructor to need any introduction, is showing, as usual, an amazing number of components, accessories and, in fact, everything to do with home construction, so that their Stand No. 72 will undoubtedly prove a most attractive exhibit for the amateur. Their latest catalogue is, without doubt, one of the most comprehensive they have ever issued, and it is an item which should find a place of note in every constructor's book shelf.

Among their exhibits will be seen a neat and efficient push-button unit, one of the first to be offered to the constructor, so there is no reason why full advantage of this tuning system should not be taken by all interested.

It is impossible for even brief mention



One of the push-button units you will see on Bulgin's stand. It is used in a new three-valver to be described in next week's issue. The push-buttons are all of the same length, and not as shown.

to be made of their other lines, so the next best thing is to visit their stand at Olympia.

Over then to Stand No. 77, this being the exhibit of the makers of the famous Eddy-stone products, a watchword, so to speak, of the short-wave enthusiasts and the transmitting hams. It is usually a job to get near the numerous items displayed on their counters, as the site seems to form the meeting-place of all the members of the two sections mentioned above.

Next, drift along to Stand No. 106 and see the range of products offered by Messrs. Wingrove & Rogers, who produce the well-known Polar lines. If you are at all susceptible to something distinctive in variable condensers, dials, volume-controls,

speakers, and what is also important, you will find a model to suit your pocket and taste. The makers have gone all out on "quality" reproduction, and bearing in mind the efficiency of their last year's models, you can be sure that they have set themselves a pretty high standard. They can offer you a speaker for a midget portable to a large super-model ideal for quality-power public address work, so they should be able to satisfy the requirements of the most fastidious. While you are there, don't forget to see their latest idea in concealed table speakers.

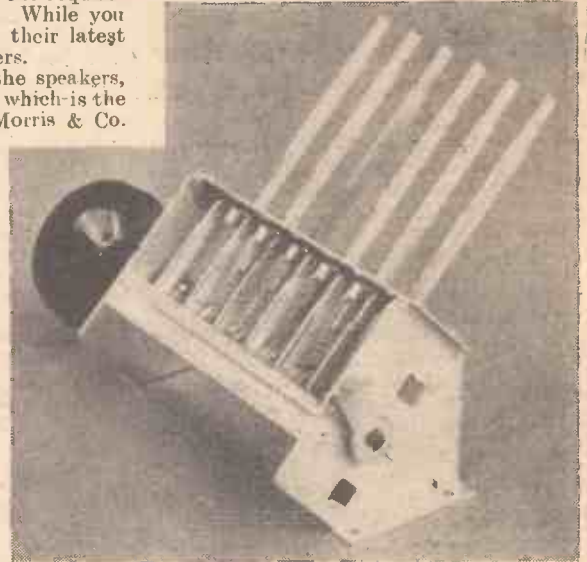
When you have inspected the speakers, come with me to Stand No. 74 which is the Exhibition home of Messrs. Morris & Co. (Radio), Ltd., the makers of

without a few condensers; so, as the B.B.C. would say, "Over to Stands Nos. 69 and 81" to see the almost confusing range of condensers—of all sizes and shapes—made by Dubilier and T.C.C., respectively. Paper condensers, mica condensers, electrolytic—wet and dry—condensers, in fact, every conceivable class of condenser will be found on the stands of these two noted makers, and as their literature describes, in detail,



The new R.G.D. remote control unit (left).

On the right is another form of push-button control, produced by British N.S.F.



etc., you will find something there of considerable interest. Such components are difficult things to describe, so it will have to suffice if it is stated that precision, careful designing, reliability and high efficiency are the keynotes of all the Polar products.

To acquire a loudspeaker of superb quality is the desire of every constructor; therefore, while at Olympia follow the crowd to the Stand of the makers of the famous W.B. products, Messrs. Whiteley Electrical, whose Stand number is 26. Here you will find a fine range of high-quality

Premier Products, who have come along this year to support the constructor and show the amazing range of items they have to offer. From a length of wire to a complete transmitter is about the best way of describing their interesting and varied programme. Space forbids enumeration of the many lines, so have a good look round, and you are bound to see several components or accessories which will lengthen your list of purchases or mental reservations. Don't forget to secure a copy of their catalogue. C stands for constructor and condenser, and no constructional job can be complete

all the various kinds and why. Interested readers are advised to get copies of their latest lists.

Time is getting short, and Stand No. 9 is calling, so our little advance tour of Radiolympia must come to an end for this week. But don't forget that next week we shall visit those Stands which space and time have caused us to dash past this week.

Speaking about Stand No. 9. There is no need to tell you who will be seen there, surely? If you have a moment to spare to come along and have a few words with any of the Technical Staff.

Important Broadcasts of the Week

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

Wednesday, August 17th.—Promenade Concert: Brahms, from Queen's Hall, London.

Thursday, August 18th.—The Three Corned Hat, a musical comedy.

Friday, August 19th.—Promenade Concert: Beethoven, from Queen's Hall, London.

Saturday, August 20th.—Variety programme.

REGIONAL (342.1 m.)

Wednesday, August 17th.—Coronation Scot: The story of a journey in which the course of the train will be traced by way of London, Midland, North, and Scottish Regions.

Thursday, August 18th.—Promenade Concert: Part 1, from Queen's Hall, London.

Friday, August 19th.—The Three Corned Hat, a musical comedy.

Saturday, August 20th.—Terror from the Sea, a fantasy, a thriller and a parable, by Froom Tyler, from West of England.

MIDLAND (297.2 m.)

Wednesday, August 17th.—Massed Bands, from the Shrewsbury Floral Fête.

Thursday, August 18th.—Prospects for the Final Test Match, a talk.

Friday, August 19th.—Rambles in the D. H. Lawrence Country, a talk.

Saturday, August 20th.—Sport in the Midlands, including the Midland Festival of Diving.

WEST OF ENGLAND (285.7 m.)

Wednesday, August 17th.—Variety, from the Theatre Royal, Exeter.

Thursday, August 18th.—A Garden Tour: Devon and Cornwall, last of a series of four talks.

Friday, August 19th.—Band programme, from the Bandstand, Paignton.

Saturday, August 20th.—Terror from the Sea, a fantasy, a thriller and a parable, by Froom Tyler.

WELSH (373.1 m.)

Wednesday, August 17th.—Band concert.

Thursday, August 18th.—Dadl Cadair

Lerpwl (The Liverpool Chair Debate), arranged by Ilew Owain.

Friday, August 19th.—Seithenyn: A legend of the Cardiganshire Coast by Spencer Vaughan Thomas.

Saturday, August 20th.—Band programme, from the Pier Pavilion, Aberystwyth.

NORTHERN (449.1 m.)

Wednesday, August 17th.—Coronation Scot, the story of a journey in which the course of the train will be traced by way of London, Midland, North, and Scottish Regions.

Thursday, August 18th.—Hospital Half-Hour—1, gramophone recital.

Friday, August 19th.—Morcambe Merriment—2, excerpts from seaside entertainments.

Saturday, August 20th.—Running commentaries on the Ullswater Sheep Dog Trials.

SCOTTISH (391.1 m.)

Wednesday, August 17th.—Breezes from the West: A ceilidh evening from Iona.

Thursday, August 18th.—Scots songs.

Friday, August 19th.—The Scottish Country: Iona, an impression of the Holy Island and its life to-day, from Iona.

Saturday, August 20th.—Orchestral programme.

THE SUPERHET FREQUENCY - CHANGER

Our Contributors Show that the Difference between a "Straight" and Superhet Circuit is mainly in connection with the Frequency-changer, and Explain in Simple Terms how the Frequency-changer Operates

YOU will remember that in our recent articles in which we dealt with readers' ideal circuits—or, at least, with a few of them—we mentioned that we were surprised to find how many there are who still "fight shy" of the superhet. It is a pity, because we believe that this type of circuit is the simplest that could be employed when long range and a high degree of selectivity are considered essential.

Additionally, the superhet is easier to deal with when all-wave reception is required. In our experience, it is a comparatively simple matter for the constructor with a fair experience of receiver building to make, and even design, a sensitive superhet, whereas considerable difficulty would in most cases be met if a "straight" circuit were adopted to give similar results. And

any set that he might make, but the principles are not difficult to understand.

After all, the only important difference between a superhet and a "straight" is

by The Experimenters

that whilst the former has a frequency-changer before the H.F. (more strictly I.F.) stages, this is not required for the latter. If you look at the two diagrams in Fig. 1 you can see at once where the difference between the two general circuits lies. To compensate for the slight added complication of the frequency-changer, however, there is the absence of tuning controls for

valves, which comprise the frequency-changer, is a signal of a certain and fixed frequency. In other words, the signal applied to the I.F. amplifier, which corresponds with the H.F. amplifier in a "straight" circuit, is always of the same frequency, regardless of the frequency or wavelength of the signal first picked up by the aerial-earth system. In the case of the "straight" circuit the tuning of the H.F. amplifier must be altered to suit every different station which is to be received.

At this point it might be as well if we clear up a misunderstanding which appears to exist in the minds of many readers. It is frequently noticed that the use of the term "straight" is confined to a circuit of the detector L.F. type; that is, one that does not incorporate an H.F. amplifier. This is incorrect usage, for, with few exceptions, a "straight" circuit is any circuit—with or without H.F. stages—which does not operate on the superheterodyne principle.

Two-valve F.C.

To understand the operation of the frequency-changer it might be best to look at a circuit of the original and effective type of frequency-changer employing two valves, one for so-called "first detection" and another for providing the steady oscillation. This is shown in Fig. 2. Suppose the intermediate frequency is fixed at 465 kc/s by the type of intermediate-frequency transformer employed, and that the first detector valve, which is coupled to the aerial and earth, is tuned to receive a signal on 300 metres (1,000 kc/s : found by dividing the wavelength into 300,000). The oscillator must be tuned to a frequency of 465 kc/s above or below 1,000 kc/s, and in practice it is found better to use the higher frequency. That means that the oscillator tuning circuit must be tuned to 1,465 kc/s. Two separate coils, with their own tuning condensers, are shown, so it will be seen that it is an easy matter to tune

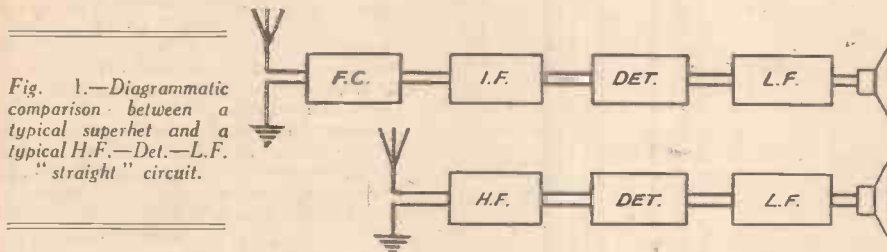


Fig. 1.—Diagrammatic comparison between a typical superhet and a typical H.F.—Det.—L.F. "straight" circuit.

yet readers often fail to appreciate this point, although this is not the first time that we have mentioned the matter.

Superhet Simpler in Practice

One reason is, no doubt, that the theory of the superhet is somewhat more involved than that of the "straight." If that point is conceded, however, we still believe that the superhet is generally more satisfactory. But why worry too much about theory; practice is of far greater interest to most constructors. It is better that the constructor should have a "nodding acquaintance" with the underlying principles of

the intermediate frequency amplifier. And this effects a very marked simplification, particularly when all-wave reception is considered.

Through a Superhet

To refresh readers' minds, we will just run over the changes that take place when a signal is passed through a superhet. First the signal is "detected" by the first detector. It is then mixed with a steady oscillation—or second unmodulated signal—provided by the oscillator valve. As a consequence, the output from these two

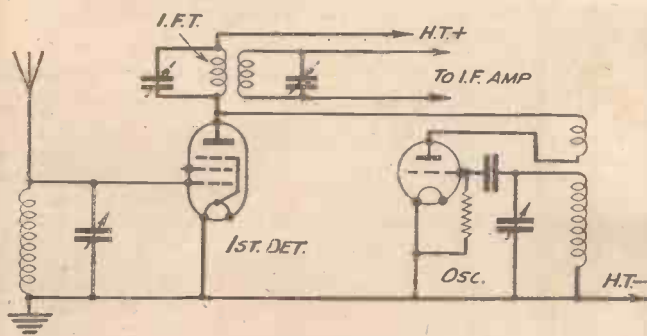


Fig. 2.—A two-valve frequency-changer circuit with H.F. pentode as first detector and a triode as oscillator. A "double" valve is generally employed in current practice.

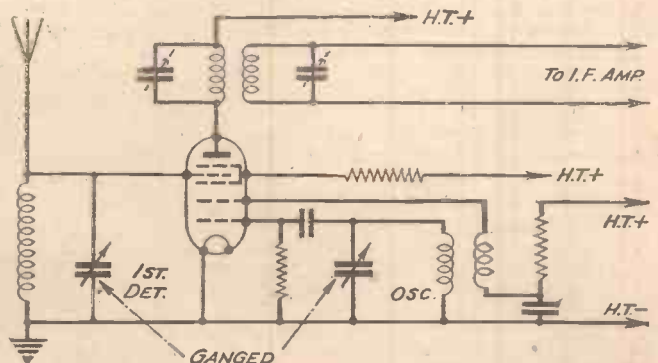


Fig. 3.—A typical present-day frequency-changer in which a heptode or pentagrid valve serves as first detector and oscillator. "Mixing" is electronic and takes place within the valve.

the oscillator independently to that frequency.

Each time the aerial-tuning condenser is readjusted to tune to another signal the oscillator condenser must be reset to tune to the frequency of the signal, plus 465 kc/s. Some years ago, before the superheterodyne had become as popular

"Mixing" the Oscillations

There are different methods of "mixing" the signal and oscillator frequencies, but these can be divided into two main types. In one the "mixing" takes place within the frequency-changing valve, which is almost invariably of the "double" type, the two sections acting as first detector

The triode section of the valve is used in almost the same manner as a simple detector valve with reaction, except that reaction is fixed instead of being variable. Additionally, the values of grid condenser and leak are somewhat different from those generally used with a regenerative detector.

An octode valve is another form of frequency-changer, this having an additional screening grid in the first detector portion of the valve. This is claimed to give certain advantages which need not be discussed here, but is very similar in principle to the pentagrid.

Triode-pentode

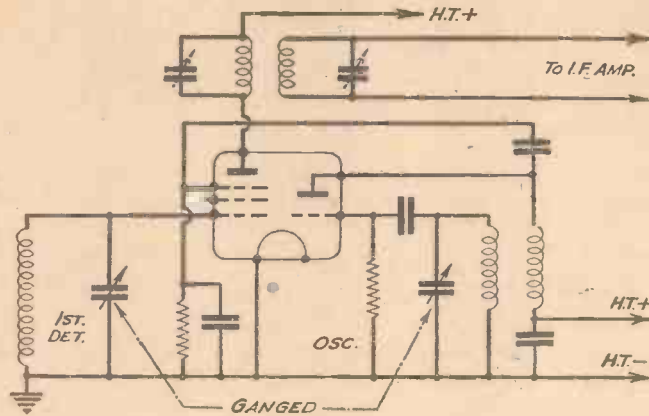
Another type of frequency-changer valve is the triode-pentode. The circuit of this has a still closer resemblance to that of the two separate valves shown in Fig. 2, as can be seen from Fig. 4, although in this circuit the oscillator output is fed into the suppressor-grid circuit of the H.F. pentode portion of the valve. The "mixing" could, however, take place in an external circuit, the anode circuit, for example. It would be difficult to prove that there is any appreciable difference in reception afforded by a correctly-used pentagrid, octode or triode-pentode, different designers using all three with marked success.

Triode-hexode

A newer type of frequency-changing valve, which is being fairly widely used in short-wave and certain all-wave receivers is the triode-hexode; a circuit for which is given in Fig. 5. This valve closely resembles the pentagrid, but it will be seen that the oscillator grid is electrically connected inside the valve envelope to a grid in the hexode (six electrode) portion of the valve. In suitable conditions this ensures better electronic "mixing," the advantages being most in evidence on short waves. It is generally recommended with the triode-hexode that the anode (actually a grid) of the triode portion should be parallel-fed as shown and that the anode winding be tuned, but connections similar to those of the pentagrid may be employed.

One of the simplest frequency-changers for short-wave use (although one that is becoming obsolete because of its lack of selectivity) is an ordinary H.F. pentode, with reaction, connected as illustrated in Fig. 6. This is not a true frequency-changer, since the valve acts as an oscillator, producing oscillations which "beat" with the signals picked up by the aerial system. Since there is one tuning circuit only, any signal can be received at two positions on the tuning scale: one corresponding with a wavelength equal to the signal frequency plus the intermediate frequency, and another representing a frequency of the signal less the intermediate frequency.

Fig. 4.—Connections for a triode-pentode with coupling between the oscillator section and the pentode suppressor grid.



as it is to-day, two tuning condensers had to be operated more or less simultaneously in the manner described. Nowadays, however, two matched coils and a gang condenser to suit them can be bought from almost any maker of components. The oscillator coil has fewer turns than has the aerial coil, and the oscillator section of the gang condenser has specially-shaped vanes.

and oscillator respectively. In the other, the "mixing" takes place in an external circuit: anode, grid or cathode. In Fig. 2 anode-circuit "mixing" is used, whereas in Fig. 3 "mixing" occurs within the valve, when it is known as electronic.

Pentagrid

Fig. 3 shows a pentagrid (five grids) or heptode (seven electrodes in all, made up

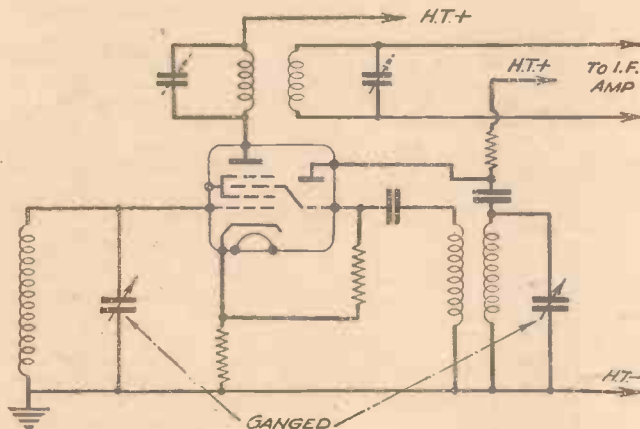


Fig. 5.—A modern triode-hexode which is being widely used for short-wave and all-wave receivers.

As a result, both circuits can be tuned by turning a single knob. Trimming adjustments are necessary when the circuit is first set up, as they are in any set with a gang condenser, but after they have been made the oscillator tuner can be relied upon to keep "in step" with the aerial circuit. Those who wish to minimise the work of trimming and what is generally referred to as aligning the two tuned circuits can, if they wish, buy a complete tuning unit comprising matched coils with a matched gang condenser. In that case, very slight trimming adjustments only are needed to compensate for the varying capacity of the connecting leads.

Due to the fixed intermediate frequency, the I.F. amplifier operates at the same efficiency regardless of the frequency of the received signal. In the case of a "straight" set with an H.F. amplifier the efficiency of the amplifier varies within appreciable limits as the tuning is altered. Due to the advantage of the superhet in this respect greater H.F. gain can be obtained with comparative ease.

of five grids, anode and cathode, or filament). Three grids operate in conjunction with the anode and cathode as an ordinary H.F. pentode, while the other two grids operate along with the common cathode as a three-electrode valve serving as oscillator. The similarity between this circuit and that in Fig. 2 will be evident, for the only real difference is in the method of mixing.

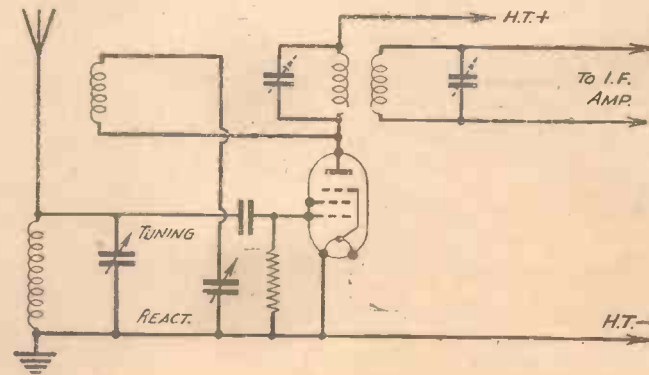
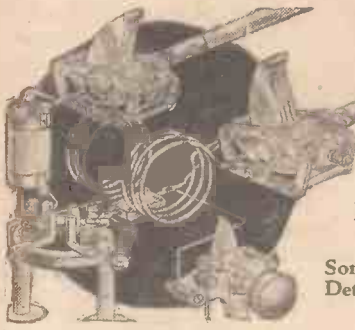


Fig. 6.—The so-called autodyne frequency-changer (really a simple oscillator) circuit. One valve, with reaction, is used to produce a beat note with the required signal. This system is now obsolescent.



Short Wave Section

MODIFICATIONS TO AN ULTRA-SHORT-WAVE UNIT

Some Suggestions Regarding the Operation of the Detector Unit Described in Last Week's Issue Are Given in This Article

ULTRA-short-wave reception requires a great deal of care, both in operation and construction. A practical design for an ultra-short-wave adaptor has already been described, so a few suggestions will be put forward regarding the operation of the detector unit, and improving the results generally.

If possible, the maximum H.T. voltage should be used on the valve, but where rather a low voltage is used, it may be advantageous to take the grid leak to the positive side of the filament as shown in Fig. 1. The grid leak must be taken to the input side of the ultra-short-wave choke, as if it is taken direct to the filament pin reaction will be affected.

There are two ways of using the adaptor, one is to remove the detector valve of a receiver, and plug the anode lead into the valveholder, utilising the coupling components in the receiver. But it is also possible to use the pick-up terminals which most broadcast sets are fitted; this will obviate the trouble of removing the detector valve, and will, of course, add an extra stage of amplification.

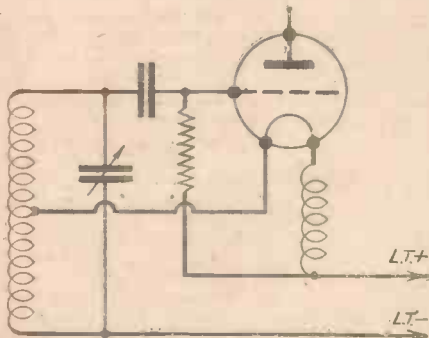


Fig. 1.—Circuit diagram showing the grid leak taken to the positive of the filament.

It will be necessary to add an anode resistance and output condenser, as shown in Fig. 2. A 50,000-ohm resistance is connected in series with the H.T. lead and the output is taken via a .1 microfarad condenser; it may be desirable to screen this lead which goes to the grid of the valve, so it must be seen that the connections to the pick-up sockets or terminals are the right way round. The adaptor may have its own H.T. and L.T. supplies and will then be entirely self-contained.

Mains Version

A mains version of the ultra-short-wave detector unit was built and found to operate quite as well as the battery arrangement. The circuit of the mains version is shown in Fig. 3. There is, of course, no need to use the ultra-short-wave choke with an indirectly-heated valve. The cathode is simply tapped into the tuning coil. A grid-leak with a value of 500,000 ohms was used, otherwise all the rest of the circuit values remained the same.

Oscillation with the indirectly-heated valve was smooth, but some trouble may be encountered with various kinds of hum.

It must be remembered that a reacting detector on such low wavelengths will be extremely sensitive to any external A.C. fields. If when the valve is in oscillation a modulated hum occurs, filament bypass condensers may help in effecting a cure; these are shown in the circuit diagram. It is most essential that the adaptor should have its own filament transformer, or alternatively a separate winding on the power transformer in the receiver, otherwise if the heater leads are taken direct to the receiver to valves already supplied with heater voltage, a bad ripple may result. Wiring to the heater pins of the valveholder must be carried out carefully, and kept as far away from the grid wiring as possible.

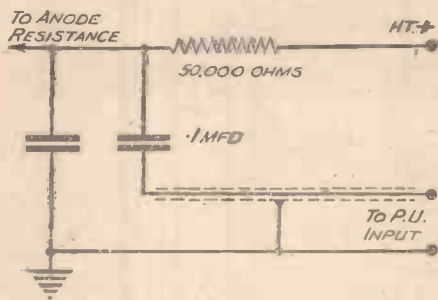
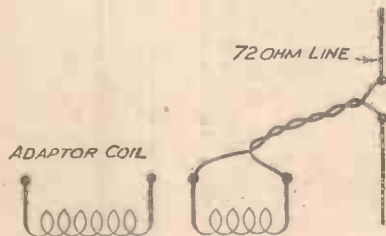


Fig. 2.—Showing modification to the adaptor when using P.U. input of set.

There should be no hum with the valve in or out of oscillation, and it is worth while spending a little time in getting rid of any of these troubles.

Several different types of valve were tried and in the 4-volt 1-amp. class an M.H.4 was as good as any. If it is desired to use a valve with a 6.3-volt heater an American metal octal 6C5 was found very suitable, and this valve will need an American octal valveholder.

Fig. 4.—Simple dipole aerial system.



Aerial System

With either the mains or battery version of the ultra-short-wave adaptor the aerial system can play an important part in improving results; in fact, in all ultra-high-frequency reception as much gain can be obtained with a proper aerial system as from the receiver itself. The best known system is the simple dipole which is tuned (by means of cutting to correct length) to a half wavelength of the station it is desired to receive. This self-resonant tuning is broad, and will hold good over a wide band of frequencies. If a dipole is used with the ultra-short-wave adaptor, it should be erected as high as possible, and connected to the adaptor by means of a 72-ohm transmission line, as in Fig. 4. A loose

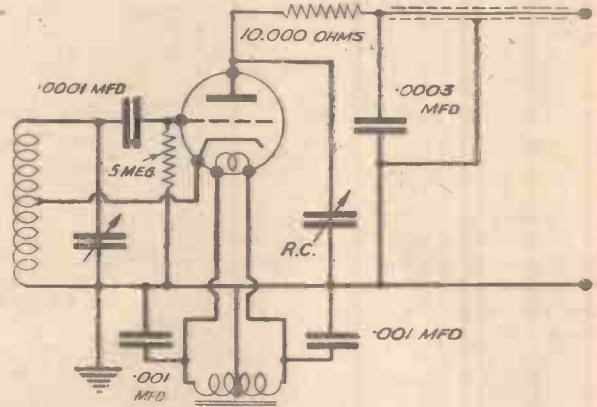


Fig. 3.—Circuit diagram of the A.C. version of the adaptor.

coupled coil may then be used.

For receiving the television transmissions each half of the aerial should be 5ft. 4in. long, and further improvement can be made by using a reflector placed a quarter wave (5ft. 4in.) behind the aerial. The reflector should be a little longer than the aerial itself, and still further improvement can be made by using a director, as well as a reflector. The arrangement is shown in Fig. 5. The director is placed at three-eighths of a wavelength in front of the aerial in the direction of the stations to be received. The measurements given are for the 5-metre band; a similar arrangement can be used for the television stations by altering the measurements accordingly. It is in reality a simple beam system of reception.

Reception Conditions

Regarding reception conditions on the ultra-short waves, it will be found that over comparatively long distances signal strength varies much the same as with other short-wave bands, except, if it is

(Continued overleaf)

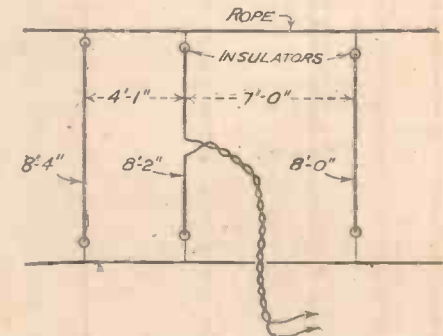


Fig. 5.—Simple beam aerial system for ultra-short-wave reception.

Leaves from a Short-wave Log

A New Swiss Short-waver

FOLLOWING a series of tests made by the local Radio Club, the Swiss authorities have decided to erect a new short-wave station near Schwarzenburg for the relay of programmes to their nationals residing overseas. Experimental broadcasts are now being made daily between G.M.T. 18.00-19.00 on 31.46 m. (9.535 mc/s). Reports of reception should be addressed to the Telegraphic Communications Bureau at Berne (Switzerland).

08.00-15.00. Address: Station KZRM, Erlanger and Galinger, Inc., Manila, Philippine Islands.

Honduras Calling

THE 100-watt station HRPI, at San Pedro Sula (Republic of Honduras), on 47.24 m. (6.351 mc/s), is now operating a regular daily service of radio broadcasts. With the exception of Sundays the studio is on the ether from G.M.T. 11.00-12.30, and again from 19.00-21.00.

1.5 kW. The latest schedule advertised is: Weekdays: G.M.T. 12.15-13.45 and 19.00-21.00; Sundays: 15.00-17.00. Address: Etablissements Séri, Route de la Dillon, Fort-de-France (Martinique). The owners of this station also possess another stand-by transmitter of a power of 200 watts which is operated occasionally on 48.82 m. (6.145 mc/s).

New Broadcaster at Singapore

THE British Malay Broadcasting Corporation, Ltd., at Singapore, has announced the opening of the 500-watt short-wave transmitters, ZHP, on 31.48 m. (9.53 mc/s), and ZHO, 49.9 m. (6.012 mc/s). The inauguration ceremony was recently performed by Sir Shenton Thomas, Governor of the Straits Settlements.

Radio Wien and the Reich

SINCE Austria became part of the German Republic, all broadcasting stations have been taken over by the *Reichsrundfunk Gesellschaft M.B.H.* of Berlin. The power of the existing short-wave transmitters is to be increased to 50 kilowatts in the near future, and two further stations of equal power will be also built. The Vienna short-wave network will consist of: OER2, 49.41 m. (6.072 mc/s); OER3, 25.42 m. (11.801 mc/s); OER4, 31.35 m. (9.57 mc/s), and OER5, 19.75 m. (15.19 mc/s).

From 400 Watts to 10 Kilowatts

FOR some time past Amalgamated Wireless (Australasia), Ltd., at Suva, Fiji Islands, have broadcast a regular weekday programme on 31.46 m. (9.535 mc/s) from G.M.T. 10.30-12.00. It is now proposed to raise the power of the transmitter from 400 watts to 10 kilowatts. Three extra channels have been officially allotted to this station; they are 48.94 m. (6.13 mc/s); 19.79 m. (15.16 mc/s), and 25.22 m. (11.895 mc/s).

SHORT-WAVE SECTION

(Continued from previous page)

possible to receive the station at all, complete wipe out will not take place, though signal strength will vary from night to night, and will remain more or less the same for the whole transmission. This was particularly noticeable on the television transmissions. It cannot be stressed too much that the ultra-short waves have not been sufficiently pioneered in regard to the behaviour of signals over long distances.



Miss Irene Beaver, aged 13, of Grove Park, Liverpool, a pupil of the Belvidere College for Girls in that town, is to broadcast in the North Regional programme on August 24th. She is a brilliant pianist and has won many prizes at musical festivals all over the country. She won an upright grand piano at the Wallasey Musical Festival last year, and is also the winner of three Exhibitions to the London Trinity College of Music. In all she has won over 100 prizes. Our illustration shows Miss Beaver rehearsing in readiness for her forthcoming broadcast.

More Power for Schenectady

BY next month (September) the General Electric Company (Schenectady, N.Y.) hopes to bring into operation its latest 100-kilowatt short-wave transmitter. The channel to be used is 31.41 m. (9.55 mc/s).

At present, W2XAD broadcasts on three frequencies, namely, 21.5 mc/s (13.95 m.) from G.M.T. 12.00-16.00, for a transmission destined to listeners in the South American Latin States; 15.3 mc/s (19.56 m.) for a beam broadcast to Europe from G.M.T. 16.15-22.00, and on 9.55 mc/s (31.41 m.) for the second transmission to South America from G.M.T. 23.15-03.00. W2XAF, on 31.48 m. (9.53 mc/s), is daily utilised for a broadcast to the world from G.M.T. 20.00-22.00, and from the latter hour to 04.00 for a transmission in Spanish to the Argentine Republic.

Re-timed Manila Programmes

KZRM, Manila (Philippines), is entitled to use three channels for its radio transmissions, but the broadcast heard in Great Britain is invariably logged on 31.35 m. (9.57 mc/s). The schedule is as follows: Daily (Sundays excepted), G.M.T. 21.30-24.00; 04.15-06.15 and 09.00-15.00; on Sundays from G.M.T.

More Channels for Zeesen

FURTHER frequencies have been officially allotted to the new 50-kilowatt transmitters which the German Reichsfunk is adding to its already extensive network. The additional stations and their respective channels are given hereunder: DJK, 13.86 m. (21.64 mc/s), 12 kW; DJJ, 13.91 m. (21.565 mc/s), 12 kW; DJH, 16.81 m. (17.845 mc/s), 50 kW; DJG, 16.84 m. (17.815 mc/s), 50 kW; DJZ, 25.42 m. (11.801 mc/s); 50 kW; DJF, 25.54 m. (11.745 mc/s), 50 kW; DJX, 31.01 m. (9.675 mc/s), 50 kW; DJW, 31.09 m. (9.65 mc/s), 50 kW; DJI, 41.15 m. (7.29 mc/s), 50 kW; and DJY, 49.41 m. (6.072 mc/s), 50 kW.

A Puzzle and Its Solution

FOR some time listeners have reported reception of programmes from Martinique on two different wavelengths. The explanation is that there are two short-wave broadcasting stations in that French Colony. *Radio Fort-de-France* works on 31.27 m. (9.594 mc/s) with a power of 200 watts. Address for reports: M. Edouard Boullanger, fils, Fort-de-France (Martinique). The station more frequently logged is *Radio Martinique*, on 30.93 m. (9.7 mc/s),

RADIOLYMPIA

AUGUST 24th to
SEPTEMBER 3rd, 1938

OUR STAND
No. 9
GROUND FLOOR

ON YOUR WAVELENGTH



Radiolympia

WITHIN a few more days—on Wednesday next, August 24th, to be exact—the Oyster opens and reveals the pearls. It is, perhaps, true to say that some of the pearls are cultured, whilst some will be the real thing. I expect most of you know how cultured pearls are made. It takes too long to wade through thousands of oysters to find one natural pearl, so the pearl divers catch the oysters, open their shells, put in a grain of sand, and throw the oysters back into the sea. The grain of sand irritates the oyster which proceeds to build a pearl around it. By marking the dates on the shells of the oyster before they are put back into the sea it is possible to catch the oysters again when the pearl has developed sufficiently. Graduated pearls are obtained by leaving the oysters in the ocean for varying periods of time.

The grain of sand in the radio oyster this year seems to be Push-button Tuning. It is intended to tickle the fancy of the public, and let us hope that they surround it with an iridescent sheen of acclamation. For this journal will describe the first home-constructed receiver using push-button tuning, and combines manual control.

I want to remind you at this point that our original push-button receiver, as well as the experimental models of other receivers we are describing next week, will be on view at our Stand No. 9—Ground Floor (same site as last year)—and that your friend Thermion may also on occasions be one of the exhibits, radiating good humour on an ultra-short wavelength, punctuated by slight heterodyning from my quondam (accent on the last syllable!) critics, and slight interference caused by I.P.A.; for my legal wisdom in settling readers' knotty problems I expect to be called to the bar—quite often!

It is going to be a radio exhibition, not a cabaret exhibition. The public will be able to judge the merits of television for themselves, and you will be able to go round the exhibition in greater comfort.

The Radiolympia Demonstration

THE Radio Manufacturers' Association have asked me to say that the essence of the demonstration

By Thermion

system at Radiolympia this year is demonstration under actual reception conditions, controlled only to the extent of preventing the cacophony which would result from unfettered reception. For this purpose transmitting and relay equipment is being installed, and standardised signals are being distributed by co-axial cables to the exhibitors' stands, which are being equipped with outlet points simulating normal receiving aerials.

Under normal conditions the television programme will be relayed from Alexandra Palace, the signals being picked up by an aerial (dipole with reflector) on the roof of Olympia, and amplified in a broad-band power amplifier, the output of which is distributed by means of a system of cables, on the basis of one cable to each stand taking the programme. As already announced by the B.B.C., the television programme is being considerably extended, and includes items from a studio in the exhibition building.

There will also be a small television transmitter, capable of feeding into the input of the broad-band amplifier, and of being modulated by signals from the Radiolympia studio, which can be used for testing purposes, and also if faults or interference make it impossible to relay a representative picture from Alexandra Palace.

The outlets on the stands will be unbalanced concentric cables with a characteristic impedance of the order of 90 ohms, and the signal will be of the order of 20 millivolts for full white picture.

Two medium-wave transmitters will be provided, taking the same basic programme, which will normally be the sound part of the television programme; when this is unsuitable, or when there is no television programme, the transmission will consist

of either a B.B.C. Regional or National programme, or else of a programme of suitable gramophone records. The two medium-wave transmissions will be:

Radiolympia Local on 800 kc/s (375 metres) with an intensity of approximately 20 millivolts; this is a high-fidelity transmission, the frequency-characteristic of the whole system being flat within one dB from 30 to 12,000 cycles, and the harmonic distortion being less than 3 per cent. for 90 per cent. modulation.

Radiolympia Distant on 895 kc/s (335 metres) with an intensity of approximately 2 millivolts. This transmission will be accompanied by two others to simulate typical adjacent-channel interference; these will be some 30 dB lower in intensity and spaced 9 kilocycles above and below the distant carrier; they will be modulated with an interfering programme, which will not normally be intelligible, though being typical as regards frequency and power distribution.

These two transmissions will be distributed by means of broad-band power amplifiers, feeding a system of co-axial cables, from which the various stands are "teed-off," the outlets on the stands having attenuators and networks to minimise the risk of interference being carried by the feeder system from one stand to another, and also to give the correct output level and impedance; this latter corresponds to the recommendations of the R.M.A. Set Testing Sub-committee.

These two signals *only* will be distributed on the medium wave-band; it may be possible to receive other stations on some receivers; this would arise if the earthing of the adjacent section of the co-axial cable (always difficult under exhibition conditions) is defective, or if the receiver itself is poorly screened. In other words, reception of other stations implies either an accidental set of conditions or else a bad receiver.

Definition—and a Joke

W. B. P., of Old Kent Road, S.E.17, did not dare me to publish the appended letter, and that is why I am printing it.

"It would seem to even the most casual reader of your very interesting

page that you have (for some unknown reason) a rooted objection to Crooners and a by-product known as ridm. But surely even you classify your 'insects' in varying degrees.

"What I mean is, would you call a singer such as Brian Lawrence a 'crooner'? If so, I am afraid that I cannot entirely agree with your criticism. If, on the other hand, you do differentiate between a crooner and a singer of light songs, I am all for you. While I am on the job, perhaps you would like a definition I heard a little while ago of a crooner, namely a person who uses a microphone as a slop basin.

"With regard to your invitation a few weeks ago to let you have examples of our most embarrassing moments in radio, here is mine: When I first became interested in wireless the domestic receiver was an old transportable five-valve set, which had been defective for many months. I decided to make my initial set out of this commercial job, and first of all tested the valves. The unfortunate point was that I tested the filaments for continuity with a 120v. H.T. battery instead of the accumulator. However, I had obtained three nice bright flashes from the valves before my father came on the scene. Imagine my feelings when he pointed out that in a minute I had messed up about a pound's worth of valves.

"Hoping to spot you at Radiolympia."

Swindle in a Box

C. A., of Nellore, who by calling is a Parson, addresses the following letter to me, which I print exactly as received:

"Dear Mr. Thermion,—Perhaps it may interest you, and your readers to know, that we, although living in India, also have our 'Boon' to Radio Owners. The advertisement in a local paper read: 'All the Radio Owners, who experience not a little trouble in the reception, such as atmospherics, distortions, back-ground noises, last but not least fluctuations of voltage, would do well to note, that a special patent device, sold at delivers to any set exactly the voltage, that the set requires, whatever may be the voltage of the incoming current.'

"Now we know that if we apply to a set the exact voltage, we are rid of atmospherics, distortion, back-ground noises. Indeed a boon. I must confess that I was caught by the 'Boon.' I bought one, and paid £1 for it, with the assurance that it would cost £2 in future. And I received a little box with two lamp-holders, in which I had to fix two

Notes from the Test Bench

Multi-wire Joints

IT is often necessary to anchor two or three wires to the same point and, if solder is used, it is not always an easy matter to make a neat and efficient job.

It is, of course, best to use separate soldering tags for each wire and clamp them all together under the terminal concerned, but, if no terminal is provided, as with many components, then it is advisable to twist the wires together, leaving one slightly longer than the others, and then float in solder so that a sound joint is made. The single projecting wire can then be easily connected to the tag.

More than one mysterious fault has been traced to a poor job being made of such connections. In fact, one case came to hand recently, where one of three wires had broken away and was making only intermittent contact with the others.

Meter Shunts

WHEN constructing a multi-purpose meter a very good plan to provide universal application is to arrange for the necessary shunts or series additions to be of the plug-in type. This will give a much greater range than could be obtained if the components were wired into the apparatus. By making these resistances in multiples of 100 and using a 10-point switch it will thus be possible to obtain steps of 10 from zero up to the highest value desired. Alternatively, the total resistance of each unit may be chosen to cover a given range and the tappings or steps then selected to give definite values, such as 11 ohms in steps of 0.1 ohm, 110 ohms in steps of 1 ohm, 1111 ohms in steps of 0.1 ohm, and so on.

Using a Pick-up

IN some receivers a very high gain detector valve is employed, and thus, if a pick-up is joined in the grid circuit in the usual manner there will be a danger of overloading when a very loud record is employed with a sensitive pick-up. This difficulty may be overcome by including a resistance in series with the pick-up. The value of the resistance should be such that when the volume control is at maximum the output valve is fully loaded.

ordinary lamps of 60 watts 230 volts. The lamps were connected in parallel, and both were in series with the mains.

"On the box a warning: 'Please do not open this outfit. If opened, it will not function properly afterwards.'

"I hope for the firm that the patent will follow very soon. Many thanks for your splendid articles and remarks in PRACTICAL AND AMATEUR WIRELESS."

Joke

G. I., of Wentbridge, has received a book for the following:

"I went to lodge at a house where the owner had a wireless set with ordinary aerial and earth led in through the window. Every night this doughty male religiously uncoupled the aerial of the set before retiring, also placed a jug on the sideboard and just as religiously placed the end of the aerial in it. On enquiring why the ceremony, this was the reply: 'So the set won't get struck by lightning, you know pot's a good insulator.' I suppose it will be jugged lightning when he get's a jugful. When he does, I'll send a spoonful on."

Spelling Wasp!

CALL it a Spelling Wasp, because those who engaged in it got stung. The announcer gave the definition of a Fascist as "a person who chalks messages on walls." Another Howler: The step from Hail to Hate is not a long one—just a couple of dashes!

H.M.S. President

IT is interesting to note that London's Navy Week begins on August 27th. Its activities are centred round H.M.S. President, Admiralty Depot Ship, anchored in the Thames and headquarters of the Royal Naval Volunteer Reserve. The R.N.V.R. use the President as London headquarters for training purposes. From the beginning of Navy Week, H.M.S. President is at home to the public, who may go aboard and inspect all phases of training activity.

The B.B.C. has arranged with the Admiralty to place their microphones and observer aboard on September 3rd for twenty minutes to describe life on the President during London's Navy Week.

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A PAGE OF PRACTICAL HINTS

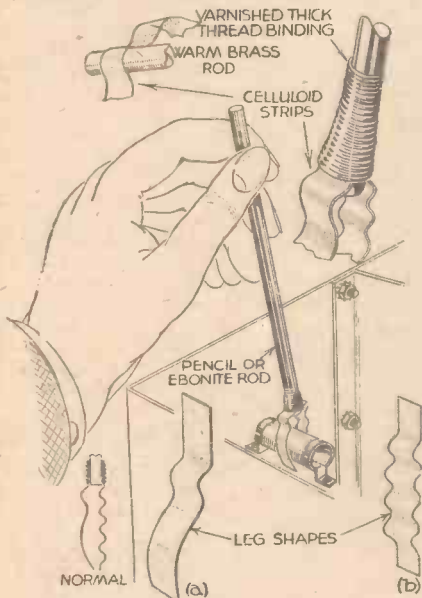
**SUBMIT
YOUR
IDEA**

READERS WRINKLES

**THE
HALF-
GUINEA
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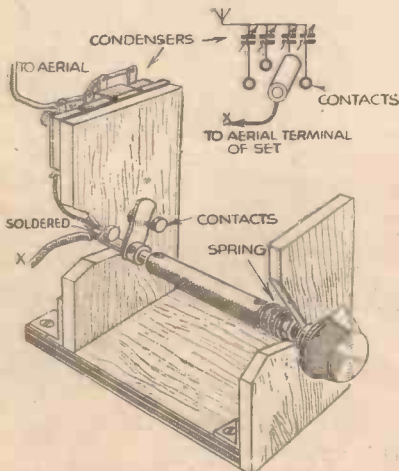
A Useful Component Placer and Utility Tool

THE difficulty of overcoming the placing of certain small components in a compactly designed chassis, can be easily effected by the simple tool illustrated. It



This simple tool is handy for placing small components.

will be apparent that there will be adequate springiness in two short lengths of celluloid for the handling of the majority of small components and miscellaneous parts, whilst the novel shape of the "legs" permits a steady grip, irrespective of the shape of the components. To fashion the legs I resorted to the use of a heated brass rod (as shown in the inset) and providing this is not too hot, or the celluloid too thin, it



An effective aerial-condenser switching arrangement.

THAT DODGE OF YOURS!

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

SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page 568

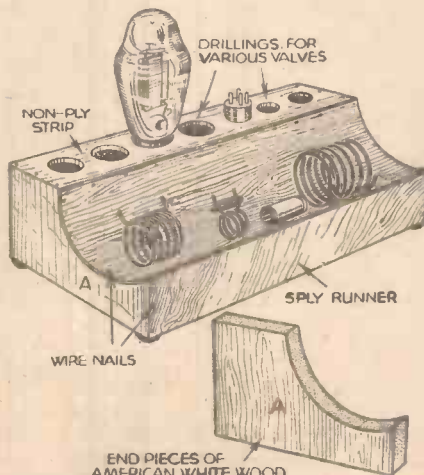
is a simple matter to bend the strips to the required shapes.—D. G. HANES (Ashford).

An Aerial-Condenser Switch

TO avoid having to adjust the aerial condenser in my all-wave set every time the waveband is changed, I use one condenser for each waveband, with a switch to change from one to the other, as the coil is changed. Each condenser is set for one particular coil, and then left. The condensers, which are mounted as shown in the sketch, can be home-made ones, or small trimmer condensers can be used.—R. DEWEY (Saffron Walden).

A Handy Accessory

WHILST renovating my wireless den recently, it occurred to me that a useful addition to my equipment would be a combined valve and coil rack, and the results of my efforts are shown in the accompanying sketches. Experiments in short-wave work tend to make one a little careless at times with the coils, and in the case of ultra-short-wave coils which are silver-plated this state of affairs is detri-

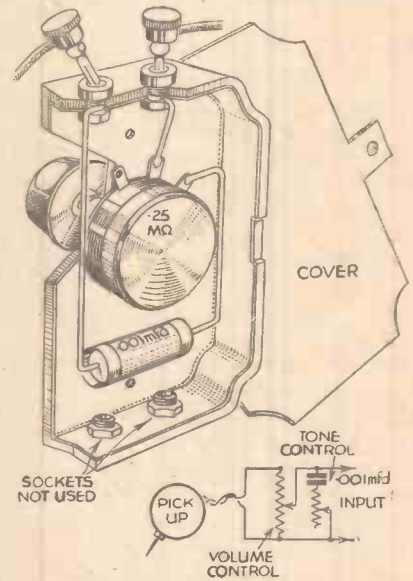


A combined valve and coil rack.

mental to the ultimate efficiency of these coils. To make the trough for the coils, I steamed a piece of thin plywood, carefully bending this to shape; then with a little persuasion the assembly was completed. For longer troughs it is advisable to have a centre support similar in shape to one of the end pieces. As a further protection for the coils, a piece of baize can be glued to the trough.—A. T. LENTWILL (Bradford).

A Simple Scratch Filter

THE accompanying sketch shows a simple scratch filter or tone control suitable for a radiogram with a detachable turntable unit. The tone control is made from a disused H.M.V. pick-up volume control, as follows: The volume control comprised a potentiometer with provision for extra shunt resistances. The spring



A compact scratch-filter unit.

contacts or tags for the latter were removed, and a condenser of suitable value housed in the space so formed. The original potentiometer or one of some other value is connected as a variable resistance in series with the condenser, and the whole unit shunted across the pick-up leads. The advantages of this unit are: 1. Unit can be fitted anywhere on the exterior of the turntable cabinet. 2. Experimenters can alter the values of the resistance or condenser without disturbing in any way the general wiring of the radiogram. Gramophiles using H.M.V. volume controls are provided with a tone control which matches.—E. R. J. ROBBINS (Hounslow).

NOW READY!

WIRELESS COILS, CHOKES AND TRANSFORMERS, AND HOW TO MAKE THEM.
Edited by F. J. Camm.

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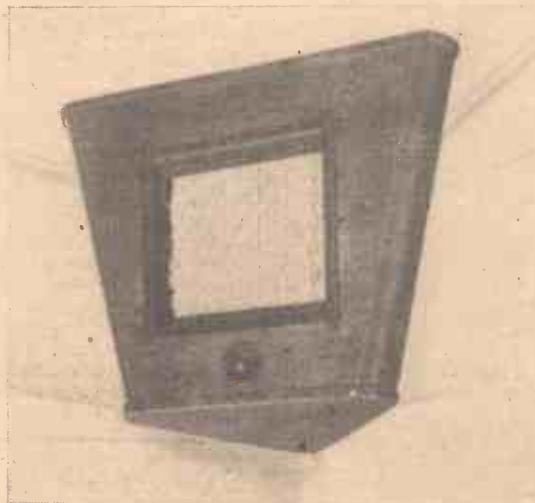
RADIOLYMPIA

Advance Details of Some of the Items Which You Will See



A Push-button 5-valve Console in the Bush range of receivers.

AS has already been announced, Push-button tuning and Television are the two high-lights of this year's Radio Exhibition, and on this page we illustrate some of the new items which we have so far been able to inspect. Contrary to the expectations of some antagonists of the push-button system, the row of buttons does not give to the receiver an appearance of an accordion. Manufacturers have attempted in most cases to make the push-buttons inconspicuous, without making it difficult to find them when required. Thus, in the Mullard Model MAS20 seen at the foot of this page, the six push-buttons form a neat assembly on the right of the row of controls, whilst in the Bush receiver at the top of this column the buttons form the main part of the control panel layout. In every case we have so far examined, a

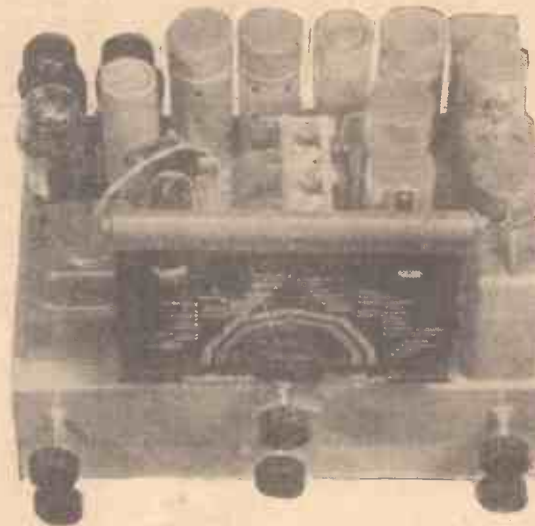


A novel speaker cabinet by W/B.

manual control button is provided so that when desired the receiver may be tuned in the ordinary way, but we anticipate that at least one manufacturer will produce a receiver in which no manual tuning is provided, a row of buttons and a simple combined on/off and volume control, with the addition of a tone control being all that will be fitted. A receiver of this type, designed to produce a very high quality of reproduction, should find a ready market.

Speakers

Whilst on the subject of loudspeakers, we might mention the W/B Stentorians which again will be prominently exhibited. At the lower right- and left-hand corners of these pages may be seen two new W/B Cabinet model speakers, the one on the left being designed to occupy a corner position and being known as a "Pendant" model. On the right is a normal extension or similar model, and in each case it will be noted that a volume control is mounted on the cabinet. This control may, if desired, form part of the W/B Long-arm device which enables the distant receiver to be switched on and off, whilst still permitting the volume from the speaker to be controlled as desired. The quality of reproduction from the modern speaker is steadily improving, and modifications in the design of the cone shape and fabric, as well as in the magnet, have resulted in increased sensitivity and a wider frequency range. Quality enthusiasts will still find certain models available which are designed for use with special experimental receivers, and which will give a wider response than is at present adopted in the B.B.C. broadcasts.



Here is one of the Armstrong chassis—all-waves, A.C. mains, and push-pull output.

Test Equipment

Among the various items of test equipment to be exhibited, the experimenter and the service engineer will find a very exten-

Portable Design

Another important aspect of the show will apparently be the design of the modern portable. In the past the portable has taken on many forms, from the original suit-case arrangement, which was heavy as well as bulky, to the miniature "novelty" design, which, although extremely small and light, failed to give an adequate performance. On the right of this page are two modern portables such as will be seen at Olympia, and the most important feature which strikes the eye is the scheme adopted for the panel or control layout. In some models a pull-down flap (after the manner of a roll-top desk) is employed to cover the knobs when the receiver is not in use, and in other models the controls are sunk to be flush with the cabinet surface. These modern portables are extremely light, but an important point is that in the majority of them full-size H.T. batteries are employed, thus permitting the valves to work "full out" and not at a very small value which fails to give maximum performance. The speakers are, in the majority of cases, highly-efficient moving-coil models, capable of delivering a really high quality of reproduction.



This is the Ferranti Model T 24 receiver.

A PRE-VIEW

See at the Radio Show which Opens Next Week

sive range. Meters, Bridges and Oscillographs are now commonplace items in the experimenter's laboratory, whilst no serviceman worthy of the name would think of servicing a modern receiver without making use of two or three modern test instruments. Dealers will find the Valve Testers of very great interest as they enable the customer himself to see the condition of the valve, and thus remove any doubt which may exist as to whether or not the valve does, in fact, need replacing. The difference between it and a new valve is shown on various forms of dial or chart, in some of which merely the words "Good," "Replace," or "Normal" are shown. For those who prefer to build their own equipment, the small cathode-ray tubes will undoubtedly

prove an attraction as they enable a really efficient oscillograph to be built up for test purposes.

Chassis

The Armstrong Chassis have already obtained a measure of popularity among



those constructors who prefer to build their own cabinets or who desire only a ready-made set to use as a stand-by and consequently do not wish to go to the expense of a cabinet. These chassis are available in various types, and on the opposite page may be seen a high-quality all-wave mains set, with a push-pull output stage. The large open dial, magic-eye tuning, and wave-range indicator may clearly be seen on the dial. Other manufacturers are also prepared to supply only the chassis for those who have their own ideas regarding cabinets or the method of housing the receiver, and a number of these appear in the de-luxe class.

Television

The importance of television cannot be over-emphasised, and one of the main attractions at the Exhibition will be the glass-walled television studios in which visitors will be able to see performances taking place, and special arrangements are being made to permit visitors to appear before the television cameras. This will be done during broadcasting hours, so that relatives or friends who have television receivers will be able to see their faces on the screen. Some of the hidden mysteries of make-up and so on will be disclosed. The television receivers on view will be fed from a distributing line, and will show how they appear in your homes, so that screen colour, definition, and all other essentials will be readily seen. This is, of course, much better than having to queue up and see the models during a very short period of time. The television receivers are now much simpler to operate, many of the original controls now being pre-set inside the cabinet, and in some cases only two controls are provided—namely, for brilliancy and contrast. The circuits have now been so improved that framing holds perfectly over long periods, and no need arises to make



Two Modern Portables—a Pye and an Invicta.

any adjustments other than contrast and brilliancy, which may be likened to the volume and tone controls of a modern broadcast receiver. The model illustrated on the opposite page is the Ferranti T.24, which costs, complete with all-wave radio, 60 guineas.

Components

As mentioned on page 547, the constructor will find many interesting items available for his inspection. Apart from the new push-button devices for the conversion of existing receivers into the latest pattern, there will be other interesting details to be seen. Many old-time items will appear in new guises, either with new casings or other outward appearance, or in an improved technical form. The various short-wave items exhibited on the Eddystone stand will undoubtedly form one of the main attractions for the constructor. Here will be seen many old items as well as a good collection of new ones. The transmitter is, of course, well catered for by the Eddystone people, and a number of new transmitting components will be exhibited. The short waves are becoming still more popular, and components which at one time were considered very good for short-wave work are now being steadily improved so that they may be used down to 5 metres and below, and accordingly a very high standard is expected of these particular items.

In addition to the components so far mentioned there will, of course, be many smaller parts such as meters, with which no experimenter can dispense. The Ferranti stand especially should be borne in mind when visiting the instrument section of the Show.



Another neat speaker by W/B



A test instrument by Mullard.



A neat push-button set in the Mullard range.

Further Notes on Automatic Volume Expansion

In this Article Mr. McMurdo, of the McMurdo-Silver Corporation, who has Developed the System of A.V.E. used in America, Offers Some Suggestions and Gives Details of the 2B Volume Expander

THE writer has read with interest the article entitled "Noise Suppression and A.V.E.," appearing on page 393 of the July 2nd, 1938, issue of PRACTICAL AND AMATEUR WIRELESS, and feels that a few suggestions may be of interest.

Referring to Fig. 1, which is intended to indicate the method of volume expander operation, this is not as clear as might be desirable. Actually, in customary volume expansion, a portion of the audio amplifier signal is diverted into a second channel for amplification, rectification, and, operating as a varying D.C. voltage by virtue of an R.C. filter of suitable time constant, is applied to some valve or agent in the signal amplifier circuit to regulate gain in approximate proportion to volume. Thus, in a conventional expander, Fig. 1 would more accurately show the rectifier D.C. output of V3, not as applied to V4, but as applied to an auxiliary gain control grid or element of V1, or some other tube in the signal circuit chain.

Were Fig. 1 intended to show the expander circuit of Fig. 2, then it would be necessary to alter the figures of Fig. 1 to make V1 of Fig. 1, V1 of Fig. 2; V2 of Fig. 1, V3 of Fig. 2; V3 of Fig. 1, V4 of Fig. 2; and V4 of Fig. 1, V2 of Fig. 2. It would further be necessary not to show output of V4 as coupled back to V2 of Fig. 1, but to show V4 Fig. 1 as representing one section of a variable resistance bridged across the output of V1, the other portion of this variable resistance being R9.

Actually, as will be seen from the following notes on this expander as developed by the writer, the output of a signal amplifier valve is fed to a succeeding expansion amplifier and rectifier. The rectified voltage through the R.C. filter of a suitable time constant is then applied between grid and cathode of still another valve which in series with a fixed resistance, both across the whole output of the signal amplifier valve, provide a signal varied automatic volume control potentiometer.

Suggestions made by the writer as to the noise suppression possibilities, which may be inherent in this system, were purely suggestions offered for those who cared to experiment further, as the writer has not had the opportunity to fully explore them, as yet.

While the writer does not wish to comment definitely, at the same time he would question whether the volume range handled in B.B.C. transmissions is appreciably greater than that possible to American broadcast stations. In any case, it is doubtful if the full volume range of symphonic music can be handled upon British or European phonograph recordings to a more satisfactory degree than is the case with American recordings.

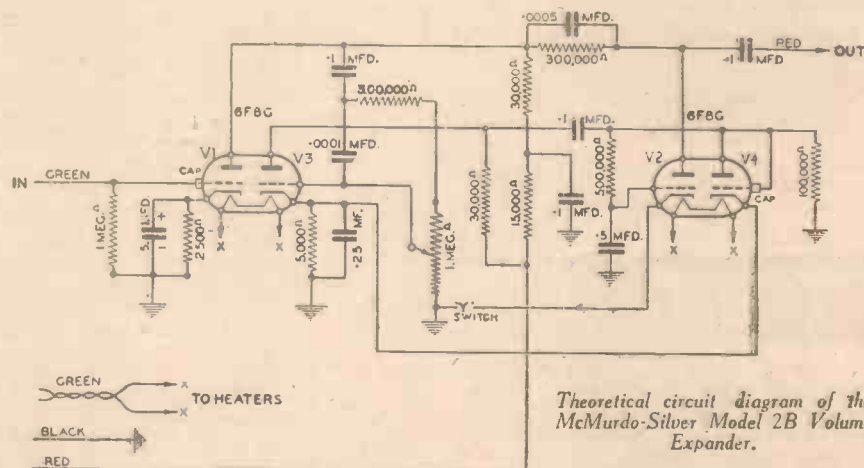
The 2B Volume Control

In view of the foregoing remarks the following details of the 2B volume expander should be of interest. From the accompanying circuit diagram, it is apparent that the 2B Volume Expander employs one triode V1 of one 6F8 as a signal amplifier, and the second triode V3 of this tube as an amplifier for signal voltage to be employed for expansion control. The second 6F8 uses one triode V4 as a diode rectifier and the remaining triode V2 as a "gain control," with its resistance varied by signal voltage changes as regulated by the potentiometer. When the potentiometer knob is turned off, its switch opens the V2 circuit, allowing V1 to increase total audio voltage amplification approximately 23 db.

The 2B Volume Expander is employed to add dynamic volume expansion to any

which is also the grid leak for the first audio amplifier tube. It is only necessary to disconnect this condenser from the volume control, connecting the green 2B wire to the freed wire of the condenser and the red 2B wire to the freed volume control lug. A notch, slot, or hole should be cut in the bottom shield plate of size sufficient to pass the 2B wires.

Four wires twisted together and coming from a single grommet on the rear of the 2B must be connected to the radio set to obtain filament and plate voltage for the Expander. The two green wires are 6.3 volt filament or heater, and must be connected to convenient 6.3 volt circuit points in the receiver, as at tube socket lugs. The black wire connects to radio set B-, usually the grounded metal chassis. The red B+ wire connects to any convenient



Theoretical circuit diagram of the McMurdo-Silver Model 2B Volume Expander.

existing radio receiver by connecting its green "IN" wire to the output of the receiver's audio detector, with its red "OUT" wire connected to the radio set wire previously connected to the audio detector output. In other words, the original connection from radio set audio detector to the grid or input transformer of the immediately following audio amplifier is broken for insertion of the green "IN" and red "OUT" wires. If no blocking condenser is provided in the radio set between audio detector and following audio amplifier, a 1/10 mfd. 400 volt paper condenser should be connected in series with the green "IN" wire (if D.C. insulation is required).

Triode Audio Amplifier

In practice, the radio set's audio detector will usually be a diode resistance coupled to a following triode audio amplifier. In this, an essentially typical case, the audio detector load resistor is connected through a coupling condenser to the volume control

250 volt B+ circuit point in the receiver. The bottom view of the "15-17" is marked to show how these connections are made. In final mounting, the "IN" and "OUT" wires should be kept away from the four twisted power wires. These wires should not be lengthened if this can be avoided.

Adding the Unit

When added to an existing radio set with connections made as above, the 2B Volume Expander may be mounted on the side of the console by means of the nut on the knob shaft bushing. This will require a 3/8 in. hole drilled in the console, counter bored on the outside to 1/2 in. diameter and 3/8 in. deep to provide a recess to accept the plate boss, which is held in place by the shaft bushing nut. This plate should be so located that when the knob has clicked off the switch at the extreme counter-clockwise position, the knob pointer is over the plate lettering "OFF."

(Continued on page 564)

New Broadcasting Plays and Features

THE B.B.C. inform us that Val Gielgud, Director of Features and Drama, has now completed the main outline of his plans for the October-December quarter. The closing months of 1938 will provide amply varied material for the ever-growing numbers of listeners to broadcast plays. The popular demand for serials will be abundantly met. It has already been arranged, for example, that Patrick Riddell's adaptation of Dumas' "Les Misérables" will be produced on twelve consecutive Sundays by Peter Creswell with Terence de Marney in the leading rôle.

Paul Temple Again

Thy many thousands of admirers of Paul Temple will hail with delight the news that there will be a further series of his adventures extending over eight weeks. Another serial broadcast will be entitled "The English Family Robinson." This has been written by Mabel Constanduros in collaboration with her nephew, Denis, and will relate the adventures, both pleasant and unpleasant, of a perfectly typical English middle-class family. The Robinsons are sure to make many friends for themselves.

National Repertory

Important revivals will include Noel Coward's "Cavalcade" and Flecker's "Hassan." James Barrie's "What Every Woman Knows," Ben Jonson's "Volpone," and Auden and Isherwood's "The Ascent of F.6" should appeal to more serious students of the drama. Vosper's "Murder on the Second Floor" and "The Wind and the Rain" by Merton Hodge, are two

examples of the work of repertory companies to be broadcast by the B.B.C. in its national repertory scheme.

In response to the demand for shorter plays and features there will be many half-hour and forty-five minute programmes by such well-known writers as Horton Giddy, James Laver, and Norman Edwards.

Feature Programmes

Outstanding feature programmes will include a series entitled "Europe at Home," which, produced from various points on the Continent by Moray MacLaren, will be in some respect a sequel to his earlier series, "European Exchange." A further series with the general title of "The Thin Red Line" will celebrate historic achievements of famous British regiments. The first of these programmes, dealing with the Grenadier Guards, will be produced by Val Gielgud. Others dealing with the Royal Scots and the Inniskilling Fusiliers will be produced appropriately in Edinburgh and Belfast respectively.

Lawrence Gilliam, in addition to an Armistice Day feature, will be responsible for programmes on such widely differing subjects as the Armada, the famous showman Barnum, and the Mercantile Marine. Many features in the forthcoming quarter will be contributed by the various Regions. Typical examples will be a Saint Andrew's Day programme from Scottish, one on Sark from the West of England, a "documentary" on Coal by D. G. Bridson from Northern and programmes on Gloucester and Durham Cathedrals in the series "Sermons in Stone" from the Midland and North Regions respectively.

RADIO CLUBS & SOCIETIES

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

RADIO, PHYSICAL AND TELEVISION SOCIETY
PERMISSION has been granted for parties of members of the above society to visit—(1) Beckton Gas Works; (2) The Royal College of Surgeons; (3) The Main London Telegraph Office of Cables and Wireless, Ltd.; and (4) Battersea Power Station.

It may be possible to find room in the parties for one or two non-members. Readers who would care to accompany any of the parties on the above visits are invited to make application to the Hon. Secretary, 72a, North End Road, London, W.14, indicating in which visit they are interested. Applications from non-members will be dealt with strictly in rotation.

THE SUSSEX SHORT-WAVE AND TELEVISION CLUB

AN Extraordinary Meeting of this club was held at East Ashling, on July 19th. Mr. L. Willard, the Chairman, was unavoidably absent, and the Vice-Chairman, Mr. E. C. Cosh, explained that he did not wish to preside over this particular meeting, thereupon Mr. R. F. Hansford was elected to preside.

A good attendance was registered, 80 per cent. of the membership being present. After the usual preliminaries, Mr. Hansford said all officers, excepting the Chairman and one member of the committee, had signified their intentions of resigning from office. The Chairman then asked for the resolution, and Mr. Meachem (Tangmere) moved that:—

"The West Sussex Short Wave and Television Club be disbanded, and that a new club be formed, known as 'The Sussex Short Wave and Television Club'—the new club to assume the assets, liabilities, and membership of the 'West Sussex Short Wave and Television Club.'"

It was further resolved to commence the club's new financial year from July 19th. The meeting to be considered the inaugural meeting of the "Sussex Short Wave and Television Club."

Officers were then elected as under:—

President, G. Maruse, Esq.; Chairman, Mr. R. F. Hansford; Vice-Chairman and Social Officer, Mr. H. K. Mawer; Joint Honorary Secretaries, Mr. C. J. Rockall, "Aubretia," Seafeld Road, Rustington; Mr. E. C. Cosh, "Anslin," Mill Road, Angmering; Committee, Messrs. Blake, R. Allen, Mayor, Rowley, Burbidge, Meachem, O'Neill, and Older.

Arrangements are well in hand for the winter programme; and several interesting speakers have promised to address the club. Headquarters will be open shortly, and the club should enjoy a really progressive winter season. Particulars of membership are obtainable from the Joint Honorary Secretaries.

ROMFORD AND DISTRICT AMATEUR RADIO SOCIETY

THIS club has now settled at the new headquarters, and the first evening was spent doing C.W. practice and making final arrangements for the district D.F. day, when three teams were entered from the club. G8PL is now licensed for 25 watts. 2DBT and 2DJU have each built CO-PA rigs, and the latter is wondering how to get a 66ft. antenna in a space of 30ft. For benefit of G's who QSO EA7XX on 7 mc. band, his full QRA was obtained, and is as follows: C/o Radio Aviacion, Sevilla, Spain. He also promises a QSL, but the card has not yet arrived at QRA of G8PP, who worked him in June. The club still has room for new members, and meets at the Red Triangle Club, North Street Romford, at 8 p.m., on Tuesdays.

Secretary, R. Beardow (G3PT), 3, Geneva Gardens, Chadwell Heath.

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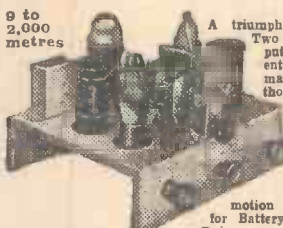
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Employs famous B.T.S. One-shot inductors or N.T.S. 6-pin coils. Slow-motion Tuning. Complete Kit for Battery use with steel chassis, Twin-gang condenser, Slow-motion Tuning Dial, Transformer, Resistances, etc., and assembling instructions, less coils, 27/6 only, Cash or C.O.D. or 2/8 down, and 12 monthly payments of 2/6.



COMPLETE KIT. Comprising above kit with set of 6 Coils 9-2,000 metres. Cash or C.O.D. 41/6 or 2/6 down and 12 monthly payments of 4/-. **VALVES GIVEN FREE.**

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Complete Kit with **FREE VALVES** and 3 pairs 6-pin coils, 51/6 or 4/8 down and 12 monthly payments of 4/7.

4-VALVE BANDSPREAD SHORT-WAVE RECEIVER. 12-94 metres. Amazing performance. Amazing value. Complete kit with coils and comprehensive instructions, 42/-, or 2/8 down and 12 monthly payments of 4/-. 4 matched valves given **FREE.**

2-VALVE BANDSPREAD SHORT-WAVE KIT. 12-94 metres. Amazing performance. Amazing value. Complete Kit. List 69/6. **BARGAIN** 52/6, or 2/8 down and 12 monthly payments of 3/1. Two matched valves **FREE.**


3-VALVE BANDSPREAD S/W KIT. 12-94 metres. Complete Kit, including three coils. List value 23/17/6. **BARGAIN** 37/6 cash, or 2/8 down and 11 monthly payments of 4/1. Three matched valves **FREE.**

1-VALVE SHORT-WAVE KIT. Complete 1-Valve Receiver Kit, including 3 coils; 12-94 metres, and pair of super-sensitive headphones, 27/6 cash, or 2/8 down and 11 monthly payments of 2/6. Valve **FREE.**

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FURTHER SPECIAL PURCHASE

SPEAKERS. PM's, well-known makes, 6in. cone, for Power or Pentode, 12/8. Goodmans and Celestion, 6in. PM's, 7/6. Mains Energised. 8ohm, 6in. cone, Pentode Output 2,600 ohm, 10/6. **ALL NEW.**

METAL CHASSIS. Steel, ready drilled for 1-9 valve-holders, Electrolytics and mains transformers. Size 15in. x 9in. x 3in. grey enamel finish, brand new. **BARGAIN** 2/- each. Also size 10in. x 7 1/2in. x 2 1/2in., ready-drilled with 3 valve-holders fitted and A. and E. strip, 2/3. Also, Brand new, heavy gauge Cadmium-plated steel chassis, 14 1/2 x 7 1/2 x 2 1/2in., ready drilled for 5 valve-holders, mains transformer, etc. **BARGAIN**, 2/-. Post, 6d. extra.

New light weight super-type **HEAD- PHONES**, recommended for short-wave work and testing.

List Value 15/-, **BARGAIN 3/6**
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3 MATCHED BATTERY TYPE VALVES, BARGAIN 5/6

2-volt Philco type (2 S.G. H.P.'s and one Output Pentode): List value 35/-. **YOURS FOR 5/6 only. POST FREE.** 3-valve-holders, data and circuits given **FREE.** Ideal valves for experimental purposes, Short-Wave, All-Wave receivers and replacement purposes.

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Practical Television

August 20th, 1938. Vol. 3. No. 114.

Television and Fog

FROM the time that Baird demonstrated his Noctovisor in August, 1929, many schemes have been propounded for "seeing through fog." There is no doubt that if any idea can be perfected for this purpose it will prove a boon to navigation both on the sea and in the air. One of the newest methods comes from America, and for its successful operation appears to embody many of the latest developments in television. Stating that infra-red radiation to a greater or less degree is always present, and emphasising that these rays pass quite freely through fog, cloud or mist, the idea is to focus an infra-red image of the obscured object on to a special form of fluorescent screen which has the property of responding to them more or less as it does to ordinary light waves. The picture which is formed on this screen is then scanned through the medium of a beam of electrons emanating from a standard form of cathode-ray tube electrode and deflecting system. This is said to bring into being an image or picture which has the right differential values of light intensity. This scanned image is focused by a projection lens on to the active cathode surface of a photoelectric cell. The resultant output current produced in this way is then amplified and fed as a signal to the control or modulation electrode of a second cathode-ray tube. The picture built up in scanned form on the screen of this tube is claimed to be a greatly improved reproduction of the picture on the screen of the first tube, and is in effect a light replica of the scene or object obscured originally. The scheme really embraces the methods of the iconoscope and spot light scanner, and should not be very complicated to build up in a commercial form if the tests which are now being made show any degree of promise.

The Eye and Picture Brightness

IT is not always appreciated by the average individual how the human element enters so much into every form of television viewing, whether the pictures are seen on the small home screens or watched on large screens in the cinema or theatre. One has only to mention persistence of vision to show that but for this human phenomenon whereby the eye retains an impression of a scene it has witnessed even after the scene has disappeared, both television and the cinema would be impossible. The eye fortunately is a very adaptable organ, particularly in relation to its reaction to light and dark. When you first enter a darkened room everything is black and movement is therefore difficult, but after a minute or two the eye becomes accustomed to the new conditions, and objects previously invisible can be seen. Not only can the eye show an advantage over a camera, which can vary the light sensitivity for a given film only by altering the shutter opening or lens diaphragm, but it alters its own sensitivity to suit the

conditions under which it has to work for any period of time. This is brought home very forcibly when looking at television pictures under various degrees of extraneous illumination. If this were not the case then it is certain that some form of standardisation would be necessary; a point which would apply with equal emphasis to the cinema also. According to actual measurements the normal human eye, because of



The television operator with his camera, watching the scene in rehearsal so as to find his best position during the actual televising.

the wide range of sensitivity it can endure, will adapt itself to screen illuminations ranging from two to twenty foot-candles without any difficulty, although any maintenance at the extremes for long periods of time will naturally produce a strain, which is not a good feature. As a very good example of this mention can be made of the demonstrations of Baird big-screen television which have been given at the Tatler Theatre. With a picture size of 8ft. by 6ft. 6ins., the screen when first observed looked a trifle dull since it was below the intensity associated with the cinema pictures seen

in the same building. After a few minutes, however, especially when the dim auditorium lights had been switched off, the eye soon accommodated itself to this level of brightness and a full contrast range was simulated. The effect as far as the eye was concerned was that of a film picture approximating to normal illumination, for the most important item with a television picture is the range of contrast between black and full high lights, and not average illumination. If the general level of room or auditorium lighting is raised, however, then other factors apply, and every demonstration must be watched carefully to ensure that this is kept to the right level with the screen illumination as the guiding factor.

An Important Application

THE degree of importance which is attached to the reasoning put forward in the preceding paragraph is emphasised in a patent which has been granted. The inventor points out that when a television receiver screen of the cathode-ray type is viewed

either in daylight or in a room with normal artificial lighting, the diffused light from the room which has been reflected back from the screen mixes with the direct light from the picture itself. The combined result of this is that the range of contrast values in the television picture is reduced, while the blacks exhibit a tendency to become grey. To offset this it is proposed to reduce the diffused or unwanted light by two simple methods. In one of these a greyish coloured glass plate is interposed so that it has the property of absorbing more of the diffused light than it does of the direct light from the built-up picture. Another suggestion is to shield the cathode-ray tube's screen from extraneous general illumination by means of a metal tube having a blackened inside surface. Although the present-day types of cathode-ray tube are capable of

producing very bright pictures which removes in many cases the necessity for resorting to such devices, the idea is important, and can find application in many directions.

RADIOLYMPIA
August 24th to Sept. 3rd
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COMMON IMPEDANCE COUPLINGS

WHEN constructing a mains operated receiver for the first time, or when replacing the high-tension battery of a battery operated circuit with an eliminator, certain faults are often experienced.

As the symptoms, owing to their complex nature, can be most misleading to the beginner, it is not always an easy matter to remove the faults. However, if it is remembered that the majority of the trouble can be traced to H.F. or L.F. instability, suitable steps can be taken to prevent such troubles being present.

The term "motor-boating" is familiar to most readers; it is a description given to a form of oscillation the frequency of which is so low that each cycle is audible, the noise produced being similar to the pop-popping of a motor-boat engine.

This objectionable form of instability is usually due to a coupling between the various anode circuits, and it is invariably caused by high and low-frequency currents,

Describing how Various Forms of Instability can be Introduced into a Battery or Mains Operated Receiver by Impedances Common to all Circuits = = = = By L. O. SPARKS

in fact it is, so far as we are concerned with the flow of direct current and voltage, but such an arrangement also provides an easy path for any H.F. and L.F. currents to a common meeting point in the battery.

If the battery is in good condition, the possibility of inter-anode coupling is reduced, as a comparatively low resistance path to earth is provided by the negative return, but if the battery is old, or has developed a breakdown between the cells, then a high resistance is offered to the flow, and the unwanted currents are unable to get away. The high resistance really acts as a choke, and traps a very large percentage of the H.F. and L.F. currents, and these immediately start causing trouble, usually in the form of "motor-boating" or general instability. To revert to the eliminator circuit. Fig. 4 shows a simple

current in milliamps, then a rise in voltage must be expected if the current flowing is lower than the rating of the eliminator. If tests are made, it will be found that the voltage is no longer 120 volts but nearer 140. Fig. 4, which represents a voltage regulation curve of one form of rectifier, gives a very

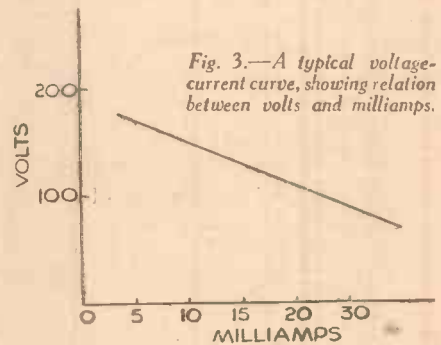


Fig. 3.—A typical voltage-current curve, showing relation between volts and milliamps.

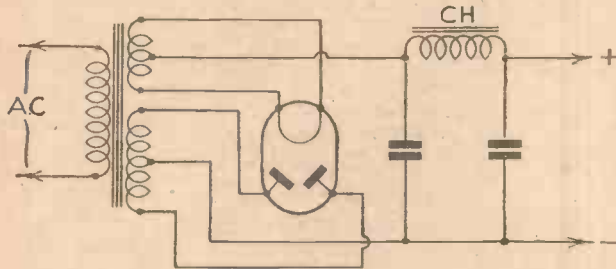


Fig. 1.—The fundamental circuit of an A.C. eliminator for H.T. purposes.

together with an impedance which is common to all anodes.

This impedance can be present in the form of a high resistance or an inductance. The high resistance might be due to the breakdown of cells in a high-tension battery or by the inclusion of a voltage dropping resistance in the H.T. circuit. On the other hand, when the impedance is that offered by an inductance, smoothing or L.F. chokes are usually to blame.

Rectifying Circuit

A glance at Fig. 1, which shows the rectifying circuit, in skeleton form, of an A.C. eliminator or receiver, will show that the smoothing choke Ch. is in such a position that all high-tension has to pass through its windings, thus rendering it common to all anode circuits if certain precautions are not taken.

Such an arrangement, while being quite satisfactory in itself, is far from ideal if the output is to be used to operate a simple or "straight through" circuit, particularly if one or more stages of H.F. amplification are employed.

The term "straight through" refers to the anode circuits, and its meaning will be rendered more clear by examining Fig. 2, when it will be seen that all anodes are in direct contact with the H.T. battery or supply. This form of circuit is often used for simple or cheap battery operated receivers.

To some, this may seem quite in order,

eliminator connected to the three-valve battery receiver, and it will be noticed that no alteration has been made to the circuit wiring. We will assume that the consumption of the receiver is 12 to 15 milliamps at 120 volts, while the output of the eliminator is 120 volts at 20 milliamps.

Voltage Regulation

If we also assume that the milli-wattage output of the unit is constant, that is, the product of the voltage multiplied by the

good idea of how the voltage varies when different values of current are flowing.

This change in the operating conditions of the receiver is likely to produce instability and distortion, unless attention is paid to the anode feed of the H.F. and Det. valves, and a higher value of grid bias applied to the output valve.

Supposing no attempt is made to adjust these items, then, apart from other undesirable effects, it is highly probable that the efficiency or life of the valves will suffer, particularly the output valve, while H.F. chokes or the primary windings of L.F. transformers may break down owing to excessive current.

The other undesirable effects can be many and varied; for example, the reaction circuit will no longer respond in a smooth manner—it will be rather fierce and difficult to adjust on a weak signal; the whole circuit will be very touchy, if not completely unstable, while, as previously mentioned, the quality of reproduction will suffer,

(Continued Overleaf.)

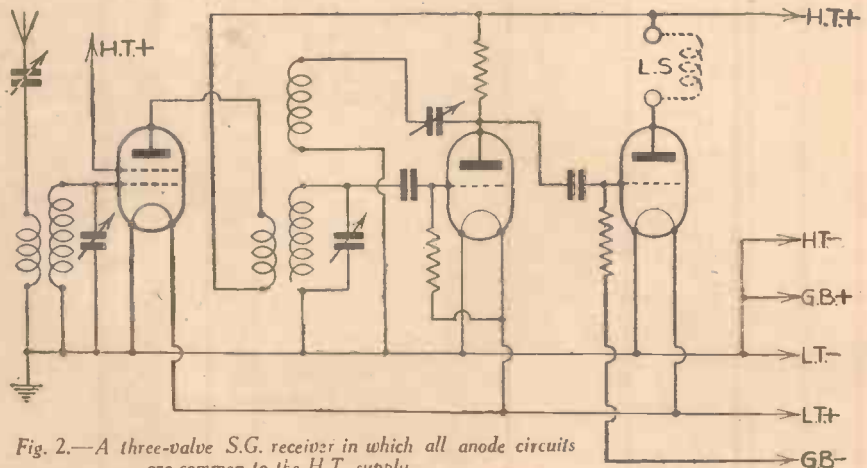


Fig. 2.—A three-valve S.G. receiver in which all anode circuits are common to the H.T. supply.

(Continued from previous page.)

and last, but quite possibly the first to make itself known, "motor-boating" will be set up with most distressing results.

This brief list of possible faults may seem very depressing and make things look rather hopeless for those who wish to use an eliminator, but don't get the impression that eliminators are unsatisfactory devices—far from it—the average unit is a sound engineering job, and capable of carrying out all the claims made by the maker, provided that it is given a square deal, and a reasonable chance.

Now, supposing we look on the more cheerful side of the whole business, and see what steps are necessary to secure good results.

If it is agreed that "motor-boating," to

3,200 ohms at 50 cycles, and only 320 ohms at 5,000 cycles, therefore it will readily be appreciated that its impedance at much higher, or radio frequencies, will be very small. This fact tells us that for any decoupling before the detector, providing suitable resistances are chosen, a condenser having a capacity of .1 mfd. is quite large enough.

Resistance Values

By suitable resistances, it is meant that their value must be large compared to the impedance of the condenser, otherwise the H.F. currents will flow through them in preference to the condensers. If other factors are agreeable, it is fairly safe to use a resistance having a value ten times greater than that of the impedance of the condenser

flows through a resistance. If a resistance having a value large enough to carry out the work under consideration was employed, then the current required by the average output valve would cause a voltage drop so large as to render satisfactory operation impossible, therefore an L.F. choke having a comparatively low D.C. resistance is used.

This brings us to the question of how large the resistance can be, and its effect on the anode voltage.

This problem can be approached from two points; one can either decide what decoupling resistance is to be used and then adjust the H.T. supply to meet the requirements of the valves or, knowing the current required for satisfactory operation, and the maximum H.T. available, determine what resistance will conform with those details. The first method is, of course, the more efficient, but the second way is often the only course open, particularly when one is using a limited battery supply. In such cases it is advisable to make the resistances as large as conditions will permit, and, if the values are on the low side, use larger decoupling condensers.

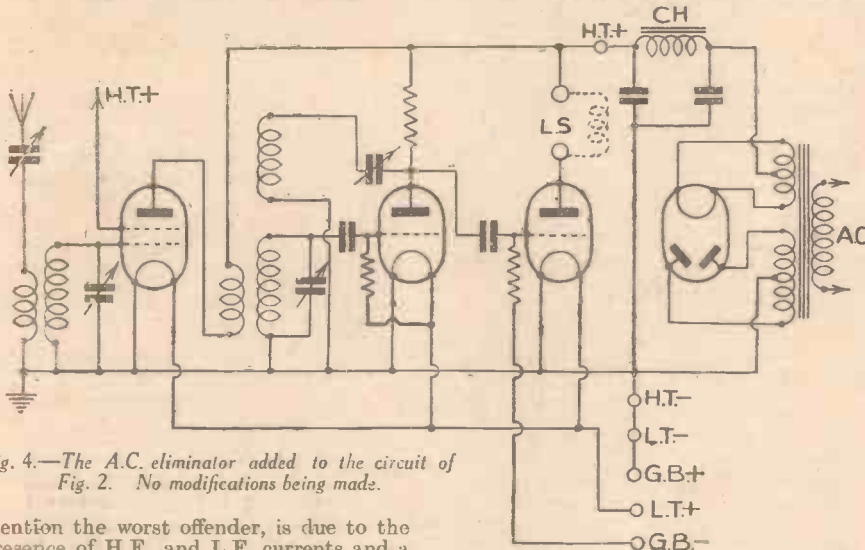


Fig. 4.—The A.C. eliminator added to the circuit of Fig. 2. No modifications being made.

mention the worst offender, is due to the presence of H.F. and L.F. currents and a common impedance, then it would seem that the obvious step to take is to prevent these currents from reaching the impedance. We have seen in a previous article on "H.F. Chokes" that these components can be used to trap H.F. currents, but they cannot be employed in all stages, therefore it is more usual to apply what is known as anode decoupling.

Decoupling Arrangements

Many circuits already embody adequate decoupling, and with these the minimum of trouble is likely to be experienced when an eliminator is used. It does not follow that the design of a circuit is bad if such arrangements are not used, the omission is more likely due to the question of cost, simplicity or the circuit may be such that other provisions have been made to keep the various currents in their respective channels.

Let us refer to Fig. 5, which shows the same circuit, but certain modifications have been made, and these are shown by the heavy black lines.

It will be noticed that each anode circuit has been modified by the inclusion of certain fixed resistances, and, in the case of the output valve, an L.F. choke.

The object of the resistances is to trap or offer a high impedance to any alternating currents having a high frequency, but it is not the slightest use doing this unless another path is provided for the currents to get away. The easiest and most efficient way of doing this is to provide a low impedance path to earth, and this is done by means of fixed condensers whose capacity depends on the position they occupy in the circuit and the size of their associated resistance. For example, a .1 mfd. condenser offers an impedance, or reactance, of

at a frequency halfway between the extreme ranges. When we are concerned with the lower or audible frequencies, it is necessary to use larger condensers, as from the above example it will be seen that the impedance increases as the frequency becomes lower. For this reason it is quite usual to use 2 mfd. for anode decoupling in the detector and L.F. stages, while the resistance should be as large as the H.T. supply and valves permit.

Reverting again to the last diagram; in the anode circuit of the output valve a L.F. choke is used instead of a resistance. The reason for this is fairly obvious if we bear in mind Ohm's Law as regards the voltage drop produced when a current

Voltage Dropping

Although the matter has been dealt with fully in previous articles, it will not be out of place to mention here the simple formula connected with voltage dropping, if only to refresh one's memory. The voltage dropped or absorbed, by a circuit containing resistance, is expressed by: $V = \frac{\text{Milliamperes} \times \text{Ohms}}{1,000}$, where milli-

amperes represent the current flowing, and Ohms the resistance of the circuit. From this it is an easy matter to calculate the resistance required to drop a certain voltage. The formula now becomes:

$$\text{Resistance} = \frac{\text{Volts} \times 1,000}{\text{Milliamperes}}$$

The voltage dropping properties of a resistance and decoupling arrangements can be turned to good account in the case of an eliminator whose output is in excess of that required by the circuit. In such instances, it is strongly advisable to determine the voltage on the actual anode of each valve when the full load is imposed on the eliminator, and then calculate the exact resistance—decoupling—that is required to reduce the value to that specified by the makers of the valve. Such procedure is well worth while, as it may mean the difference between highly satisfactory re-

(Continued on page 564.)

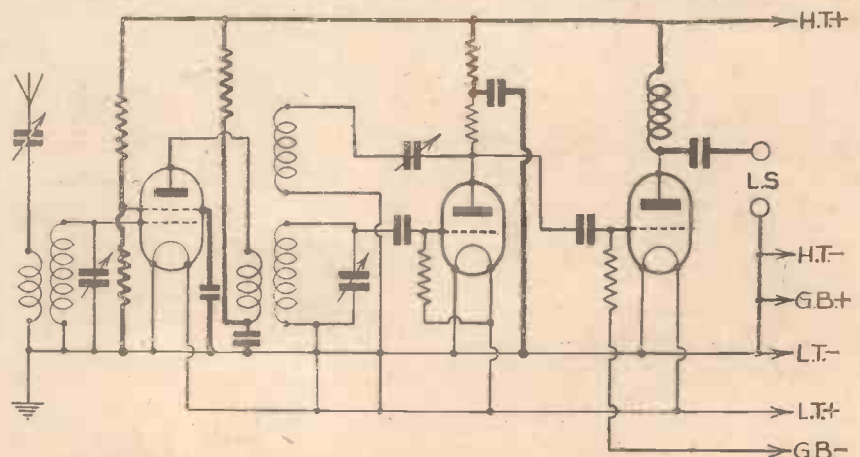


Fig. 5.—The same arrangement as Fig. 4 but embodying the anode and screen de-coupling devices mentioned in the article.

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COMMON IMPEDANCE COUPLINGS

(Continued from page 562.)

sults and instability, distortion, and loss of efficiency.

While the decoupling arrangements mentioned and shown in this article have been put forward with the object of eliminating any snags when an eliminator is used, it must be appreciated that the same system can be applied to any receiver, whether battery or mains operated, providing the values of the resistances are adjusted accordingly. The slight expense involved is well repaid by the increased efficiency and satisfaction obtained.

(Continued from page 558)

To use the 2B Volume Expander, it is first necessary to have a radio or phonograph musical piece of wide contrast between loud and soft passages. This means classical or symphonic music having great soft-to-loud volume contrast. With the "Expander" knob set at "OFF," volume for a given radio set volume knob setting will be greater than before. When the "Expander" knob is turned up to just click its switch, average volume control will drop somewhat and may have to be increased by turning up volume. As the "Expander" knob is turned to the right, loud passages will be automatically loudened, which indicates proper operation. This can be checked by noting the much lower "background" noise during silent programme periods between the "OFF" and full on Expander knob settings.

Any desired degree of expansion may be had by setting the Expander knob between "1" and "FULL." However, on radio sets having detectors of high voltage output, the Expander knob need not be set above 5 or 6 to get its maximum 35 db. expansion. In effect, the higher the signal voltage level at which the 2B Volume Expander is operated, the more its expansion control range will be compressed upon its scale towards setting "1."

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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).

An S.W. Super-regenerative Receiver

SIR,—The following description of my short-wave set may prove of interest to other readers.

Formerly, I had a straight set, consisting of an untuned S.G. stage, triode detector, and L.F. output valve, covering a range of from 12-170 metres. Getting somewhat keen on the ultra-shorts, and after trying various circuits, I decided on a super-regenerative self-quenching detector, electron coupled, plus one stage of L.F. It seemed rather a trouble, so I devised a scheme whereby I made the two sets into one, yet retained the great advantages of the super-regenerator for the ultra-shorts. It was accomplished in the following manner.

On the left-hand end of the straight set chassis I built the detector portion of the super-regen. with its own aerial condenser and tuner. By changing over the aerial lead, and taking the detector valve from its holder in the larger set and plugging it into the super-regen. holder, and by taking the plate lead from the ultra-short H.F. choke and connecting it to the plate terminal of the L.F. transformer, the set now becomes a two-valve ultra-short-wave set, with a range of from about 5-12 metres. By pulling out the S.G. valve L.T. may be economised.

Referring to the accompanying circuit diagram it will be seen that the variable resistance which controls the super regenerator is placed in the H.T. lead to the transformer, so that it also serves the purpose of providing a fine control of reaction on the longer waves.

The components are all of standard short-wave values, and in the super-regen. the H.F.C. can either be home-made or an Eddystone ultra-short type. The aerial series condenser consists of two brass discs the size of a halfpenny soldered to a threaded rod for adjustment of capacity. Coils are home-made on 3in. formers; they have plugs soldered to them which plug into sockets soldered direct to the tuning condenser. The whole set is mounted on a flat piece of board with places for the batteries, so that it can be taken into any room or into the garden without any trouble of disconnecting.

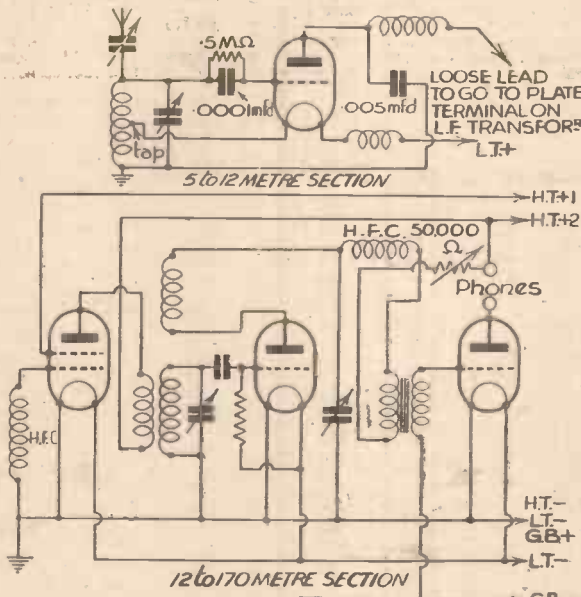
I have not appended a log, but from 12-170 metres all the usual, and many unusual, stations have been received, while from 5-12 metres, every American district from W1 to W9 on 10 metres and American police calls have been logged. Broadcasters on 9 and 11 metres, a number of European 10-metre amateurs, and also the Alexandra

Palace television signals have been received.

I have heard carrier waves on 5 metres, but not a signal, and this is possibly due to my being situated in a rather low screened position.—R. W. Lenham (Swindon).

A DX Log from Gloucestershire

SIR,—I am pleased to see that a number of readers are in favour of S.W. logs appearing again in PRACTICAL AND AMATEUR WIRELESS, and in anticipation I enclose a few of my best DX stations for the past three weeks on 20 metres (14 mc/s), 'phone: ZK1AA (Cook Is.) on July 16th, at 23.25 G.M.T. R67—QSA5. PK1VY (Java) on July 17th, at 17.20



Circuit diagram of Mr. R. W. Lenham's short-wave super-regenerative receiver.

G.M.T. (R7,QSA5), HI6Q (Dom. Rep.) on July 11th, at 23.00 G.M.T. (R6,QSA5), also PY2FS, PY5BJ, PY5AQ and LU8AB, all between 22.00 and 23.00 G.M.T.

I should also like to warn listeners to be very careful about the call-signs of amateurs. Looking back through the logs, I see such stations as FEDC, PNOMZ, SA3HC, and VL1X. Now these are obviously F3DC, PAOMZ, FA3HC, and EL1X, respectively. These errors are no doubt due to mistaken identity.

In conclusion, I should like to add a suggestion that if readers have cards from any stations, they should state them after the logs.

I have since had cards from W7FEZ, VE4KF, VE3QJ, PK2WL, LY1KK, and CX2AK. In all cases the stations were logged on an 0-v-2, with an expanding antenna, 15ft. long and 25ft. high (indoor).—C. J. HINE (Moreton-in-Marsh, Glos).

[In response to requests from secret

readers we shall publish selected DX logs on this page in future, as space permits.—Ed.]

A 14 mc/s Log from Barnsley

SIR,—I submit my 14 mc/s log of stations received on July 28th, 1.0 to 2.30 a.m., and July 29th, 5.0 to 5.30 a.m., respectively.

W1JFG, W1C00; W2GB; W2AZ, W2JVR, W2VE, W2IKV, W2AU, W2JRR, W2DH; W3GH, W3BBI, W3GAG, W3XAN, W3FAN, W3GBP; W4BZX; W5UF, W5JC; W6SSN, W6BDJ, W6NWB; W8JVM, W8JD, W8CUO, W8JVF, W8GCO, W8AAJ, W8OKC; W9CUG, W9BDE, W9ASK, W9FZY, W9AFK.

Miscellaneous stations include, W10XDA (Schooner Morrissy), LU5NH (Argentina), K4EFC (Porto Rico), VE5EF (Vancouver), VE5ADB, VE1DQ (Halifax, N.S.), and SU1CK (Alexandria). After repeated efforts I failed to pull in a W7 to make the list of American 'phone stations complete. The receiver used was a straight receiver, det., R.C. and transformer coupled to a small power valve. All stations were received on 'phones.—A. KNOWLES (Barnsley).

Station W9XGT

SIR,—I should be very interested to know if any other B.L.D.L.C. member has logged this station.

W9XGT was logged here on July 31st (1938), on approx. 25,000 kc/s, at 22.00 B.S.T., relaying programmes from the N.B.C. Signal strength was on an average only R2/3, with occasional R8 peaks. My receiver is a home-made 0-v-2 using 'phones, and the antenna is a 45ft. inverted L, E to W. direction.—EDGAR P. WILLS (Dolton, N. Devon).

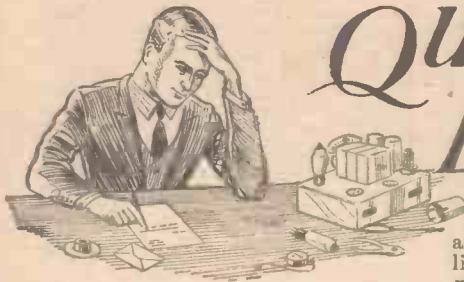
CUT THIS OUT EACH WEEK

Do you know

- THAT it is better to have the aerial and lead-in formed by a continuous length of wire rather than make a joint, which might introduce crackling noises through corrosion taking place.
- THAT the aerial and lead-in should be so fixed that they are not free to sway about, particularly if they pass close to earthed objects such as trees or walls.
- THAT when lacquering metallic parts to reduce H.F. losses on the short waves, the lacquer must be removed where contact is desired.
- THAT two short lengths of flex or insulated connecting wire may be twisted together to form a small-capacity condenser.
- THAT crystals for transmitting apparatus are cut to a fixed frequency and alternative frequencies are obtained in the circuit by doubling, etc.
- THAT vibration of the thin vanes of a tuning condenser can affect signals and produce fading and distortion.
- THAT a sandy soil will provide a very poor earth connection, due to its normal dryness.
- THAT shorted turns on an H.F. choke will result in erratic reaction and tuning effects.

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 Neumes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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QUERIES and ENQUIRIES

Hand-capacity

"I have a 4-valve S.W. set (1-V-2) which tunes from 13 to 189 metres. It is home-constructed, using an ebonite panel and is very stable except for slight hand-capacity. Would it be all right if I have a metal panel and mounted the tuning condensers on the panel without ebonite bushes and earth the panel direct? I have tried a filter output and other components and I have each stage fully decoupled."—T. D. (Ealing Common).

YOUR idea is quite in order from a screening point of view, and provided the panel is efficiently earthed and the condenser makes good contact, it will not affect the tuning efficiency. Unfortunately, however, this does not always remove the hand-capacity effects which are experienced on short waves and in some cases it is found preferable to mount the condenser a short distance back from the ebonite (or other insulated material) panel, and then to fit a screen of metal behind the panel. This should be cut so that it does not come into contact with any component and should be earthed separately—that is, to a different earth from that used for the receiver.

H.T. from L.T.

"I am interested in this problem and should be glad of information as to components and circuits for experiments."—H. G. (Tunbridge Wells).

THE method of obtaining H.T. from a low-tension supply is to convert the direct current into an A.C. or interrupted supply and then to step it up to the desired voltage. It may then be smoothed and handled as ordinary H.T. as obtained in a mains receiver. The step-up is obtained quite easily in the standard manner by a transformer, but the method of obtaining the interrupted supply from the low-tension source varies. It is possible to use an ordinary spark-coil converted for the purpose, but for really reliable results one of the commercially produced vibrators is desirable. These are now obtainable in a self-rectifying pattern by means of which the initial D.C. is interrupted, and after stepping up it is fed back to the vibrator and rectified. This component, with the necessary transformer, may be obtained from Messrs. Bulgin. An article on the subject was published in our issue dated July 17th, 1937.

House Telephone

"I have seen plans for coupling ordinary earphones with speakers to produce microphones or a home telephone service. Could you supply me with details of how to utilise my parts to make a kind of broadcasting system. I have two earphones, two speakers and many parts from wireless sets."—V. E. C. (Grays).

THE most satisfactory plan is to use a simple amplifier—say, two stages—and by means of a change-over switch the earphones acting as mikes may be switched in as desired. We have not published designs for a unit of this type, but it should

not be a difficult matter to arrange a change-over switch so that the phones and mike are changed as desired for distant listening. Perhaps the room-to-room Communicator, described in our issue dated December 11th, 1937, will be of interest in this connection.

Components

"I have got your blueprint for the one-valver and should like to know whether you sell the parts for the same. If so, please let me know the cost."—R. D. F. (Worcester).

WE do not supply components, but all our specified parts may be obtained from Messrs. Peto-Scott in kit form. There are two or three different kits—one consisting of parts only, one the parts plus valves, one the parts, valves and speaker, and so on.

Filling Panel Holes

"I have one or two ebonite panels that I wish to utilise, and they have several holes in them which will not be used. I shall be glad to know if there is a compound 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.

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

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

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can be used for plugging these holes and where it is obtainable."—A. J. O. (Brocton, Staffs).

THE efficiency of the filling will depend upon the condition of the ebonite. If this is old and the colour has deteriorated you may find difficulty in making the holes inconspicuous. If, however, the ebonite has a nice black glossy surface, the holes may be filled with either Chatterton's Compound or ordinary black heelball. The former is obtainable at any good electrician's and the latter from any boot repairer. In each case the material is softened by heating, the Compound requiring only a minimum of heat, but the heelball requiring a fairly hot iron. The Compound may be moulded into the hole in a plastic state, but the heelball will have to be pressed in quickly before it cools. The final surface in both cases may be made glossy and level with a warm or hot knife, according to the material. Properly done, it should be almost impossible to see the holes.

Lining-up Circuits

"I have tried to make an all-wave tuner for a superhet. I find, however, that I cannot get the ganged tuners to hold, and at every adjustment where there is a fairly weak station I can get full volume by re-setting one of the ganged condensers. What is the best way of overcoming this difficulty? I have wound the coils from the details in your book on coils."—H. E. R. (Brockley).

THERE are several snags in building tuners of this type without accurate measuring apparatus. Firstly, it is very difficult to obtain the exact inductance value on all coils where ganged tuning is to be employed. The simplest way of overcoming this is to gang only some of the tuners, bringing out the remainder as panel controls to act as verniers. Without a circuit diagram we cannot say which would be the best components to bring out in this way. The addition of small ceramic trimmers mounted on each coil will assist in matching, but alone will not be sufficient to ensure perfect tracking throughout the range. An additional inductance matcher consisting of a copper disc on a threaded rod inside the coil formers may be used for maximum results.

Output Stage

"I am designing my own broadcast set to be of the superhet type, mains operated. I am in some doubt regarding the output stage, which I want to be a pentode. I propose to use a double-diode for rectification and A.V.C., but am uncertain whether I need an L.F. section (double-diode-triode) or, if not, whether I could use a double-diode-pentode in place of the separate double-diode valve and the pentode. Perhaps you could let me have your ideas on this point."—G. R. (Perth).

A LOT depends upon the remaining circuit details. If you have ample amplification preceding the second detector, then an L.F. stage may not be necessary before the pentode. In that case a double-diode-pentode could be used without any loss compared with the separate valves. You may find, however, that a double-diode-triode, with a volume control as part of a resistance-capacity coupling unit to the output pentode would be most valuable as it would enable you to obtain additional amplification on weak stations, and the volume control would enable you to keep down the more powerful stations.



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. J. (Christchurch). We cannot identify the components or, likewise, the makers. If you are able to supply any more information about it we will render what assistance we can.

D. T. (Yorks). An A.A. licence will enable you to carry out many tests and experiments with a transmitter; in fact, you can do everything except radiate signals. If you are really interested in the subject we would advise you to try to get the licence granted.

R. C. (Dudley). No, we would not advise the use of another L.F. stage. The best way to handle the problem is to add a stage of H.F. amplification and let the existing aerial coil form the tuned-grid coupling coil.

M. M. (Gatford). The proposed lay-out is satisfactory. If care is taken in adjusting the operating voltages, good results should be obtained.

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MISCELLANEOUS

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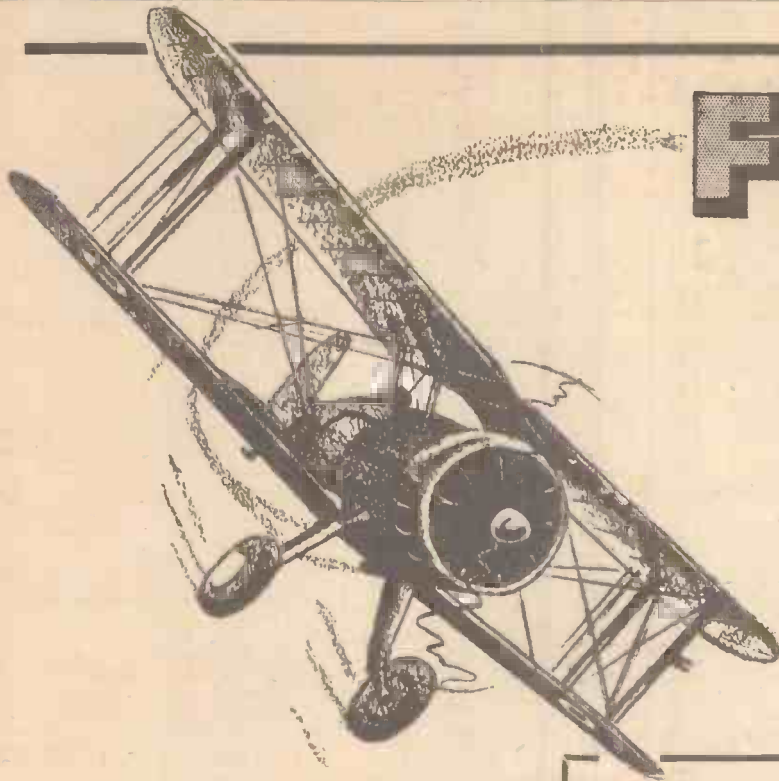
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SIXTY TESTED WIRELESS CIRCUITS, by F. J. Camm, 2s. 6d.—This handbook contains every modern circuit complete with instructions for assembling, component values, and notes on operation. Obtainable at all Booksellers and Newsagents, or by post 3s. from George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, Strand, London, W.C.2.

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PRACTICAL AND AMATEUR WIRELESS,
20/8/38.



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F. J. CAMM
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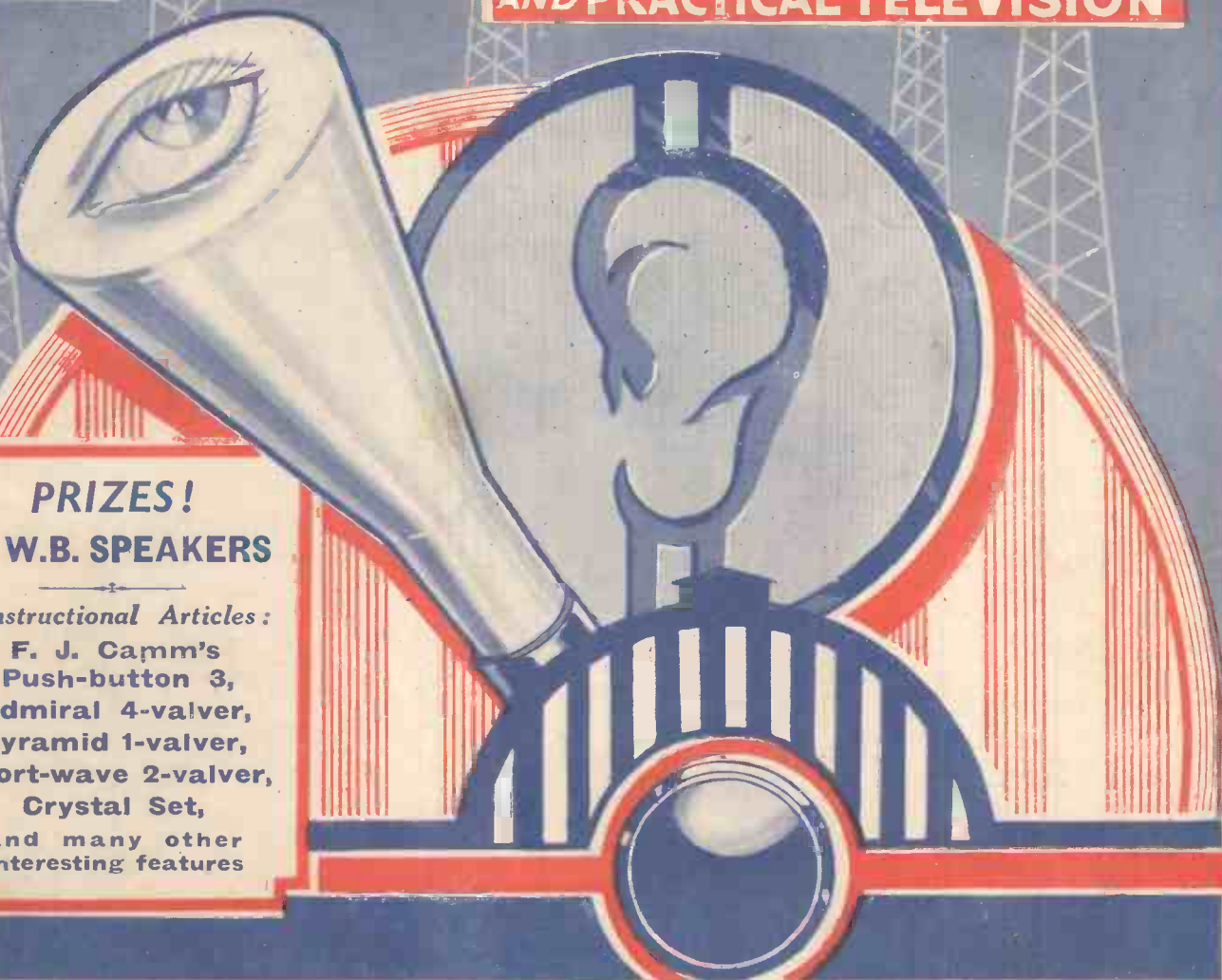
EVERY WEDNESDAY

Edited by F.J. CAMM

A GEORGE NEWNES Publication

Vol. 12. No. 310.
August 27th, 1938.

AND PRACTICAL TELEVISION



PRIZES!

25 W.B. SPEAKERS

Constructional Articles:

- F. J. Camm's Push-button 3,
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"HIS MASTER'S VOICE" 5-valve superhet table model 653 for AC mains. Three wavebands. Vernier scale. Separate controls for tuning, tone, volume, waverange. Pick-up sockets provided. CASH PRICE **10½ GNS.**
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Also available with trawler waveband (70-200 metres) instead of 13.5-50 metres band. Model 653C at 11 Gns.



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A GENERAL advance along the entire front is sounded in the new season's range of "H.M.V." Radio to be exhibited at Radiolympia, and presently to be seen, heard, and admired at your "H.M.V." dealers. Yet wider station-range . . . yet clearer reproduction . . . automatic and finger-spin tuning . . . modernity and dignity in cabinet design . . . irresistible price appeal, coupled with really easy hire purchase terms. Buy "H.M.V."—for home and beauty.



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- CONSOLE•TABLE
- and
- FLOOR MODELS

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NEXT WEEK: COMPLETE SHOW REPORT



Practical and Amateur Wireless

First Souvenir Number

Edited by F.J. CAMM

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

VOL. XII. No. 310. August 27th, 1938.

Twenty-five Loudspeakers as Prizes

IN accordance with our usual policy, we are celebrating the Radio Exhibition by making a presentation of twenty-five of the latest W.B. Midget Loudspeakers. The speakers are to be awarded as prizes in a simple free-for-all competition, full details of which will be found on page 591. Remember there is nothing to pay and no irksome restrictions. Fill up the form on page 591 when you have found the mistakes in the circuit and send it as directed. The Editor of this journal will act as judge, in conjunction with the W.B. Engineers, and the result of the competition will be published shortly after the closing date.

Broadcast Efficiency

FOR a recent broadcast it was necessary to have a background sound effect of a train journey. In order that realism could be imparted to this broadcast the B.B.C. fitted a microphone to the top of the Coronation Scot boiler front and a special recording van was coupled to the train. Records were then taken of the train starting, climbing Shap, arriving at and departing from Carlisle, climbing Beattock and arriving at Glasgow. A number of

further records were taken of the rhythms of the wheels and so on.

B.B.C. Theatre Organ

FOR those listeners who are interested in the B.B.C. organ we can recommend the interesting handbook which has just been issued by the B.B.C., price 1s. (by post 1s. 1d.). With fine illustrations, this

a theatre of the intimate type, and a large area in Gloucestershire is served by it.

"Brigade Exchange"

A REPEAT performance of this highly dramatic War story is to be given in the Regional programme on September 7th. Listeners who heard the original performance in 1930 will remember that this broadcast provides a sound picture of the activities in a dug-out on the Western Front in 1918, and the effect is vivid and ideal for a broadcast play.

ROUND the WORLD of WIRELESS

explains many of the hidden mysteries of this interesting organ, and it is claimed that it is "one of the grandest and most versatile and satisfying theatre organs in the world."

Orchestral Concert

THE B.B.C. Midland Orchestra will be conducted by Dr. W. K. Stanton, Midland Region's Musical Director, in a programme of classical music on August 29th. The chief work in this concert will be Mozart's Symphony in C.

Variety Programme from Cheltenham

THEATRE variety on August 30th will be broadcast from the Opera House, Cheltenham, which has provided a number of broadcasts in the last three years. It is

Sheep Fair

A RECORDED impression of one of the great sheep sales on the Welsh Border will be given for Regional listeners on September 2nd. The B.B.C. mobile unit will be at Kington overnight, and make the necessary arrangements to provide the sound effects of the arrival of over 20,000 ewes for the big auction sales in the morning.

Halifax Organ Broadcast

NORMAN BRIGGS will broadcast on September 1st (Northern) for the first time at the organ of the Theatre Royal, Halifax. He will present a programme of popular music.

Editorial and Advertisement Offices:
 "Practical and Amateur Wireless," George Newnes, Ltd.,
 Tower House, Southampton Street, Strand, W.C.2.
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ROUND the WORLD of WIRELESS (Continued)

Radio Amateur's Work Appreciated

IN a résumé of the decisions made at the International Telecommunication Conferences at Cairo, the current issue of *Electrical Communication* points out that, notwithstanding the increasing pressure of national and international requirements, the frequency bands allocated to amateurs and experimenters remain substantially those originally allocated at Washington in 1927. This is regarded as an appreciative recognition of the value of their work in the radio field. It is stated that there are approximately 70,000 amateur and experimental radio stations in the world, 50,000 of which are located in the United States of America.

Electrical Recording at Berlin P.O.

A BERLIN post office has been equipped with electrical recording apparatus whereby the general public may "speak" letters instead of writing them. If the idea is well received the scheme will be extended to other centres in the Reich. The instrument is installed in a sound-proof telephone cabin which ensures privacy and secrecy. The cost of a five-inch gramophone record made in this manner is roughly 2s. 6d. for one side with an extra charge of half that amount if the reverse side is also used. Each record is supplied with a few needles for replaying, and is packed in a strong envelope for posting purposes. It is considered that many uses will be found for the record, but that in the first rush of the innovation it will make a special appeal to those ardent lovers, Hans and Gretchen!



The new "His Master's Voice" Table Television and All-World Radio Receiver (Model 904), costing only 29 gns. and giving a picture size 4½ ins. by 4 ins. It has wave ranges of 16.5-50, 200-570, and 725-2,000 metres. The instrument is here seen standing on the H.M.V. Instrument Table, which can be obtained for an extra 3 guineas.

For Philatelists

THE Netherlands Post Office authorities have now issued a special postage stamp bearing a design including a view of Hilversum as the centre of Dutch radio activity.

INTERESTING and TOPICAL NEWS and NOTES

Italy's New Radio Network

FURTHER to our note on the subject in the August 13th issue, in addition to the Italian stations already in operation, Rome (100 and 50 kilowatts), Naples (10 kW), Catania (3 kW), Ancona (1 kW), Milan III (1 kW); Florence II (1 kW),

since 1931 when he left the Nation's Station for the East. He now broadcasts from WSAI from 11.15 to 11.30 a.m., E.S.T., Mondays to Fridays. WLW's "Top of the Morning" programme will feature his hill-billy songs and guitar playing daily, except Sunday, from 6.00 to 7.00 a.m., E.S.T.

Jack's first occupation was punching mules on the Dukedom, Tenn., farm where he was born, but he gave that up when he punched one mule, fourteen chickens, four cows, and blew up one barn while dynamiting a mule into action.



An informal picture of Jack Doyle (famous boxer), Horatio Nicholls (world famous composer, otherwise known as Lawrence Wright, the music publisher), Jack Hylton (the well-known band leader), and Leslie Holmes (popular radio and stage artist), all discussing Horatio Nicholls' latest sensation, "The Blackpool Walk."

Genoa II (1 kW), as well as the short and ultra-short wave stations at Addis Ababa (Ethiopia) and at Monte Mario (Rome) have been lately brought into action. Turin II (5 kW) and Genoa II (5 kW) are almost ready for tests, and will be shortly officially inaugurated. Work is now being hurried on the construction of the 50 kW transmitter at Tripoli which is to be opened in October, and on the 10 kW Addis Ababa station, as well as on the building of the two 100 kilowatt and 50 kilowatt short-wave transmitters destined to the Rome (Prato-Smeraldo) centre.

Light Entertainment from Bellahouston Park

THERE have been so many serious and straightforward broadcasts from the Exhibition that many listeners welcome the humorous revue, "Exhibition on Parade," the third edition of which will be presented on September 3rd. Jack House, the Glasgow journalist, who is well-known as a writer for the radio, has again been spending a good deal of time at Bellahouston Park in quest of the lighter side of showmanship. He has written the book and lyrics for which Douglas Steen has provided music. The producer will be Robin Russell.

Jack Foy Returns to WLW

A NOTE from America informs us that Hill-Billy Jack Foy, one of the early-day WLW entertainers, is back in the fold again after some years of travelling about

SOLVE THIS!

PROBLEM No. 310

Atkinson had a three-valve receiver of the H.F., Detector and Pentode type which gave very good results on radio. He decided to use a pick-up, and connected this in the usual way to the grid circuit of the detector stage. He used the correct 1.5 volt grid-bias for this valve, but results were very disappointing, signals from standard records being harsh and of very poor quality. He had the pick-up tested by the makers, and it proved to be in order. He fitted the correct type of change-over switch in the grid circuit and correctly wired this. What was wrong? Three books will be awarded for the first three correct solutions opened. Address your envelopes 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. 310 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, August 29th, 1938.

Solution to Problem No. 309

The grid battery which Mackay had was obviously of high resistance due to its condition, and when connected in the grid circuit it would prevent the output valve from operating properly. He could have connected it in the cathode lead in place of the bias resistor, but in any case a run-down battery of this type should be discarded.

The following two readers successfully solved Problem No. 308, and books have accordingly been forwarded to them: J. Robertson, Aukengill, Wick, Caithness, Scotland; W. Stonier, 36, Lythorpe Road, New Moston, Manchester.

An Open Letter to Our Readers and the Trade

By THE EDITOR



GENTLEMEN,

Many changes have occurred in our industry since my last Open Letter to you. If some of those changes have been for the time being negative in character, in my view they will eventually be to our benefit. In the first place, although the number of licences has increased, the sales of sets have declined, which indicates in a very certain fashion that the public cannot be lulled into a purchasing mood by flashing knobs of fancy tuning dials and other "selling points" which enable the high-pressure salesmen to break down what they like to consider as "sales resistance." The public is a good deal wiser than it was five years ago, and it is seeking not so much mechanical improvement as advances in efficiency. It does not want a dial engraved with hundreds of stations when the set only functions satisfactorily on half a dozen. Such a dial merely invites the aggravation of the customer and certainly adds to the discomfiture of the service engineers, who are left to answer the inevitable questions as to why the set will not receive all of the stations on the dial.

The public is also tired of the policy of the too-frequent production of new designs rendering previous models obsolete. You cannot deny that many members of the public have become annoyed with you when you have over-night converted their latest twenty-guinea model into one which is obsolete and which cannot be unloaded as a second-hand receiver except for a few shillings. That is bad marketing policy which may give you only a temporary advantage. I offer you the advice that you should stabilise your models and concentrate on improving the radio side of the set before you settle down to tinkering with the purely mechanical side.

Push-button tuning is being fostered by many firms this year and it is the hope of the trade that this innovation may help to elevate sales to their 1935 level. I sincerely hope that it does so, and that you are right in your belief that there are many thousands of people to whom the small task of selecting a station by normal tuning methods is an operation they ought not to be called upon to perform. I can readily believe that this is a feature of sets which will be welcomed by females. It may also prevent a great deal of ham-handed station searching and the resultant re-radiation to the annoyance of the neighbours.

Since the last Exhibition Sir John Reith has left the B.B.C. and his successor has not yet taken over his duties. It is my opinion that the change will not be for the better nor for the worse, for the B.B.C. is now running on lines where the duties of a Director-General (the military title seems most apt) have become merely routine. The B.B.C. methods have become so well established and deep rooted that it would be impossible to change them.

I would remind you that many manufacturers thought that all-wave receivers would encourage sales, but they have not done so. I think this is largely due to the fact that many of the short-wave programmes are not worth listening to, and, even when they are, they are accompanied even on the best of receivers by a mushy background which renders them comparatively unintelligible. The all-wave receiver in my view has a long way to go before it can claim to be anything more than a qualified success.

I note with pleasure that you have stabilised prices. This is good business policy in view of the number of firms who have failed and fallen in endeavouring to maintain an uneconomic price war.

The main motif of Olympia this year is to be television. It seems a pity that your posters are so futuristic in design that their purport and meaning do not reflect the clarity of radio reception and vision which you should instil in the minds of the public. The poster is a jumble, which even a surrealist would condemn. Many of you fear the competition of television, apparently forgetful of the fact that it may be some time before the provinces have television, especially in view of the failure of the coaxial cable scheme between London and Birmingham which was to be the first provincial district to have a television service. You are guilty of making the mistake of thinking that London's problem is the problem of the rest of the country. Television may compete against ordinary sound receivers in London, but not to any marked extent. It will, in my view, enlarge the market, not compete with an existing one.

Once again it is my duty to report that manufacturers have not given the attention to the home-constructor market which that market warrants. The market is still a large one, and in spite of the decline in the number of journals, the net sales of this journal are in just as healthy a position as they were last year. Fortunately, a number of firms have retained a sense of proportion and still cater for the home-constructor. Only a few firms have produced components for the home-constructor interested in television, and, as I reminded you last year, it is to the home-constructor that you will turn when you desire to know the results of your experiments. They are not problems which you can solve in your technical department.

I congratulate you in abolishing the cabaret at Radiolympia. This attracted the wrong type of public, and although it is my opinion that the gate this year will be less, I think the volume of business done will be greater. If you disagree with my views I shall be pleased to discuss them with you on Stand No. 9—Ground Floor.

Yours faithfully,
F. J. CAMM.

F. J. CAMM'S PUSH-BUTTON

THREE

The First Home-constructor Push-button Receiver built round one of the New Automatic Units

ONE of the main features of this year's Radio Show is push-button tuning. This is familiarly referred to as "Push," "Press" or some other term, but in every case the arrangement indicates that a series of buttons are provided on the panel and when operated these tune to the various stations indicated. This process is carried out in two different manners. In one type of set the push-buttons automatically bring into circuit pre-set condensers ready tuned to the desired capacity, and in others a motor is brought into circuit and drives the tuning condenser. One special arrangement, however, causes a special type of condenser to be moved over a small angle and acts in a similar manner to normal tuning, except that pre-set stops are provided. In order that our readers may be fully up-to-date we are presenting here full constructional details of a standard broadcast receiver, in which the push-button feature is incorporated, and the accompanying illustrations show that this is both neat and simple to build.

The basis of the design is a standard three-valve circuit, in which a variable- μ H.F. pentode acts as an H.F. amplifier and is followed by a pentode acting as a grid rectifier. This is resistance-capacity coupled to a tetrode which feeds the speaker.

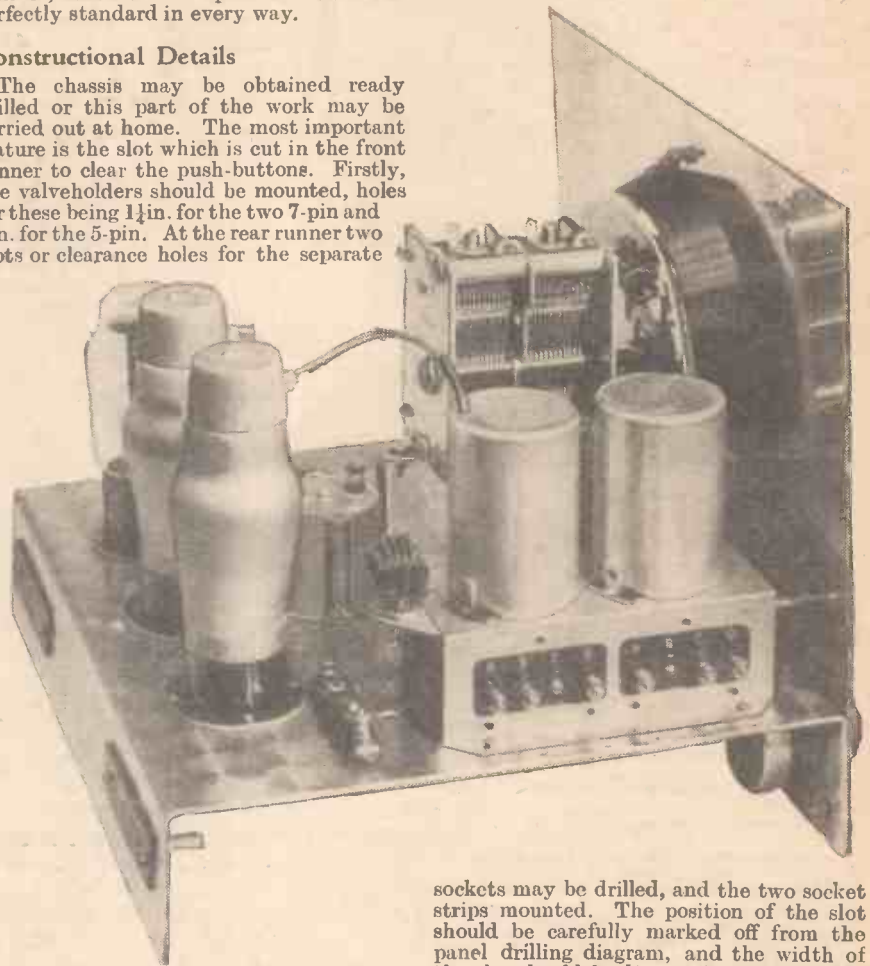
Mechanical Details

A metal chassis and panel is employed for the receiver, as for the other models described in this issue. A standard two-gang condenser is employed for manual tuning, and is operated by a wavelength-calibrated dial and slow-motion drive mechanism. The two coils are of the screened type, and the on/off switch is operated by the wave-change switch which is fitted to the coils. The automatic tuning is carried out by means of a Bulgin 6-way push-button unit in conjunction with a set of ten pre-set condensers. One of the buttons, which is coloured white for identification purposes, brings into circuit the normal two-gang condensers for manual tuning. This is trimmed in the normal

manner, and when in operation the set is perfectly standard in every way.

Constructional Details

The chassis may be obtained ready drilled or this part of the work may be carried out at home. The most important feature is the slot which is cut in the front runner to clear the push-buttons. Firstly, the valveholders should be mounted, holes for these being 1 1/4 in. for the two 7-pin and 1 in. for the 5-pin. At the rear runner two slots or clearance holes for the separate

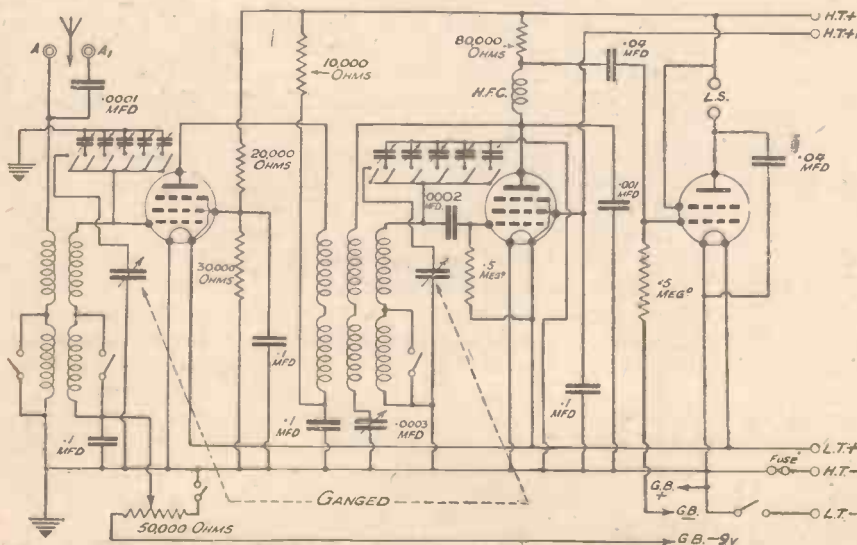


A side view of the receiver, fully assembled and ready for wiring. Note the clean layout and arrangement of the components.

sockets may be drilled, and the two socket strips mounted. The position of the slot should be carefully marked off from the panel drilling diagram, and the width of the slot should be 3/8 in., or just to clear the base of the buttons. The unit should then be carefully positioned and the two end fixing holes accurately marked off. Bolt the unit in position temporarily and place the escutcheon plate over the knobs so that the end fixing holes for this may be placed. It will be noted that the operating rods for the unit are supplied longer than are required for this particular set, and therefore two courses are open to the constructor. In our case, we cut off a short portion of each rod and mounted the push-button unit back from the chassis runner with 1 in. distance pieces. Longer pieces could be employed to avoid cutting the rods, but this would entail moving back the condenser unit, and the valveholders, and thus it is desirable to follow the procedure which was adopted in the original model. When the fixing holes are placed, the escutcheon should be removed, and the panel drilled from the panel drilling diagram.

Wiring Details

The panel may be bolted to the chassis before wiring is commenced, and before locking the nuts of the retaining bolts care should be taken that the push-buttons all operate cleanly in the holes and slot, and each one should return immediately a

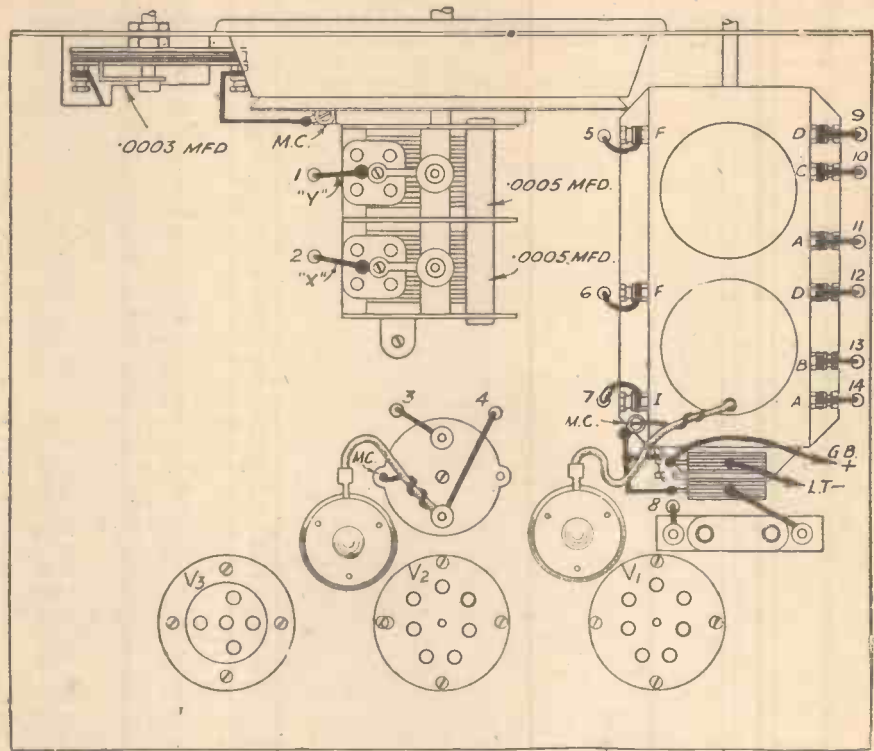


Theoretical circuit of the push-button set.

Wiring Diagram of the Push-button 3

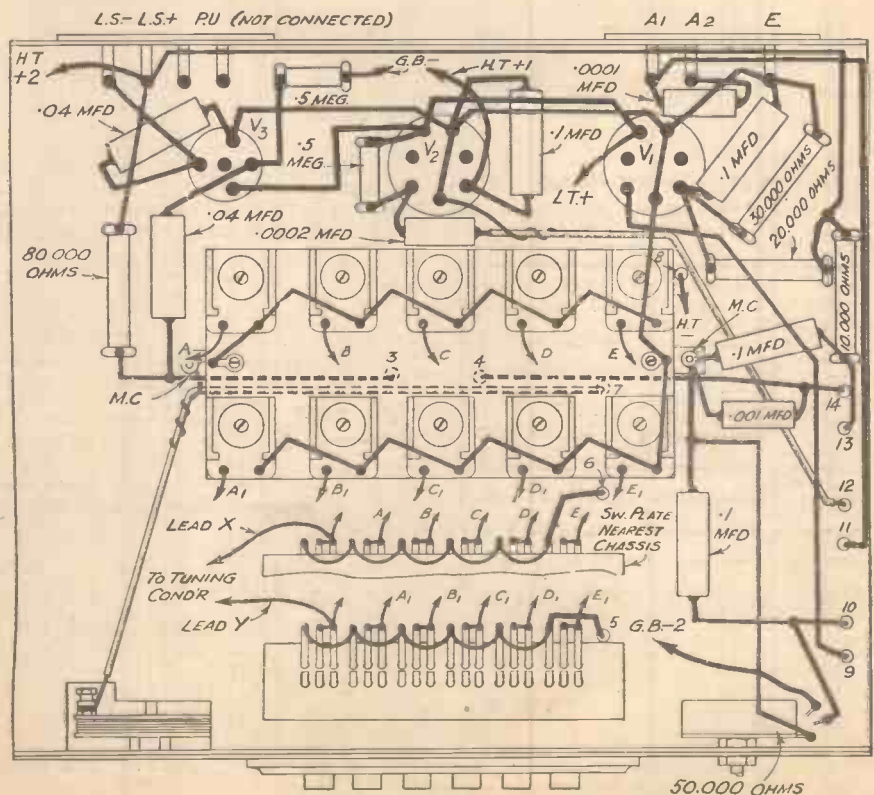
second one is pressed in. Small mounting brackets will be needed for the gang condenser, and these may be made or obtained from the suppliers of the kit. The wiring will have to be carried out very carefully in order to ensure that the push-button mechanism will operate in the correct manner. The wiring diagram shows the switch with the two plates separated and identified, and it will be found desirable to make connection to the switch before assembling it. Lengths of tinned copper wire should therefore be joined to the points indicated, and the pairs of contacts shown bridged should be joined with a short length of the wire. When mounted, the leads may then be joined to the appropriate points and insulated with standard insulated sleeving. The remaining wiring may be completed from the wiring diagram or the theoretical circuit on page 572, and the receiver is then ready for testing.

Notes on this, together with trimming details for the pre-set condensers will be given in next week's issue.



LIST OF COMPONENTS FOR THE PUSH-BUTTON THREE-VALVE RECEIVER

- One semi-circular dial (Polar).
- One B.P.114 coil (Varley).
- One tuning condenser, 2-gang, .0005 bar type (Polar).
- One reaction condenser, .0003 mfd. Compax (Polar).
- One push-button switch, S.221, with knobs and escutcheon (E10) (Bulgin).
- Ten pre-set condenser (for values, see Editorial) (Bulgin).
- One series condenser, type 451, .0001 mfd. (T.C.C.).
- One grid condenser, type 451, .0002 mfd. (T.C.C.).
- One bias condenser, type 341, .1 mfd. (T.C.C.).
- One anode by-pass condenser, type 451, .001 mfd. (T.C.C.).
- Two screen condensers, type 341, .1 mfd. (T.C.C.).
- One coupling condenser L.F., type 451, .04 mfd. (T.C.C.).
- One tone condenser, type 451, .04 mfd. (T.C.C.).
- One H.F.C. H.F.9 (Bulgin).
- Three valveholders—two 7-pin, one 5-pin (Clix).
- Two grid-leaks, .5 meg. 1/2 watt (Erie).
- Two screen resistances—one 30,000, one 20,000 1 watt (Erie).
- One anode resistance, 80,000 1/2 watt (Erie).
- One anode resistance, 10,000 1 watt (Erie).
- One on-off switch, S.132 (Bulgin).
- Two terminal strips—A, A1, and E, L.S. (Clix).
- One panel, 11in. x 9in. alu. (Peto-Scott).
- One chassis, 11in. x 2in. x 9in. alu. (Peto-Scott).
- One bias pot., 50,000 without switch (Erie).
- Fuse, 100 mA (Microfuse).
- Fuseholder (Microfuse).
- One valve, 210VPT, 7-pin metallised (Cossor).
- One valve, 210 SPT, 7-pin metallised (Cossor).
- One valve, O.T.220, 5-pin (Cossor).
- One 120-volt H.T. battery and one 2-volt 40 A.H. accumulator (Exide).
- One Stentorian loudspeaker (W.B.).



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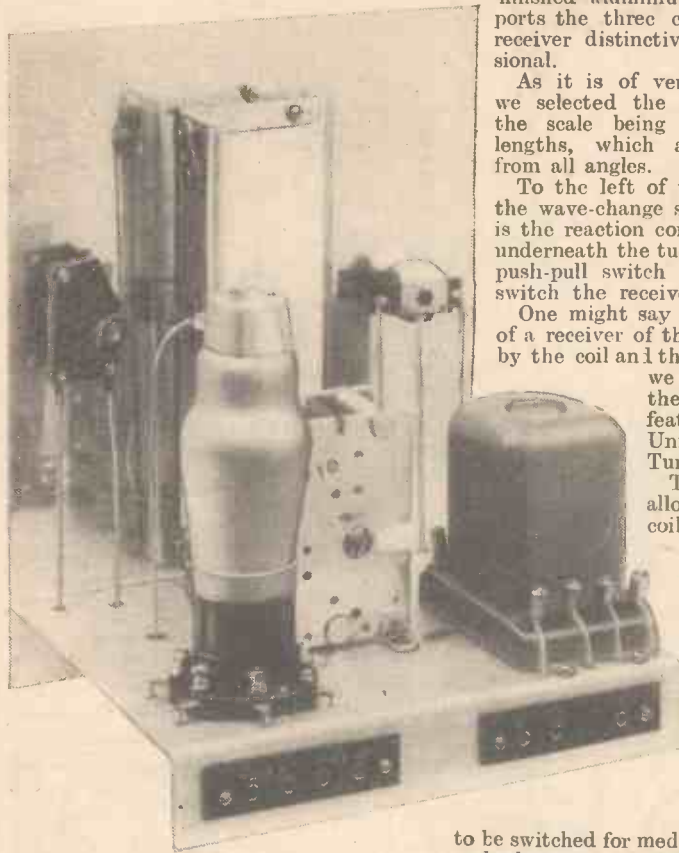
It will be noted that three connections are omitted in the above plan. The centre terminal on valveholder V3 should be joined to the L.S.+ terminal, and the two left-hand blank sockets of V1 and V2 should be joined to the L.T.— filament line.

The "PYRAMID" ONE-VALVER

Preliminary Details of a Modern One-valve Set

ONE of the most useful receivers for a beginner or anyone requiring individual reception is that employing a single valve in conjunction with an efficient circuit.

To provide a design of this type we have



This three-quarter rear view of the "Pyramid" One-valver shows the business-like layout which is adopted.

apparatus combined with the highest degree of efficiency, and so arranged that the veriest beginner will experience no trouble with the constructional work.

From the appearance point of view, the panel, which is formed from machine-finished aluminium, and which supports the three controls, makes the receiver distinctive and quite professional.

As it is of vertical oblong shape we selected the Polar vertical dial, the scale being marked in wavelengths, which are clearly visible from all angles.

To the left of the dial is situated the wave-change switch, to the right is the reaction control, while directly underneath the tuning-knob is a small push-pull switch which is used to switch the receiver on and off.

One might say that the efficiency of a receiver of this type is governed by the coil and the valve; therefore, we have selected for these two essential features the Wearite Unigen coil and the Tungram H.P.210.

The coil windings allow the aerial coupling coil and the grid coil

it should be possible to secure the most satisfactory operating conditions.

The tuning and reaction are controlled by Polar variable condensers, which allow a very smooth action to be obtained.

The advantages and disadvantages of triode versus pentode valves were explored to the fullest extent, and it was finally decided to use a straight H.F. pentode as a leaky grid detector, as the gain obtainable more than repaid for the slight addition of cost and wiring.

With correct screen voltage, this type of valve forms one of the most efficient detectors, and as the headphones are connected to the anode circuit of the valve via a resistance-capacity coupling, the maximum output is secured with the minimum of distortion.

This arrangement also serves another purpose. In many cases, it will be desired to use a battery eliminator which, if of the D.C. type, is in direct contact with the mains supply, and this might raise some doubts regarding the advisability of using headphones. The resistance-capacity output, however, removes any fears that one might have in this direction, as the headphones are isolated from any direct current voltage.

Again, it may be necessary at some future date to add an L.F. amplifier to the "Pyramid." Through embodying the output circuit mentioned above, such additions will be rendered quite simple.

To simplify the wiring a small metal chassis has been used, and it also allows the panel to be securely fastened by two bolts.

produced the "Pyramid" receiver and, as with all our designs, we have spared no trouble to produce a simple piece of

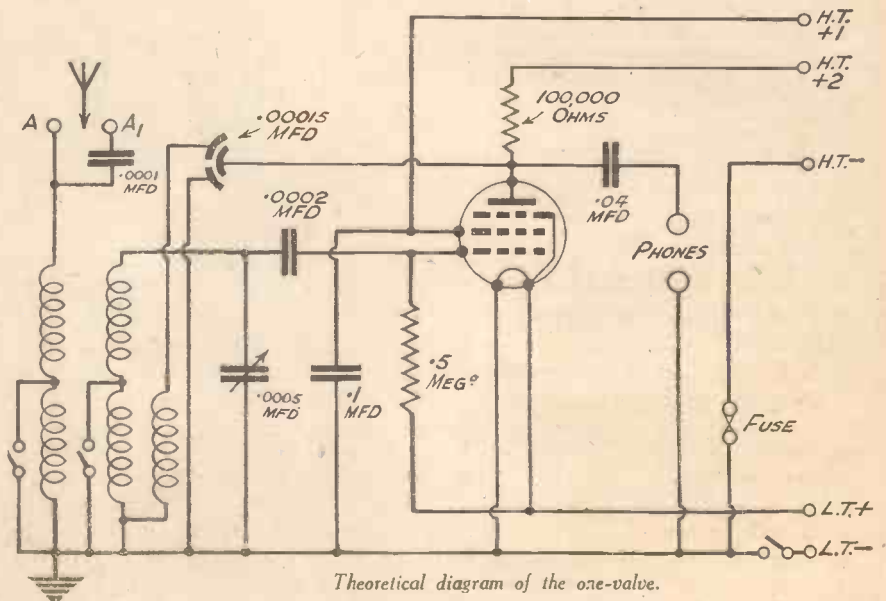
to be switched for medium and long waves, and advantage is taken of this to secure the maximum selectivity. In this direction alternative aerial connections are also provided, so whatever type of aerial is used,

NEXT WEEK!

Wiring Diagrams and Further Details of the Receivers described in this Issue.

LIST OF COMPONENTS FOR THE "PYRAMID" ONE-VALVE RECEIVER

- One vertical C.K. dial (Polar).
- One No. 5 tuning condenser, No. 5 .0005 (Polar)
- One reaction condenser—Compax differential, .00015 (Polar).
- One Unigen coil (Wearite).
- One valveholder—V.H.22 (Bulgin).
- One grid condenser—type 451, .0002 mfd. (T.C.C.).
- One anode condenser—type 451, .0003 mfd. (T.C.C.).
- One coupling condenser—type 451, .04 mfd. (T.C.C.).
- One series condenser—type 451, .0001 mfd. (T.C.C.).
- One screen condenser—type 341, .1 mfd. (T.C.C.).
- One grid leak—.5, 1-watt (Erie).
- One anode resistance—1 meg., 1-watt (Erie).
- One switch—S.114 (Bulgin).
- One switch—S.22 (Bulgin).
- Two terminal strips—1.3 sockets—A., A.1, and E., 1.2 sockets, L.S. (Clix).
- One panel—9½ in. x 7½ in.—Alu. (Peto-Scott).
- One chassis—7½ in. x 6 in. x 1½ in.—Alu. (Peto-Scott).
- Fuse—100 mA. (Microfuse).
- Fuseholder (Microfuse).
- One H.P.210 metallised valve (Tungram).
- One pair earphones (Ericsson).
- One 120-volt H.T. battery (Exide).
- One 2-volt 40 A.H. accumulator (Exide).
- One Stentorian loudspeaker (W.B.).



Theoretical diagram of the one-valve.

ON YOUR WAVELENGTH



Welcome!

A HEARTY welcome to every reader on the occasion of the 17th Radiolympia, and a particular welcome to Stand No. 9—Ground Floor. It was not so long ago that the wall stands at Radiolympia were somewhat crowded with various periodicals. To-day, only two of them remain. I take pride in the fact that this journal is one of those two—the oldest and the youngest side by side. The others for one reason or another have fallen by the wayside. It could not have been for want of interest in home construction, for the net sales of this journal are healthier to-day than they were a year ago. This journal immediately took the lead in editorial policy and in net sales. It has been present at 7 exhibitions, and the portents are that it will be present for many more. We are on the eve of great developments in home construction, for it is my belief that television will create a vast new army of home-constructors. Just as soon as the moment is ripe this journal will describe practical television receivers as it has done in broadcast receivers.

It has been my privilege to examine the Exhibition before it is opened to the public. You will not have had time if you are in the provinces to have visited it at the moment you receive this issue. You owe it to yourself, however, to go, for design has taken a marked step forward since last year, and the television demonstrations alone will make it worth while. When you call do please look me up!

Two New Handbooks

SPECIALLY produced in time for Radiolympia are the two new PRACTICAL AND AMATEUR WIRELESS Handbooks—the first is entitled "The Practical Wireless Service Manual," and the second, "Wireless Transmission for Amateurs." Both may be inspected on our Stand. The first volume is opportunely produced in view of the fact that there are 50,000 people in this country engaged in the profession of wireless servicing. This is now a definite profession with attractive prospects, for good salaries are paid to people who rapidly diagnose the faults and apply the necessary remedies. The book will be found a

By *Thermion*

useful tool to amateurs and professionals. The contents include:

Choice and Types of Instruments, Fault Tracing without Instruments, D.C. Multi-range Milliammeter, Measuring Resistance, Measuring A.C. Voltages, Measuring Capacity, Using the Universal Meter, A-Valve Voltmeter, An L.F. Oscillator, Calibrating and Using the Valve Voltmeter, Calibrating and Using an L.F. Oscillator, A Signal Generator, Tracing Faults in a Superhet, Trimming and Aligning Receivers, Testing Valves, Valve Replacement, Reaction Faults.

Improving Old Sets, Universal (A.C.-D.C.) Receiver Faults, Checking Receiver Performance, Distortion—Causes and Cure, Tracing Sources of Interference, Temporary Repairs and Substitution, Adapting Milliammeters, Renovating Cabinets, Servicing with the Cathode-Ray Tube, Tracing and Eliminating Hum, Simple Tests for Components, Adjusting and Testing Coils, Servicing Commercial Receivers, Second-channel Interference, Checking Performance, Background Noises, Loudspeaker Faults and Remedies, Equipping a Service Workshop, Wireless Calculations, Colour Codes.

It costs 5s., or by post 5s. 6d.

The second book is an ideal introduction to the fascinating field of amateur transmission.

It deals with every aspect of the subject from the obtaining of the licence to fundamental principles, erection of aerials, the various transmitting circuits, equipping a station, building transmitters, modulation systems, tables and formulæ. Each volume is neatly bound in cloth, printed on good paper, and fully illustrated; the Transmitting Book costing 2s. 6d., or 2s. 10d. by post.

Funny Story

THE following story sent to me by V. R. S., of Cambridge, was written in the hope that I would believe it not. I invite you to do the same, and for that purpose I print it: "A dear old lady possessed a beautiful radio costing at least 35 guineas. She rang up the suppliers to say that it had failed. A service man arrived with the test gear and valves for replacement. He switched on, tuned in the National, and there it was. Being a salesman, too, he fitted new valves and convinced her that it was now much better—almost as good as new! Just as he returned to his place of employment, the 'phone rang again. The dear old lady wished to speak to the Manager as the set still did not work. The Director, himself a capable engineer, paid a visit. After apologising he switched on, waited a second or two for warming-up, twiddled the tuning-knob, and there was the station again. 'But,' said the dear old lady, 'you turned that knob.' 'Certainly, madam.' 'Oh, but I have not altered it since you installed it two years ago.'" Those press-button salesmen will find this lady an easy customer.

Press-button Tuning

I WAS taken to task some weeks ago by a manufacturer interested in supplying parts for press-button tuning sets because I had dared to say that I thought that press-button tuning was a mechanical improvement, and that manufacturers should have remedied other parts of their sets first. Herewith quotation from one of our trade papers: "It is childish to talk of press-button tuning as being capable of stopping that stampede (dealers deserting the trade owing to the competition of television). There is nothing new in automatic tuning; certainly not enough to make the man who owns a set without it buy one when he is being told by Radiolympia of the imminence of television."

Whilst television will certainly become popular, I think most of these critics overlook the fact that the television service area is confined to London. It cannot, therefore, affect the sales of receivers in the provinces.

That Cheap German Receiver

THE Nazi Government proposes to back the marketing of 700,000 35s. two-valve mains receivers to implement its four-year plan for saving metals such as copper, zinc and tin. These sets were seen at the Berlin Fifteenth Radio Exhibition, and one of the manufacturers has dispensed with the metal chassis altogether and uses pressed board. The set receives the local station and the long-wave National, which is another way of ensuring that the German nation is even more closely muzzled and listens only to Hitler's views as spread through his official mouthpieces. It is evident that the German Government does not wish German citizens to listen to the broadcasts from other countries. It is with some concern that I note that methods are being adopted over here to muzzle the British Press, the chief weapon being the Official Secrets Act. At the Berlin Show a number of very short cathode-ray tubes were shown, although the size of the screen is normal. Germany proposes to continue the provision of free viewing facilities. Automatic tuning is not popular in Germany.

The Etheric Aerial

MR. T. McC., of Kingston-on-Thames, *apropos* my recent paragraph, sends me the following details of his aerial:

"The fundamental basis of my invention consists in providing lengths of intensely-strained wire or the like, the strain being imparted through the medium of springs, coiled, spiral or otherwise tensioned, so as to render them more susceptible to radio or electrical impulses.

"In carrying out my invention, I provide a wooden or other frame, whereon I stretch wires from end to end having springs at each end so as to render the tension of an elastic or resilient nature; two connections from the wires are made—one to the wireless set, and the other to earth.

"During the past three years I have experimented with all kinds of straining devices, also different metal wires (paramagnetic and diamagnetic) of all degrees of thickness, etc. etc., and have now got the device boiled down to a commercial basis, and intend putting it on the market at a price of 3s. 6d. or 4s. Besides acting as a handy indoor aerial (3ft. long) it is also of great utility if used in the audio frequency circuit, where it must be inserted in both leads—otherwise there is trouble.

"It is hardly possible to explain the *modus operandi* of my invention in this letter, but—as I said before—I will be glad to demonstrate it working

Notes from the Test Bench

Meter Readings

A PROBLEM was recently put forward by a reader who was testing a receiver with a multi-purpose meter and who could not decide upon the reading obtained. It appeared that the meter had a series of voltage ranges, obtained with a selector switch, and when on a high voltage range he obtained a reading of just over 100 volts. To make quite certain what the reading was, he used the next lower range which read slightly more than 100 volts, and he then found that the reading was only slightly above 60 volts. He thought the meter was out of order, but this was not so. On the high voltage range the total current flowing through the meter would be less than on the lower range, owing to the higher resistance of the meter, and thus this would be the more accurate reading. The voltage being tested was probably the screen voltage, where the additional drain of the low resistance meter would considerably modify the voltage actually applied to the circuit.

Oscillator Adjustments

A PROBLEM which often besets the beginner when using a simple superhet converter is the fact that stations are received at two separate settings. This problem will also arise if a superhet is employed in which the oscillator is separately tuned. The reason is that the intermediate frequency is obtained when the oscillator is tuned both above and below the signal frequency. The correct setting to employ cannot be stated definitely, although in most cases the best results will be obtained when the oscillator is tuned to the lower frequency.

Ineffective Screening

WHEN metal screens are employed between stages in a receiver it may be found that the screening appears to be ineffective. This may be due to several reasons, but it is important to bear in mind that the screening will not act in the desired manner unless it is complete. This means that the separate pieces of a complete screen must be bolted together so that no gaps or air spaces are left, and it may also be found that it must be made in such a manner that it forms a complete box—with top and bottom. An obstinate superhet was recently tested where oscillation could not be avoided until the chassis (which was of metal) was placed upon a sheet of metal so that it was closed in entirely. The underside screens had been made exactly to the depth of the chassis and this enabled each section to be enclosed by the bottom plate.

at your office or elsewhere, or perhaps you might be in this vicinity."

Back Numbers

D. WAREHAM, Ashford, Middx., says that he has a limited number of PRACTICAL AND AMATEUR WIRELESS which he would like to dispose of. He will supply these free to the first person who applies for them, and who is agreeable to paying the carriage. Letters should be sent to me marked "Ashford."

Trade Union for Service Men

LEARN that during Radiolympia efforts will be made to form a Trade Union for Radio Service Engineers. It is said that there are no fewer than 10,000 such engineers in London alone. As it is a comparatively new profession they have not yet been organised. The task of organising them would be left to the Electrical Trades Union. In view of the fact that service men are called out at all hours of the day and night, I am wondering how the Trade Union will go on about the eight-hour day?

Autumn Plans for Outdoor Television

I AM informed that Euston Station will be visited by the B.B.C. mobile television unit on September 18th and 19th to show viewers the exhibition and celebrations with which the L.M.S. is commemorating the Centenary of the opening throughout of the London to Birmingham Railway, the first main-line to London. On September 18th the cameras will be taken along the platforms to show the exhibition of rolling stock and engines from the earliest days to the present time—passenger coaches more than a century old and saloons used by Queen Adelaide and Queen Victoria, and the latest types of rolling stock including a three-car Diesel train. On September 19th viewers will see the start of the "Coronation Scot" and some of the commemoration ceremonies in Euston Station.

The first outdoor event after Radiolympia will be the televising of the British Empire Cup Pony Race at Northolt on September 5th. Five days later one of the mobile television units will be installed at Wapping, to give a pictorial survey of the work of the river police. During the autumn it is hoped to pay a return visit to the Pinewood Film Studios, where "shooting" will be in progress of scenes from "The Mikado." At the end of September it is hoped to show viewers how police horses are trained at Imber Court.

The "Fleet" S.W. Two

A Simple 2-valver for the Short Waves—Designed for the Beginner and Expert

NO programme would be complete without a short-waver, so we have designed the "Fleet" receiver to cater for those who are interested in short-wave reception.

While there are many opinions as to the most suitable circuit arrangements, it was decided to combine constructional simplicity with maximum efficiency and use, therefore, the reliable detector-L.F. combination.

With only two valves in use it was

gives an amazing over-all amplification. Particular attention has been paid, however, to the signal/noise ratio.

In the aerial circuit a plug-in coil is used which enables the correct degree of

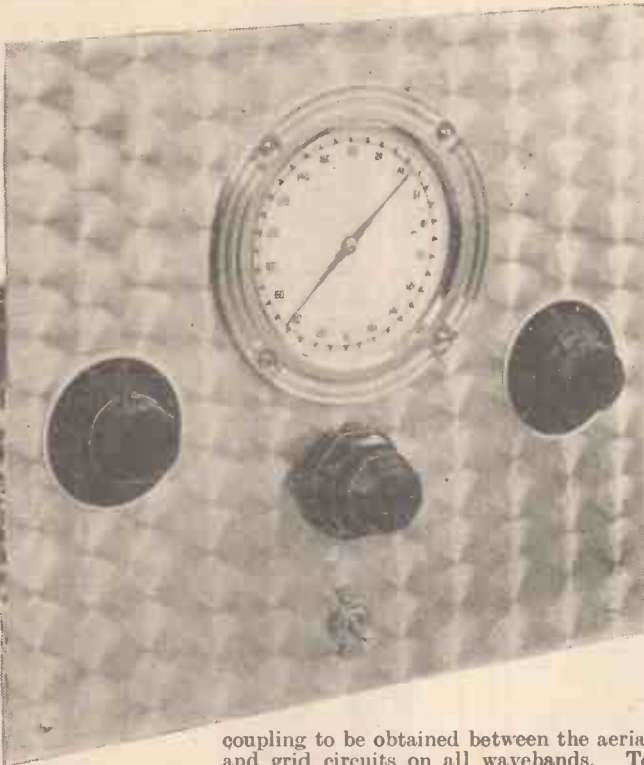
socket is provided which has in series with it an air-spaced variable condenser of the pre-set type.

Band-spread tuning is used, the tank condenser being mounted on the left of the panel, while the band-spreader is mounted in the centre and controlled by a dual-ratio slow-motion drive.

In the anode circuit of the detector valve is a short-wave H.F. choke, which not only effectively prevents undesirable H.F. currents from passing, through into the L.F. stage, but also guarantees a smooth and progressive reaction control.

The coupling between the detector and output pentode is by means of a parallel-fed transformer, this method being used to safeguard against transformer breakdown and to provide sufficient decoupling of the detector anode circuit to reduce the possibility of instability through feed-back.

As additional precautions, however, the H.T. supply is by-passed to earth through a .5 mfd. condenser; an H.F. stopper is fitted in series with the grid of the pentode, and a by-pass condenser joined between the output anode and earth.



A general view of the two-valver.

essential for the design to be such that they would give their maximum gain; for the detector valve, therefore, a straight H.F. pentode is used as this enables a very high magnification to be secured which, when fed into a high-gain output pentode,

coupling to be obtained between the aerial and grid circuits on all wavebands. To allow the utmost efficiency to be obtained on various types of aerials, an alternative aerial

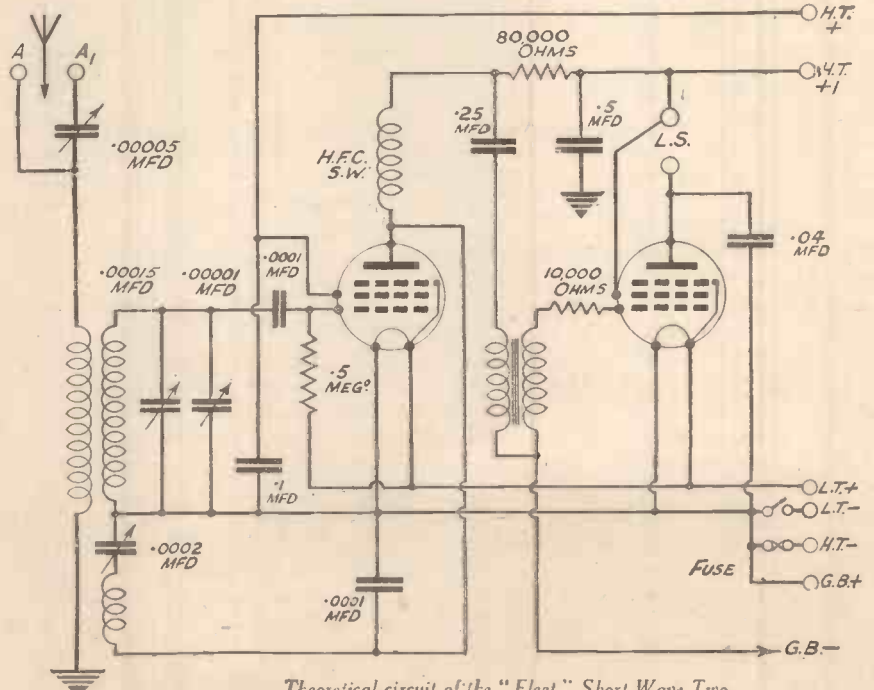
Constructional Details

With a receiver of this type it is essential to provide adequate screening to prevent undesirable hand-capacity effects, and in this direction metal has been used for both panel and chassis.

As regards the chassis, the chief work will be drilling 1 1/4 in. holes for the two 7-pin valveholders and a 6-pin coil holder, and the necessary clearance holes for the location of the two Clix sockets strips which are fitted to the rear runner.

All the components can be mounted on the panel with the exception of the band-spread variable condenser and its associated drive, and the panel then bolted to the chassis.

- LIST OF COMPONENTS FOR THE "FLEET" S.W. TWO-VALVE RECEIVER.**
- One Airplane degree marking dial—dual ratio (Jackson).
 - Two tuning condensers—.00015 S.W. Special, and .00015, Midget U.S.W. (Jackson).
 - One .0002 Dilecon reaction condenser (Jackson).
 - One .00005 aerial series condenser (Jackson).
 - One S.P. 3 coil and holder (B.T.S.).
 - One .0001 type 4601/S grid condenser (Dubilier).
 - One .5 type 4608/S H.T. condenser (Dubilier).
 - One .0001 type 4601/S anode by-pass condenser (Dubilier).
 - One .25 type 4606/S coupling condenser (Dubilier).
 - One .04 type 4601/S tone condenser (Dubilier).
 - One .1 type 4603/S screen condenser (Dubilier).
 - One .5 type 1-watt grid leak (Erie).
 - One 80,000 ohms 1-watt anode resistance (Erie).
 - One S.K.T. L.F. transformer (B.T.S.).
 - Two valveholders—one 7-pin V2, one 5-pin V1. Chassis type (Clix).
 - One switch, S.102 (Bulgin).
 - Two scales, I.P.7 (Bulgin).
 - Two terminals trips—A, A1—and E, L.S. (Clix).
 - H.F.C., S.W., (B.T.S.).
 - Panel: 10in. x 9in. alu. (Peto-Scott).
 - Chassis: 10in. x 2in. x 7in. alu. (Peto-Scott).
 - Fuse: 100 mA (Microfuse).
 - Fuseholder (Microfuse).
 - Two valves, H.P.210 and P.P.225 (Tungsram).
 - One pair earphones (Ericsson).
 - One 120-volt H.T. battery and one 2-volt 40 A.H. accumulator (Exide).
 - One Stentorian loudspeaker (W.B.).



Theoretical circuit of the "Fleet" Short-Wave Two.

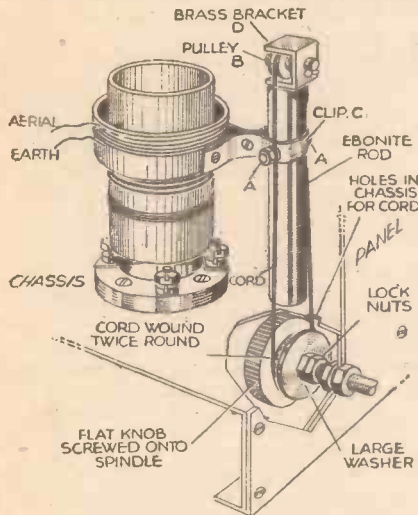
A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

An Adjustable Coupling Device
 THE sketch shows a variable coupling coil I have made for my S.W. receiver. The pulley B is a large terminal mounted on bracket D which is screwed to the top of the ebonite rod, the lower end of which is, of course, screwed to the chassis. Clip



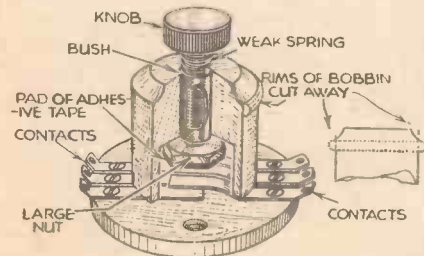
A simple adjustable coupling device.

C is a piece of thin brass made to the shape shown, and A is a small bolt soldered to C, for anchoring the cord.

If clip C is carefully made it will move smoothly up and down the ebonite rod allowing the most minute adjustment of the coils, and in conjunction with a dial and pointed knob will be found extremely useful.—R. PHILPOTTS (West Cramlington, Northumberland).

A Simple Screw-down Switch

WHEN trying out some remote control circuits I needed three press-buttons to be controlled by one knob. I could not



An easily-made screw-down switch for experimental purposes.

obtain apparatus of this kind anywhere, so I adopted the simple dodge illustrated. The hole in the bobbin is widened to 3/4 in. for about half-way up. The insulator (which is the sleeve of a disused plug) is not needed if the screw already fits the hole in the bobbin neatly.—H. NEWTON (Murton, Co. Durham).

THAT DODGE OF YOURS!

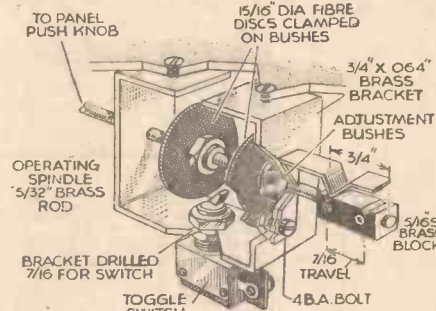
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account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

SPECIAL NOTICE

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

Operating Mechanism for Sub-chassis Toggle Switches

TOGGLE switches mounted below the chassis (to suit short wiring and layout) are difficult to adopt for panel operation. The simple yet robust mechanism illustrated which has given every satisfaction, possesses a locking action to prevent spindle backlash and is easily constructed. Two bushes, holding operating discs, are fixed to a 5/32 in. dia. brass



A method of operating chassis toggle switches.

rod by means of set screws. The vertical faces of the brass mounting bracket are drilled to allow easy spindle movement parallel to the chassis. The upper bracket faces are tapped for fixing the mechanism, whilst the

NOW READY!

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

lower face is drilled 7/8 in. dia. to receive the toggle switch. Secured to the extreme end of the spindle is a 7/8 in. square brass block (3/4 in. long): V-shaped grooves upon the sides of the latter engage with the locking spring at the "on" and "off" positions of the spindle, the travel of which is approximately 7/8 in. The mechanism has a definite "snap" action, and its simple adjustments are effected entirely by the two bush set screws.—Wm. A. HARRISON (Aintree).

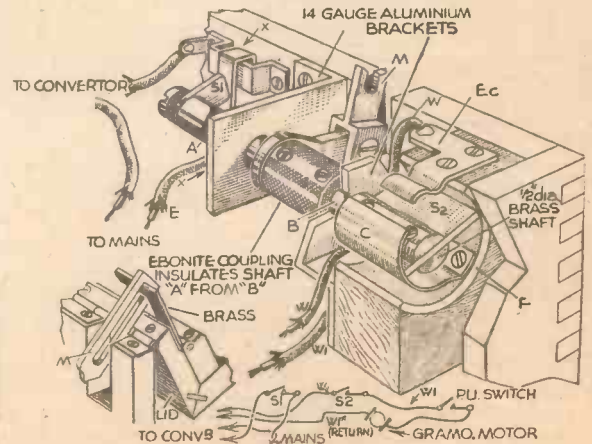
Automatic Converter and Gramomotor Switching

I HAVE recently constructed a radiogram for operation from a converter, and as will be seen from the illustrations, the method of switching is rather out of the ordinary. The operation is quite simple, being effected through the medium of the gramolid, and the movement is as follows. A strong brass control arm "M" activates in cam fashion the double shaft "A-B," this shaft causing "S1" to release a strong brass contact-arm which in turn contacts with the back contact, thus completing the necessary converter circuit.

"S2" functions in rather a novel way, inasmuch as the rotation of a flat piece of brass, previously let into the "B" shaft, engages smartly with a well-tempered contact piece "EC"; this contact is also made of brass, and completes the circuit for the gramomotor, but it will be seen that completion of the motor circuit can only take place on lifting the P.U. arm.

"F" is a section of a bakelite former, and as the wood cut-out was not sufficiently smooth, this is glued to the cut-out. The inset illustration shows the way in which the lid controls the arm "M," whilst the circuit diagram shows the simple wiring.

The only important point which had to be watched was to see that the framework side of the contact switch "S1" went to earth potential, and in my case I was able separately to earth the whole assembly.—R. C. COLPIT (Croydon).



Automatic switching device for a converter and gramomotor.

Be Guided by the expert
use

'AVO' ELECTRICAL MEASURING INSTRUMENTS

REGD. TRADE MARK BRITISH MADE

THESE instruments put into the hands of every radio experimenter and keen amateur the same precision-testing facilities which the radio engineer has learned to expect of 'AVO' instruments. The outcome of many years' experience in the manufacture and design of electrical test apparatus, they combine high accuracy with maximum utility and are available at a truly moderate cost.

STAND 21
RADIOLYMPIA



A VALUABLE BOOK

A new and enlarged edition, entirely re-written in the light of present-day knowledge. It takes the reader in easy stages through the whole routine of testing modern receivers, and clearly explains the causes of faults in receiving and amplifying apparatus. It also shows how to use effectively all radio instruments. 150 pages with numerous diagrams and graphs.

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The D.C. AVOMATOR

Electrical Measuring Instrument

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

CURRENT	VOLTAGE	
0-640 A.	0-6 v.	0-240 v.
0-30 "	0-12 "	0-300 "
0-120 "	0-120 "	0-600 "
RESISTANCE		
0-10,000 ohms		
0-50,000 "		
0-1,200,000 "		
0-5 megohms		

Complete in case with instruction booklet, leads and interchangeable testing prods and crocodile clips. **45/-**

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

D.C. VOLTS	MILLIAMPS
0-75 millivolts	0-2.5 milliamps
0-5 volts	0-5 "
0-25 "	0-25 "
0-100 "	0-100 "
0-250 "	0-300 "
0-500 "	
RESISTANCE	
0-20,000 ohms	
0-100,000 "	
0-500,000 "	
0-2 megohms	
0-5 "	
0-10 "	

Complete with instruction booklet, leads, interchangeable testing prods and crocodile clips. **£5.10s.** (Leather case, 10/-)

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Simplifies valve testing. Enables all valves to be tested under working conditions outside the set. Eliminates the need for severing connections and groping about inside the set. Instantly adaptable for 4-pin, 5-pin and 7-pin valves. **27/-**

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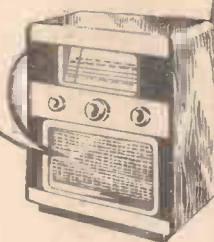
Sole Proprietors & Manufacturers:

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.,
Winder House, Douglas Street, London, S.W.1 Telephone: Victoria 3404/7.



**YOU HAVE JUST HEARD
OUR SIGNATURE TUNE. WE ARE
NOW GOING TO PLAY FOR THE FIRST TIME**

IN ENGLAND A SPECIAL SWING NUMBER
ENTITLED 'HOT HARLEM' ETC.



... and then
the set goes **DEAD**
and you say

'NEXT TIME I'LL FIT

Exide AND Drydex

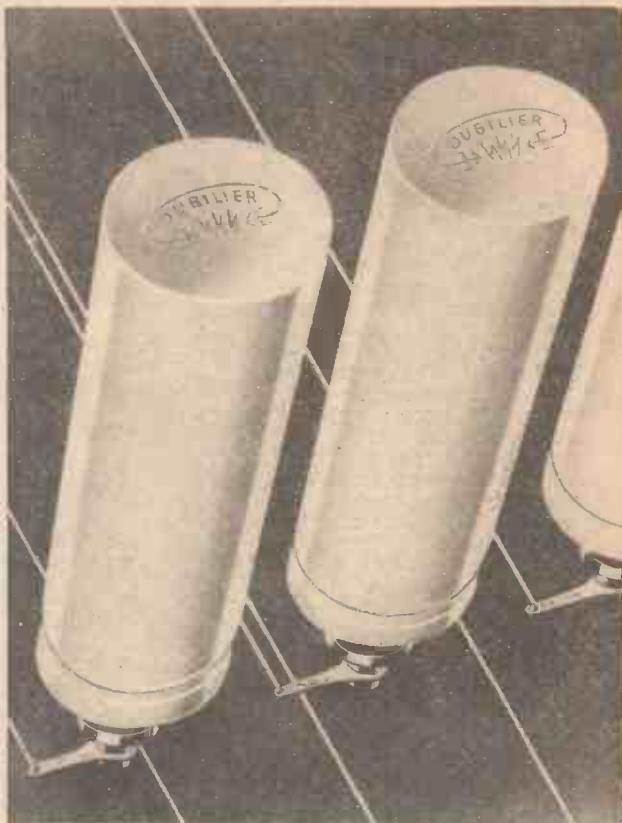
R42A

**RADIO ACCUMULATORS AND
DRY BATTERIES'**

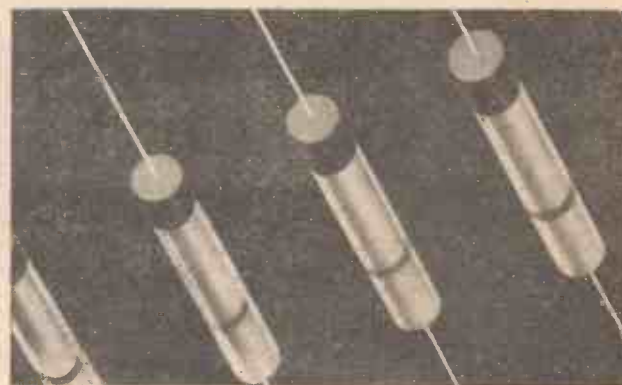
How like a battery, to run down at such a moment! And how like Exide to make such disappointments a thing of the past! For Exide has the Charge Indicator to tell you *'before* a re-charge is necessary. And what about H.T. batteries? The name to remember is Drydex. The battery that lasts longer and grows old gracefully, without fear of a quick collapse. Exide and Drydex — they *still keep going when the rest have stopped*

From reputable dealers and Exide Service Stations. Exide Service Stations give service on every make of battery. The Chloride Electrical Storage Company Ltd. (Exide and Drydex Batteries), Exide Works, Clifton Junction, near Manchester. Also at London, Manchester, Birmingham, Bristol, Glasgow, and Belfast.

DUBILIER



STAND 69



If, by any misfortune, you should not reach our stand, please write for a copy of our new Catalogue. It contains details of all our latest patterns of condensers and resistances which we think will be of most interest to Radio Manufacturers, Traders, Service Engineers and Constructors.

**DUBILIER CONDENSER CO. (1925) LTD.
DUCON WORKS, VICTORIA ROAD, NORTH ACTON, W.3**

The "JUNIOR" CRYSTAL SET

The Ideal Set for the Beginner

KNOWING that a very large demand exists for an efficient crystal receiver, we have given the design of the Junior as much consideration as the other models mentioned in these pages. We set

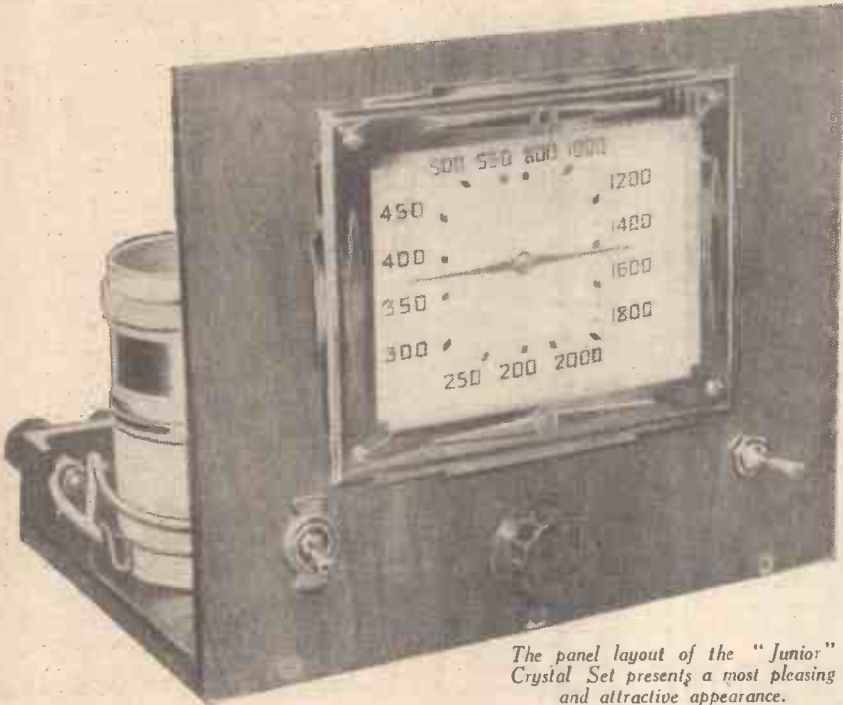
valve receiver, all conditions being equal, it is usual to employ headphones for reception and two terminals are provided for this purpose.

Many people object to using headphones,

especially the modern type, have many advantages.

For the aerial coil we have selected a most efficient dual-range air-cored coil, produced by Messrs. Bulgin, the normal reaction winding being utilised for the aerial coupling, thus allowing a very satisfactory degree of selectivity to be obtained, together with efficient transference of the signal in the aerial circuit to the tuned circuit across the crystal.

It will be noted that this coupling coil is also connected to the switch so that the



The panel layout of the "Junior" Crystal Set presents a most pleasing and attractive appearance.

about to produce a compact receiver whose appearance would be not only pleasing to the eye but also render it worthy of being placed in any room without becoming a blot on the general furnishing scheme.

For simplicity's sake we have used a wooden baseboard of a size sufficient to hold the essential components, and a panel of a piece of polished walnut-finished ply.

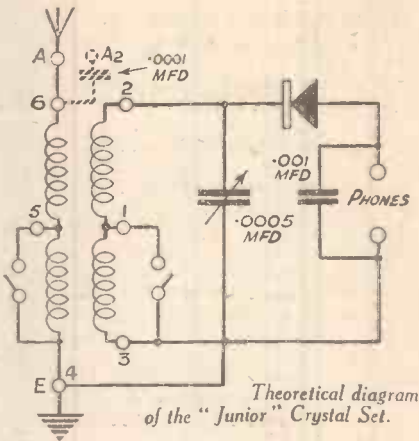
The controls are only three in number; on the left of the dial is a neat toggle-switch, which is used for changing from the medium to the long waves, and to the right of the dial projects a small knob which enables one to select the most sensitive spot on the crystal combination.

The crystal detector itself is of the semi-permanent type, and this was selected because it removes all the trouble usually associated with the old cat's-whisker arrangement.

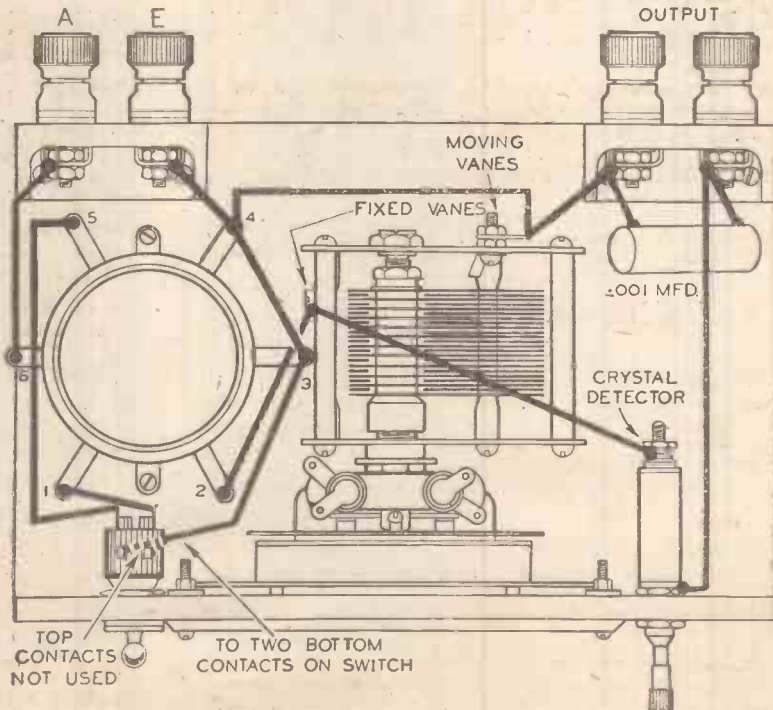
As the output of a crystal receiver is naturally much lower than that of a one-

correct coupling ratios are maintained on both medium and long waves.

The large rectangular dial clearly marked in wavelengths enables the tuning point to be readily identified and provides a pleasing finish to the panel.



Theoretical diagram of the "Junior" Crystal Set.



Wiring diagram of the "Junior" Crystal Set.

LIST OF COMPONENTS FOR THE "JUNIOR" CRYSTAL SET

- One tuning condenser, without dial or slow motion. Popular log, .0005 (Jackson).
- One tuning dial, square plane, degree and scale (Jackson).
- One coil, C.69 (Bulgin).
- One crystal detector, R.D.40 (Jewel Pen).
- One switch, S.98 (Bulgin).
- Two terminal blocks, A.E. output (with terminals) (Belling and Lee).
- One panel, 8in. x 6 1/2in. walnut (Peto-Scott).
- One baseboard, 8in. x 5in. (Peto-Scott).
- One fixed condenser, .001 mfd., type 4601/S. (Dubilier).
- One fixed condenser, .0001 mfd., type 4601/S. (Dubilier).
- One pair earphones (Ericsson).

Guide to the Exhibitors

Full List of Exhibitors arranged in
Alphabetical Order, with Addresses
and Stand Numbers

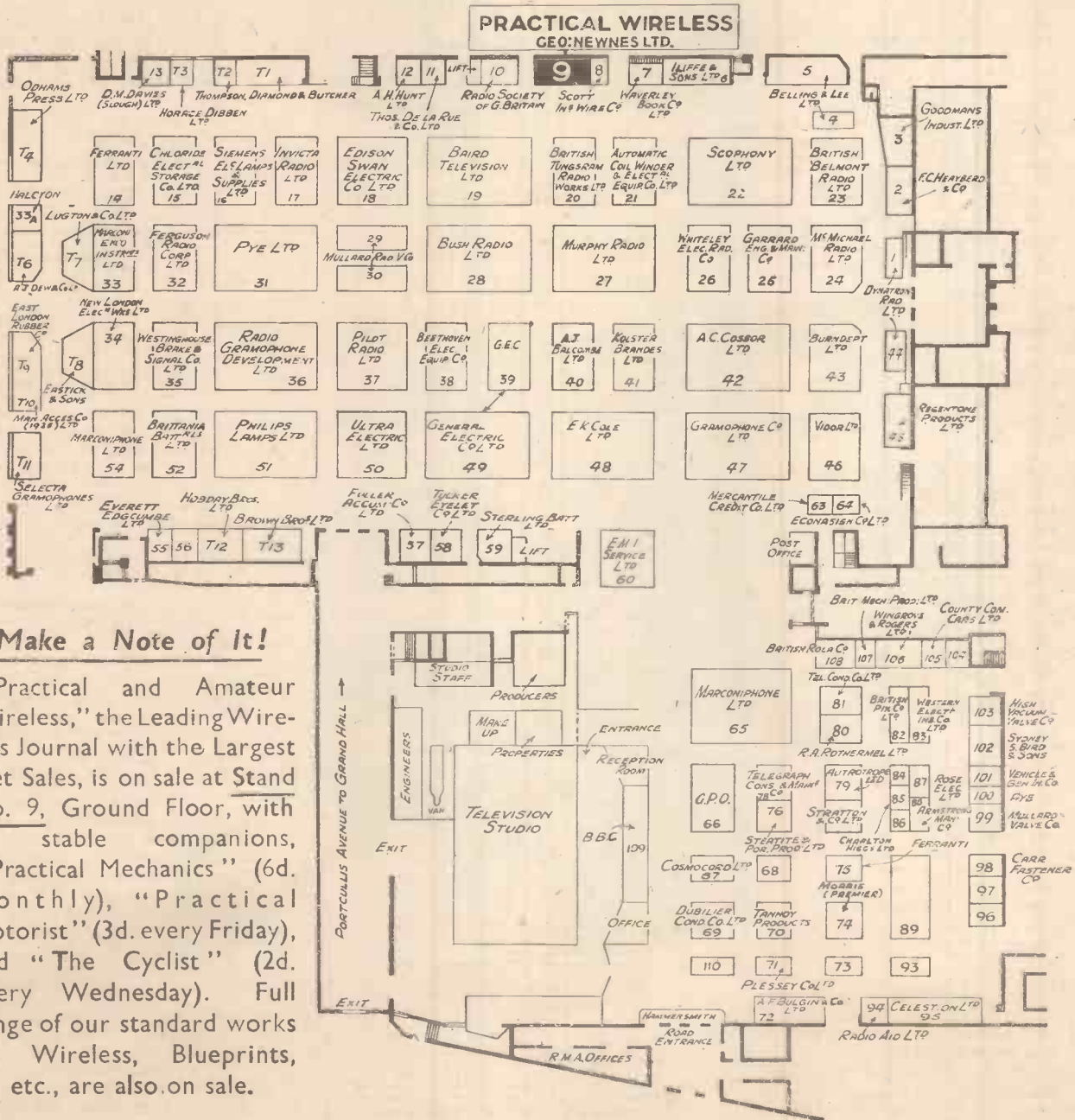


NAME AND ADDRESS	STAND	NAME AND ADDRESS	STAND	NAME AND ADDRESS	STAND
Armstrong Manufacturing Co., 100, King's Road, Camden Town, N.W.1	88	E. M. I. Service, Ltd., Sheraton Works, Hayes, Middlesex	60	NEWNES, GEORGE, LTD., TOW R. HOUSE, SOUTHAMPTON ST., STRAND, W.C.2	9
Automatic Coil Winder and Elec. Equipment Co., Ltd., Winder House, Douglas Street, S.W.	21	Everett Edgcombe, Ltd., Colindale Works, Hendon, N.W.	55	Odhams Press, Ltd., Long Acre, W.C.2	T4
Baird Television, Ltd., Worsley Bridge Road, S.E.26	19	Ferguson Radio Corporation, Ltd., 105/109, Judd Street, W.C.1	32	Philips Lamps, Ltd., 145, Charing Cross Road, W.C.2	51
Balcombe, Ltd., A. J., 52, Tabernacle Street, E.C.	40	Ferranti, Ltd., Radio Works, Moston, Manchester	14, 75	Pilot Radio, Ltd., 87, Park Royal Road, N.W.10	37
Beethoven Electric Equipment, Ltd., Chase Road, North Acton, N.W.10	38	Fuller Accumulator Co. (1926), Ltd., Woodland Works, Chadwell Heath, Essex	57	Plessey Co., Ltd., Vicarage Lane, Ilford, Essex	71
Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex	4, 5	Garrard Engineering & Manufacturing Co., Newcastle St., Swindon, Wilts	25	"Practical Wireless"	9
Bird & Sons, Sydney S., Cambridge Arterial Road, Enfield, Middlesex	102	General Electric Co., Ltd., Magnet House, Kingsway, W.C.2	30, 49	Pye, Ltd., Radio Works, Cambridge 31	100
Britannia Batteries, Ltd., Union Street, Redditch, Wores	52	Godmans Industries, Ltd., Lancelet Road, Wembley, Mddx.	3	Radio-Aid, Ltd., 45, Duke Street, W.1	94
British Belmont Radio, Ltd., 4-5, Ridgmount Street, W.C.1	23	Gramophone Co., Ltd., 108, Clerkenwell Road, E.C.	47	Radio Gramophone Development, Ltd., Globe Works, Newtown Row, Birmingham, 6	36
British Broadcasting Corporation, Broadcasting House, London, W.1	109	<p>For the Best Books, Blueprints, Periodicals, and Reader Service, visit our Stand No. 9, Ground Floor</p>			
British Mechanical Productions, Ltd., 79a, Rochester Row, London, S.W.1	107				
British Pix Co., Ltd., Pix Works, Lillieshall Road, S.W.4	82				
British Rola Co., Minerva Road, Park Royal, N.W.	108				
British Tungsram Radio Works, Ltd., West Road, Tottenham, N.17	20				
Brown Bros., Ltd., Great Eastern Street, E.C.2	T13				
Bulgin, A. F., & Co., Ltd., Abbey Road, Barking, Essex	72				
Burndepth, Ltd., Light Gun Factory, Erith, Kent	46				
Bush Radio, Ltd., Power Road, Chiswick, W.4	28				
Carr Fastener Co., Ltd., Finsbury Court, Finsbury Pavement, E.C.2	98				
Celestion, Ltd., London Road, Kingston-on-Thames	95	Hayberd, F. C., & Co., 10, Finsbury Street, E.C.2	2	Rose, Norman (Elec.), Ltd., 43, Lamb's Conduit Street, W.C.1	87
Charlton Higgs (Radio), Ltd., Edward St., Dudley Hill, Bradford	85	High Vacuum Valve Co., Ltd., 111, Farringdon Road, E.C.	103	Rothermel, R. A., Ltd., Rothermel House, Canterbury Road, N.W.6	80
Chloride Electrical Storage, Co., Ltd., 231, Shaftesbury Avenue, W.C.2	15	Hobday Bros., Ltd., 21, Gt. Eastern Street, E.C.	T12	Scophony, Ltd., Thornwood Lodge, Campden Hill, W.8	22
Cole, E. K., Ltd., Ekco Works, Southend-on-Sea, Essex	48	Hunt, A. H., Ltd., Bendon Valley, Garatt Lane, Wandsworth, S.W.18	12	Scott Insulated Wire Co., Queensland Works, Westmoreland Road, N.W.9	8
Cosmocord, Ltd., Cambridge Arterial Road, Enfield, Middlesex	67	Iliffe & Sons, Ltd., Dorset House, Stamford St., S.E.	6	Selecta Gramophones, Ltd., 81, Southwark Street, S.E.1	T11
Cossor, A. C., Ltd., Cossor House, Highbury Grove, N.5	42	Invicta Radio, Ltd., St. Andrews Road, Cambridge	17	Siemens Electric Lamps and Supplies, Ltd., 39, Upper Thames Street, E.C.4	16
Davies, D. M. (Slough), Ltd., Trading Estate, Slough, Bucks	13	Keats-Hacker, 91-93, Bishopsgate, E.C.2	1	Steatite and Porcelain Products, Ltd., Stourport-on-Severn	76
Davis & Timmins, Ltd., Brook Road, Wood Green, N.22	96	Kolster Brandes, Ltd., Cray Works, Sidecup, Kent	41	Sterling Batteries, Ltd., Sterling Works, Dagenham, Essex	59
De La Rue, Thos., & Co., Ltd., 90, Shernhall Street, E.17	11	Lugton & Co., Ltd., 203, Old Street, E.C.	T7	Stratton & Co., Ltd., Eddystone Works, Bromsgrove Street, Birmingham	77
Dew, A. J., & Co., Ltd., 33, Rathbone Place, W.1	T6	Manufacturers' Accessories Co. (1925), Ltd., 85, Gt. Eastern Street, E.C.	T10	Tannoy Products, Canterbury Grove, S.E.27	70
Dibben, Horace, Ltd., 34, Carlton Crescent, Southampton	T3	Marconiphone Co., Ltd., 210, Tottenham Court Road, W.1	54, 65	Telegraph Condenser Co., Ltd., Wales Farm Road, Acton, W.3	81
Dubilier Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, North Acton, W.3	69	Marconi-Ekco Instruments, Ltd., Electra House, Victoria Embankment, W.C.2	33	Telegraph Construction and Maintenance Co., Ltd., 22, Old Broad Street, E.C.2	78
Dynatron Radio, Ltd., Perfecta Works, Ray Lea Road, Maidenhead	44	McMichael Radio, Ltd., Wexham Road, Slough, Bucks	24	Thompson Diamond & Butcher, 34, Farringdon Road, E.C.	T1, T2
East London Rubber Co., Ltd., 29, Great Eastern Street, E.C.	T9	Mercantile Credit Co., Ltd., 39-45, Finsbury Square, E.C.2	63	Tucker, George, Eyelet Co., Ltd., Cuckoo Road, Birmingham 7	58
Eastick, J. J. & Sons, 118, Bunhill Row, E.C.	T8	Morris & Co. (Radio), Ltd., 167, Lower Clapton Road, E.5	74	Ultra Electric, Ltd., Western Avenue, Acton, W.3	50
Econasign Co., Ltd., 92, Victoria Street, S.W.1	64	Mullard Radio Valve Co., Ltd., 225, Tottenham Court Road, W.1	29, 30, 99	Vacuum-Science Products, Ltd., 166, Weir Road, S.W.12	105
Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2	18	Murphy Radio, Ltd., Broadwater Road, Welwyn Garden City, Herts	27	Vehicle and General Insurance Co., Ltd., Royal Liver Building, Liverpool, 3	101
		New London Electron Works, Ltd., East Ham, E.6	34	Vidor, Ltd., West Street, Erith, Kent	43
				Waverley Book Co., Ltd., 96, Farringdon Street, E.C.4	7
				Westinghouse Brake and Signal Co., Ltd., 82, York Rd., King's Cross, N.1	35
				Weston Electrical Instrument Co., Ltd., Cambridge Arterial Road, Enfield, Middlesex	83
				Whiteley Electrical Radio Co., Victoria Street, Mansfield, Notts	26
				Wingrove & Rogers, Ltd., Mill Lane, Old Swan, Liverpool	106
				Wireless and Electrical Trader, Dorset House, Stamford St., S.E.	89

FINDING YOUR WAY ROUND RADIOLYMPIA

Floor Plan Showing Positions, Names of Firms and Corresponding Numbers of Stands

For Detailed Guide to Each Exhibit, See Pages 584 to 591



Make a Note of It!

“Practical and Amateur Wireless,” the Leading Wireless Journal with the Largest Net Sales, is on sale at Stand No. 9, Ground Floor, with its stable companions, “Practical Mechanics” (6d. monthly), “Practical Motorist” (3d. every Friday), and “The Cyclist” (2d. every Wednesday). Full range of our standard works on Wireless, Blueprints, etc., are also on sale.



ARMSTRONG MANUFACTURING CO., 100, King's Road, Camden Town, N.W.1. Stand No. 83.

ON this stand the receivers will all be in chassis form and will include, 6-, 7-, 8-, 9-, 10- and 12- valve units. These are all of the all-wave type, some having push-button tuning, and others being of the radiogram type. One of the most popular models is a 12-valve unit, with cathode-ray tuning indication, covers five wavebands, has two I.F. stages with variable selectivity on both stages and delivers an output of 10 watts. The price is 17 gns. complete with valves.



This Baird television, which may be seen on Stand No. 19, gives a black and white picture 7 1/2 in. by 6 1/2 in.

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD., Winder House, Douglas Street, S.W. Stand No. 21.

THE exhibits here will consist in the main of test apparatus, amongst which are the popular Avometer, Avominor, Avodapter, etc. These appeal alike to the ordinary listener and the advanced experimenter or service man, and for the manufacturer the special coil-winding instruments will prove of great interest. In addition to the radio apparatus this company also produces a neat photo-electric photographic exposure meter.

BAIRD TELEVISION, Ltd., Worsley Bridge Road, Lower Sydenham, S.E.26. Stand No. 19.

ALL of the television receivers to be seen on this stand are of the type utilising the cathode-ray tube. The tubes in this case are all Baird products and give a very large image for the size of tube which is employed. There are models to suit all requirements, up to the super all-wave radiogram, and a feature of the picture on these receivers is the brilliant black and white image which is obtained.

Complete Guide to the Exhibits

In a few cases details of exhibits have not been released at the moment of going to press.

A. J. BALCOMBE, LTD., 52-56, Tabernacle Street, London, E.C.2. Stand No. 40.

THE receivers on this stand are known as "Alba" models, and a feature of them will be the automatic push-button tuning. In these receivers it is known as the "Presto-tune," and will be found on the 10-guinea all-wave superhet. The remaining models will include table, floor and console cabinets and one of the most interesting will be a 4-valve three wave-band superhet radiogram at 15 guineas.

BEETHOVEN ELECTRIC EQUIPMENT, LTD., Chas. Road, North Acton, N.W.10. Stand No. 38.

THE receivers to be exhibited on this stand will include open aerial receivers for battery and mains use, transportables for both mains and batteries, portables in a similar selection, and a special radiogram. This will be fitted with a twin speaker unit and push-button tuning will be found on several of the models. A feature of the Beethoven receivers is the large rectangular tuning dial which is set at an angle into the cabinets.



A useful plug and socket for coaxial cables. A Belling-Lee product which may be seen on Stand Nos. 4 and 5.

BELLING & LEE, LTD., Cambridge Arterial Road, Enfield, Middlesex. Stand Nos. 4 and 5.

YOU will find on Stands 4 or 5 a Belling-Lee suppression engineer who knows your locality and his job, and who is there to help you to overcome the buzzes and crackles that spoil your radio programmes. The Belling-Lee vertical aerials will come as a welcome relief after the unsightly irregular army of poles and bent sticks which ruin the outlook for so many suburban householders. These aerials are supplied as complete anti-interference systems.

Floor plan appears on page 583.
Complete Show Report next week.

The new "Eliminoise," although giving reception on all broadcast bands, makes use of switching between medium and short wavebands.

Suppression at the source will be demonstrated in a model kitchen very full of electrical appliances which visitors will be invited to put into operation by pressing a series of buttons. A very full range of industrial suppressors will be on view together with the latest interference measuring apparatus, noise locators, etc.

Television aerials will be shown *in situ* mounted on full-size brick chimneys. Other television accessories and components, flat pin-plugs and sockets to B.S.666 for extension loudspeaker points in the home or hospitals, and for radio relays; fuses and fuse-holders, terminals of all sizes and descriptions, including a new spade and a "B" type with top socket; plugs and sockets; rubber plugs (5 amp. mains) moulded on to leads, form some of the chief new lines.

Considerable interest will be shown in appliances made for use in the Air Force and now exhibited with permission of the Air Ministry. This exhibit includes special suppressors, terminals, plugs and sockets, fuses and holders, etc.

SYDNEY S. BIRD & SONS, LTD., Cambridge Arterial Road, Enfield, Middlesex. Stand No. 102.

AS specialists in the manufacture of condensers, this exhibit will consist of a display of every type of condenser that is met with in modern tuning circuits. These range from the small mica-dielectric pre-sets or trimmers up to the large transmitting models with high quality insulation suitable for use on high-voltage circuits. An interesting addition to the products of this firm is a tubular electric chime consisting of two tuned rods, operated from a special bell-mechanism. This is intended to replace the usual door bell used in the home and it may be made to operate in such a manner that an indication as to which door requires answering may be obtained.

BRITANNIA BATTERIES, LTD., Union Street, Redditch, Worcs. Stand No. 52.

THE exhibits on this stand will be very similar to those exhibited last year, except that there will be a new system of catalogue numbering of the Pertrix H.T. batteries. These are now designated "The New" Pertrix batteries. A new feature in the range of accessories and components is the Pertrix Gas Lighter, which, complete with battery and burner, costs 5s. Spare parts are available.



Another Belling-Lee product—a moulded rubber 5-amp. plug and cord.

BRITISH BELMONT RADIO LTD., 4-5, Ridgmount Street, W.C.1. Stand No. 23.

THE range of Belmont receivers which will be shown on Stand No. 23 will include some novel Midgets. These are finished in attractive coloured cabinets and range in price from £4 4s. Among the features incorporated in the Belmont receivers may be mentioned iron-core coils, silver-mica trimmers, isolantite insulation for tuning condensers and negative-feedback circuits. Another novel feature is the volume control which automatically makes the change from radio to gram—being effective on radio for the first part of its travel and on gramophone for the remainder.

BRITISH MECHANICAL PRODUCTIONS, LTD., 79a, Rochester Row, S.W.1. Stand No. 107.

HERE will be seen the wide range of "Clx" components amongst which are valveholders, coil holders, switches, plugs, sockets, etc. The valveholders are designed for various types of receiver and valves, and include chassis or baseboard types for Octal, Acorn, standard or Continental types. Valve-cap connectors, fuses, frequentite trimmer condensers, and a new wall plug are among the remaining items which may be seen on this stand.

BRITISH PIX CO., LTD., Pix Works, Lillieshall Road, S.W.4. Stand No. 32.

HERE will be seen the well-known Pix Aerial and other interesting accessories produced by this firm. These will already be familiar to our readers, and in addition to the popular small aerial accessories, the well-known Pix valves will also be displayed.

BRITISH ROLA CO., Minerva Road, Park Royal, N.W. Stand No. 108.

INTEREST in the Rola exhibit will centre largely around the new 8Z and 10Z, dustproof models of 8in. and 10in. diameter respectively. Available in both energised and permanent magnet types these units are of special patented construction whereby dust and dirt, the root cause of the great majority of speaker troubles, are totally excluded from the air gap. The well-known Rola "Roma" and Rola "Itex" cabinet extension speakers are also equipped with 8in. diameter dustproof units, whilst the F742-PM "high sensitivity" model and the 12in. diameter

devices, loudspeakers, etc., by prominent makers. There will also be a representative range of battery charging plant, with technical staff available for advice, and a full technical and sales staff will be available for dealers for the selection of stock and for advice on any points which may arise.

A. F. BULGIN & CO., LTD., Abbey Road, Barking, Essex. Stand No. 72.

IT would be impossible to enumerate all of the various items which will be displayed on this stand, but it may well be referred to as the "Home Constructor's Stand." The push-button units will probably prove of most interest, introducing, as they do, the latest scheme in receiver design. In addition, there will be many small items, from simple push-pull switches up to multi-range coil units and the associated switchgear.



Here is the British Belmont 7-valve all-wave console with automatic tuning. This is on view on Stand 23.

Mains transformers, oscillators, electrolytic condensers, quench coils, scratch filters, television components, watt and other meters, cathode ray resistors and anti-interference units are only a few of the most interesting components which may be inspected on Stand No. 72.

BURNDIPT, LTD., Light Gun Factory, Erith, Kent. Stand No. 46.

AN interesting feature of the receivers on this stand will be the "continuous tuning" band. In the 8-valve all-wave radiogram, for instance, this tunes from 13.5 to 2,000 metres and there are no blank spots. In the 9-valve superhet a similar range is covered with the exception of a small band from 580 to 750 metres. Other prominent features of the receivers to be shown here are the high fidelity reproduction, the good selectivity and the special iron-core Litz coils which are employed.

BUSH RADIO, LTD., Power Road, Chiswick, W.4. Stand No. 28.

"BUSH BUTTON" is the keynote of the Bush receivers, and this is, of course, the standard push-button tuning device, renamed to render it distinctive. The large open tuning scale, and the fine finish to the cabinets are two of the main features which will present themselves to the visitor, and for those who are interested in circuit design there are many interesting features incorporated in these receivers which will repay study. Provision for pick-up and remote speaker is, of course, a standard arrangement on the Bush receivers.

CARR FASTENER CO., LTD., Finsbury Court, Finsbury Pavement, E.C.2. Stand No. 98.

ON this stand will be seen a very varied collection of small parts such as are now used in

modern receiver construction. To illustrate the application of these parts a number of dummy receiver chassis will be on view. The parts include screened plugs and sockets, valveholders, terminals and terminal strips, voltage tapping plugs, contacts, and eyelets of all description. The range of Benjamin valveholders, which are made by Carr Fastener, will also be on view.

CELESTION, LTD., London Road, Kingston-on-Thames. Stand No. 95.

HERE will be seen the wide range of both Celestion and Magnavox speakers. These range from the very small miniature cone models, used for portables and other apparatus, to the large public-address units in single and band units. In addition to the various chassis models, there will be a wide range of cabinet models suitable for domestic use.

CHARLTON HIGGS (RADIO), LTD., Stanley Works, Edward Street, Dudley Hill, Bradford, Yorks. Stand No. 85.

AN important feature of the receivers to be exhibited on this stand is that they are custom-built. Included in these is a radiogram incorporating a three-valve chassis with "Solar" tuning and a six-watt "straight-line" output amplifier. Dual auditorium



A Clx valveholder for the international valves.

loudspeakers. Drift-compensated push-button tuning giving nine pre-set stations is fitted, and an automatic record-changer is included in the massive piano-finished cabinet. The price of this model (Type AW99AG) is £42 10s.

CHLORIDE ELECTRICAL STORAGE CO., LTD., 231, Shaftesbury Avenue, W.C.2. Stand No. 15.

FOLLOWING the Exide "Mass" type low-tension cell incorporating the visible charge indicator, a new range of Exide "Hycap" accumulators, specially designed to meet the demands of high-powered modern radio receivers, was introduced. This new range, like its predecessors, has proved an unqualified success, and will again be on view on the Exide Stand, together with a comprehensive display of other Exide and Drydex batteries.

Of particular interest are the Exide unspillable cells, of which there is a size and type to fit practically every well-known portable receiver, and which bear on their labels details of the receivers for which they are suitable. In addition, a complete range of special unspillable low-tension cells for Midget Receivers will be on view on the same stand.

Continuing the policy of having available a suitable H.T. battery for every Radio Receiver, Drydex have augmented their range to cover all latest model wireless sets, and in addition offer alternative batteries for a number of popular sets.

The use of cardboard sleeves to protect batteries in transit is still being extended, and the practice of showing the battery type number and price on the ends of the cartons—a great convenience to the trade.



Bush Radio are showing this battery receiver on Stand 28.

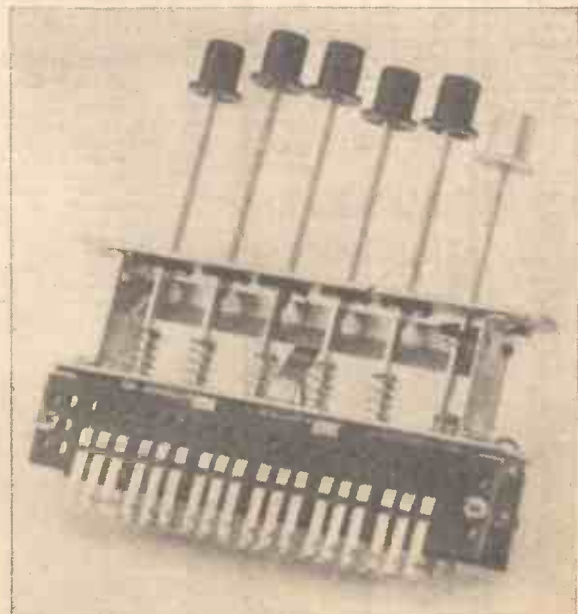
G.12 Energised and G.12 P.M. high fidelity speakers are retained unchanged. 6in. diameter models are also available.

BRITISH JUNGSRAM RADIO WORKS, LTD., West 1 Road, Tottenham, N.17. Stand No. 20.

PROMINENCE will be given on this stand to a complete series of valves which have been designed as standard replacements for any other "E" type valve. Some very interesting additions to the "E" range will be seen, especially the ELL1, which is a dual pentode in one bulb, capable of delivering 4½ watts with a total consumption of only 35 mA. There is also a double-diode which has two cathodes and is suitable for noise suppression and expander circuits, etc. The two-volt battery user is also well supplied and will be represented on the stand by a complete range of 2-volt valves. The transmitting amateur will also find several special transmitting valves which will be of interest.

BROWN BROS., Brown's Buildings, Great Eastern Street, E.C.2. Stand No. T.13.

ON this stand will be seen a representative range of radio receivers and radiograms of leading makes; a special display of radio service equipment, with technical staff available for demonstration; a full range of radio components, accumulators, interference



The home-constructor push-button unit produced by Bulgin. Other Bulgin new goods may be seen on Stand 72.

E. K. COLE, LTD., Ekco Works, Southend-on-Sea, Essex. Stand No. 48.

SOME interesting novelties are incorporated in the Ekco receivers, amongst which may be mentioned "Motor Tuning" and "Motor Cruising." A development of the push-button system, the cruising idea is to simplify manual tuning by permitting the motor to turn the tuning condenser quickly from one end of the scale to the other so that a desired station which may not be tuned by a normal button may be obtained. The normal station selector button is also available



One of the new season's Cosmor receivers—an A.C., all-wave 6-valve superhet on Stand No. 42.

EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, London, W.C.2. Stand No. 18.

ON this stand the largest battery of cathode-ray tubes to be run from a single receiver will be seen. Five tubes, ranging from 9in. to 15in. in diameter will be so arranged as to supply vision to five separate viewing booths. Each booth will have its own speaker. Special monitoring devices are to be fitted to ensure maximum results. There will also be a historical collection of interest, including the original Fleming valve of 1904, surrounded by its successors. A complete range of Mazda miniature valves, battery valves, and other types, cathode-ray tubes, radio accessories and batteries will complete this interesting exhibit.

taneous station selection by single operation on any waveband. The television sound band is included in certain of the models, and high fidelity reproduction is an important feature of these receivers.

FERRANTI, LTD., Moston, Manchester, 10. Stand No. 14 and 75.

IN the receivers to be exhibited on this stand will be two television sets at 50 gns. and 60 gns. These provide a 10 X 8in. picture, have a safety-glass screen, and the angle of vision is 120°. One model is for television only, and the other includes the broadcast wavelengths. A wide range of domestic radio sets will also be shown, in which "prestune" automatic tuning will be featured. Car radio is also to be represented by a new Ferranti set of the 6-valve superhet type giving 2.5 watts output. Special aerials are available for these, and are designed for roof or running-board mounting. There will also be a wide range of small accessories, such as meters, and other items, which will be of interest to the home-constructor.



New Dubilier items, to be seen on Stand No. 69, include mica condensers with wire ends as shown here.

and receivers will be on view this year in which pre-set condensers are brought into action, as well as the motor driven sets. In the pre-set models a new system of permeability tuning is introduced with high-quality ceramic and silver fixed condensers to give stability. The maximum drift is stated not to exceed more than 1 per cent. of inductance or .05 per cent. of the station frequency. The approximate settings for each of 60 stations are given on the backs of spare name-cards supplied with the set.

COSMOGORD, LTD., Cambridge Arterial Road, Enfield, Middlesex. Stand No. 67.

THE Cosmogord Playing Desk is an important item which will receive prominence on this stand, and in addition there will be a new crystal pick-up. This gives very high-quality reproduction and sells for 25s. The playing-desk is available in several models, from the "Desk for the Masses" at £4 7s. 6d., to the de-luxe pedestal desk at £11 10s. This is enclosed in a highly-finished walnut cabinet with crystal pick-up, motor, record storage space and record index, and an electric light for illuminating the record turntable.

COSSOR, A. C., LTD., Cossor House, Highbury Grove, N.5. Stand No. 42.

A WIDE range of receivers will be seen on this stand, in addition to the extremely varied range of valves. Included among the many old favourites in this section will be a number of new valves designed for the two-volt battery user, and as a complete departure from previous items, Cossor will be showing at this year's show a range of electric clocks and a vacuum-cleaner. A range of batteries, both for radio and associated purpose, an extension speaker, and television equipment will also be featured. The Telelial tuning device, fitted to some of the new Cossor receivers, enables a number of stations to be tuned in by dialling in the case of the standard automatic telephone. In the receiver range there is a portable in two patterns—for battery or A.C./D.C. mains use. At the other end of the scale is a de-luxe all-wave superhet radiogram tuning from 13 to 2,000 metres, with two supertriodes in a push-pull output stage. This model also has an automatic record-changer, and costs 40 guineas.

DUBILIER CONDENSER CO. (1925), LTD., Ducon Works, Victoria Road, North Acton, W.3. Stand No. 69.

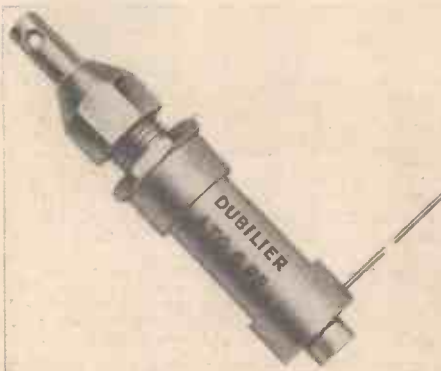
A NUMBER of new and interesting developments in condensers and resistances will be introduced at the Show, including a new range of trimmer condensers, mica dielectric twin trimmers, air trimmers, and ceramics in disc, cup and tube shapes. In addition there will be moulded metallised mica condensers, dry electrolytics, surge-limiting wet electrolytics, surge-proof dry electrolytics and special models of various types. In the range of resistances there will be an extensive exhibit, from the small half-watt units up to the large power components of the wire-wound type.

DYNATRON RADIO, LTD., Perfecta Works, Ray Lea Road, Maidenhead. Stand No. 44.

ALL the receivers exhibited by Dynatron are redesigned, although in some instances the changes are only small. In addition a number of new models will be shown. Television receivers will be seen on this stand, and a further improvement in the Searchlight Tuner will be noted. Other improvements in the receivers include a new development in A.V.C., high fidelity from more distant stations by a special selective tuner, an improved loudspeaker system, and the combination of a straight and a superhet circuit in a single receiver. The television is a 35-valve radiogram, selling at 165 guineas.

E.M.I. SERVICE, LTD., Sheraton Works, Hayes, Middlesex. Stand No. 60.

A VERY wide range of accessories and gear for the serviceman will be displayed here. In addition to the elaborate electrical equipment, E.M.I. Service



Another new Dubilier line—an air-dielectric trimmer.

also produce many workshop accessories, such as benches and tools which are essential to the running of a proper workshop used for the servicing of modern radio and television receivers.

EVERETT, EDGUMBE & CO., LTD., Colindale Works, Hendon, N.W.9. Stand No. 55.

AMONG the many interesting test instruments to be seen on this stand is a combined Set Tester, which is making its first appearance. This is a combination of several of the popular instruments of the Everett Edgumbe range and forms a most valuable addition to the modern workshop. It is designed for A.C. mains working. In addition, there will be an All-purpose Tester, All-wave Oscillators, Workshop Test Set, and sundry other modern instruments.

FERGUSON RADIO CORPORATION, LTD., 105/109, Judd Street, W.C.1. Stand No. 32.

IN accordance with the policy of this company, all receivers on the stand will be of the All-wave type, employing from three to five wavebands. New features in this year's models will be edge-lighted full-vision glass tuning scales with linear pointer movement, and press-button operation. In the latter arrangement, wave-changing is also effected by the button so that the pressure of a button automatically gives instan-

FULLER ACCUMULATOR CO. (1936), LTD., Woodland Works, Chadwell Heath, Essex. Stand No. 57.

HERE will be seen representative types of the popular "Mammoth" Plate range accumulators, feature in the display of L.T. accumulators which include multi-plate and de-luxe plate types in glass and ebonite containers. Three sizes of H.T. accumulators in 10-volt units will also be shown. As in previous years, a large section of the display will be devoted to batteries selected from the comprehensive range of H.T. units for all types of receiver.

GARRARD ENGINEERING & MFG. CO., Newcastle Street, Swindon, Wilts. Stand No. 25.

THE exhibit will, as in past years, consist of a unique display of gramophone accessories including motors, pick-ups, playing desks and automatic record-changing mechanism. The small units are suitable for incorporation in existing radio-gramophones, or may be used as accessories in the building of a new receiver.

TWO NEW HANDBOOKS

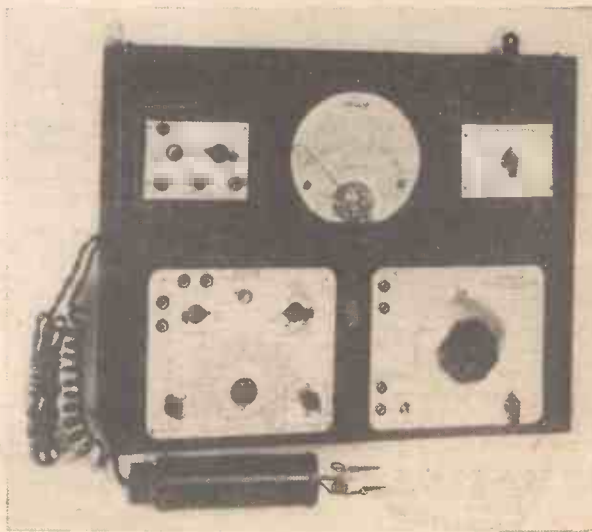
PRACTICAL WIRELESS SERVICE MANUAL

5/- (5/6 by post.)

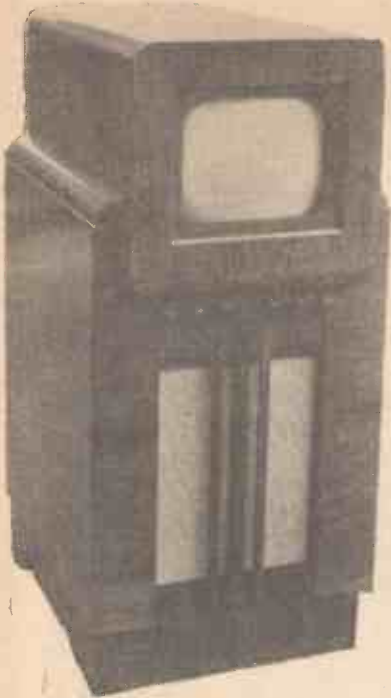
WIRELESS TRANSMISSION FOR AMATEURS

2/6 (2/10 by post.)

See them on our STAND No. 9, Ground Floor.



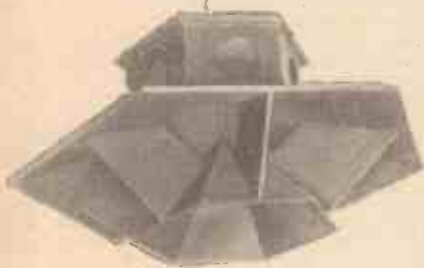
Everett, Edgumbe—Stand No. 55—has produced this valuable service-man's receiver test panel.



One of the new Ferranti television sets to be seen on Stand No. 13.

GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. Stand Nos. 39 and 49.

ON these stands the G.E.C. will display their many interesting radio products, including receivers, television sets, batteries, valves, etc. Touch-tuning and Selectalite Tuning will be features of the broadcast receivers, and some interesting improvements are to be noted in these sets. Floating edge cone speakers,



A novel public-address speaker produced by Goodmans, and shown on Stand No. 3.

rubber mounting for chassis, automatic two-speed tuning, and novel tuning dials are some of these. The wide range of Osram valves and cathode-ray tubes will be seen, together with the special batteries and other accessories which have been produced in the G.E.C. works.



Push-button tuning is included in this new H.M.V. receiver. It is shown on Stand No. 47.

GOODMAN'S INDUSTRIES, LTD., Lancelot Road, Wembley, Middx. Stand No. 3.

HERE will be seen an interesting range of public-address speakers and accessories. Some novel speaker designs will be shown, and special speakers, designed for large assemblies indoors and out, will also be displayed.

GRAMOPHONE CO., LTD., 108, Clerkenwell Road, E.C. Stand No. 47.

THE well-known H.M.V. receivers will be displayed on this stand and undoubtedly the many interesting novelties incorporated in them will attract the attention of everyone. Apart from the simpler types of receiver, there will be the larger radiograms and television receivers. A new hyper-sensitive pick-up, designed on entirely new lines, will also be shown, together with a new record player at 39s. 6d. A special feature will be the low-priced television receivers in which small pictures are produced—the lowest-priced model being the 15-valve model 904 at 29 gns., in which the picture size is 4in. by 4½in.

HEAYBERD & CO., F.C., 10, Finsbury Street, London, E.C.2. Stand No. 2.

THIS firm is well known for its main products, and among the many familiar items to be seen on the stand the AO3 battery charger will be seen in a new form. This has been re-designed, but the price remains the same. The popular Tom Thumb charger, which charges at .5 amps. 2 volts for less than ½d. a week, is still to be seen at 12s. 6d. A full range of transformers for metal and valve rectifiers, and chokes for use with home-constructed receivers, will remain the same as for last season.



Push-button tuning is also found on this Invicta receiver.

HIGH VACUUM VALVE CO., LTD., 111-117, Farringdon Road, E.C.1. Stand No. 103.

IN addition to the complete range of 60 battery, mains, midget and short-wave valves to be seen on this stand there will also be a new cathode-ray tube with a 3in. screen—the price of which is £2 2s. Other new additions to be seen on the stand will be the special cathode-ray tube designed for photographic work, a high-voltage half-wave rectifier for use with C.R. tubes, and delivering up to 6,000 volts at 3 mA, two grid-controlled rectifiers, a 5-pin output tetrode and a 2-volt variable-mu H.F. pentode designed to operate at 150 volts on the screen. This valve requires no separate screen dropping resistances and will cost 9s. 6d.

HUNT, A. H., LTD., Bendon Valley, Garratt Lane, Wandsworth, S.E.18. Stand No. 12.

ON this stand you will see the new anti-static aerials combined with "L" and dipole designs; an interference suppressor, capacitor analyser; signal generator; exact replacement service fixed condensers; dry and wet electrolytics in various



For the music lover. This is one of the fine G.E.C. radiograms.

patterns; paper condensers; mica condensers and trimmer condensers. It is interesting to note that last season Hunts made more than 100,000 fixed condensers per day, and that they keep in stock more than 800 different types of exact service replacement and over 1,000 types of standard condensers.

INVICTA RADIO, LTD., St. Andrews Road, Cambridge. Stand No. 17.

PUSH-BUTTON tuning is incorporated in some of the receivers which will be exhibited on this stand, and in addition to several popular models Invicta will also be showing a range of H.T. batteries. An interesting model in the range of receivers is the Junior portable, which is a 4-valve midget set measuring only 11½in. by 9in. by 7in. This is complete with moving-coil speaker and frame aerial.

KOLSTER-BRANDES, LTD., Gray Works, Sidcup, Kent. Stand No. 41.

INCLUDED in the range of K.B. receivers to be seen on this stand is a "Keyboard" Push-button set which incorporates 5 valves and a cathode-ray tuning indicator. Another interesting model to be seen is the all-wave A.C. super-hot with 8 watts push-pull output



The modernised AO3 charger which is to be found on Heayberd's Stand No. 2.



Marconiphone are introducing push-button tuning in this model.

stage. A valuable feature of this set is that it incorporates 4 wavebands, two of which cover the short waves from 11.5 to 100 metres. Two television sets, an extension speaker and the Rejectostat all-wave Anti-disturbance Aerial outfit will also be exhibited.

McMICHAEL RADIO, LTD., Wexham Road, Slough, Bucks. Stand No. 24.

An extensive range of receivers will be seen on this stand, and among the special models will be a low-priced radiogram. This is an 8-stage 5-valve all-wave set tuning from 16 metres upwards. The receivers incorporate many interesting features amongst which may be mentioned frequency-controlled negative feedback. With this there are three positions "Normal" in which bass and treble terminate at the orthodox frequencies, "Bass" in which the treble is further reduced and the bass considerably accentuated, and "Foreign" when the bass is normal but the treble below usual.

MARCONIPHONE Co., LTD., 210, Tottenham Court Road, W.1. Stand Nos. 54 and 65.

The new receivers to be seen on Stand No. 65 include the latest small television instruments. At 29 guineas, Model 706 provides, in addition to an all-wave radio, a television section providing a picture 4 1/2 in. by 4 in. This receiver is of the table type, and a special stool is available upon which it may be placed if desired. This costs an extra 3 guineas. The stand is immediately adjacent to the B.B.C. Television Studio, and thus visitors will be able to see the programme being enacted in the studio and pass directly to the Marconiphone stand and see the results on the screen, and will thus be able to compare and see the high quality which is provided in these sets. A four-valve two-waveband lightweight battery portable, and a five-valve three-waveband push-button receiver are particular models which will repay time spent in inspection, and in the accessories range will be a new Contrastatic aerial, designed for use on the medium and long wavebands where man-made static is particularly bad, and a new record player. On Stand 54 a display of the latter and records by Columbia, Parlophone, etc., will be seen. Visitors will be able to hear their favourite artists by means of Post Office telephones connected direct to Marconiphone Radiograms.



A neat television receiver produced by K.B.

lines to be shown for the first time is a five-valve "Communications" receiver, a complete range of seven high-fidelity P.A. amplifiers for A.C. and A.C./D.C. operation, a five-valve all-wave superhet receiver chassis, a six-valve all-wave superhet chassis, a ten-valve deluxe superhet chassis and a new 3in. cathode-ray oscillograph. For the transmitter there will be many items of interest, including the Variable Impedance Modulation transformers, and a 10-watt all-band transmitter which is entirely self-contained and may be used for phone or C.W.



Note the novel panel design on this Invicta receiver

MARCONI-EKCO INSTRUMENTS, LTD., Electra House, Victoria Embankment, W.C.2. Stand No. 33.

On this stand will be seen a range of very high-class instruments, the majority of which are designed for use with modern transmitting equipment. A very interesting model is a special distortion factor meter, which is a mains-operated portable instrument measuring directly the total harmonic content in the output of audio-frequency oscillators and amplifiers and having a frequency range of 100 to 8,000 cps. fundamental.

MORRIS & CO (RADIO), LTD., Jubilee Works, 167, Lower Clapton Road, London, E.5. Stand No. 74.

Here will be seen the wide range of Premier components, including items for every type of receiver and transmitter. Among the new

MULLARD RADIO VALVE CO., LTD., 225, Tottenham Court Road, W.1. Stand Nos. 29, 30 and 99.

In addition to the well-known Mullard valves the Mullard Company will be exhibiting receivers and test equipment. A wide range of receivers is to be shown, including battery and mains apparatus, in which the push-button tuning device is prominently featured. In these receivers the push-button rotates the gang condenser which consists of two cylinders, one sliding inside the other, the capacity thus being varied by a "sleeve" action instead of the usual rotational movement. In the range of valves there is a special Red "E" series of valves specially designed for short-wave reception. The design is such that there

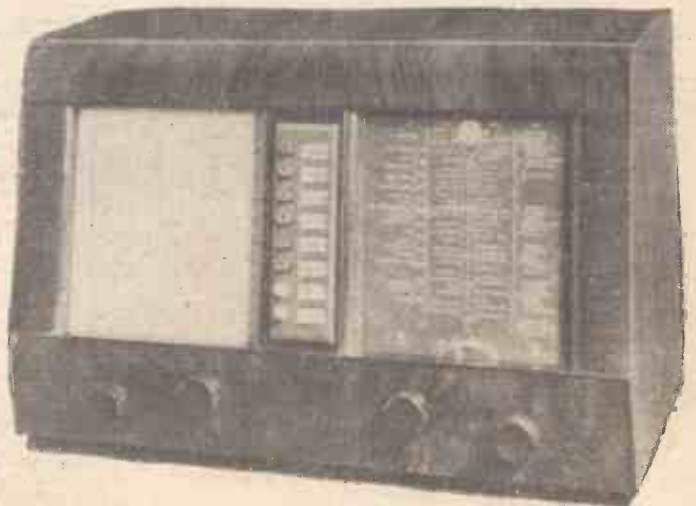


This neat television receiver costs 29 gns. and is a Marconiphone product. See it on Stand No. 65.

is a great reduction in noise on short-wave receivers and sensitivity is increased. Receiver model MASS is an interesting model, as it incorporates a single control by which all the normal operations are carried out. This receiver incorporates an inverse feedback circuit and a tone diffuser in the loudspeaker.

MURPHY RADIO, LTD., Broadwater Road, Welwyn Garden City, Herts. Stand No. 27.

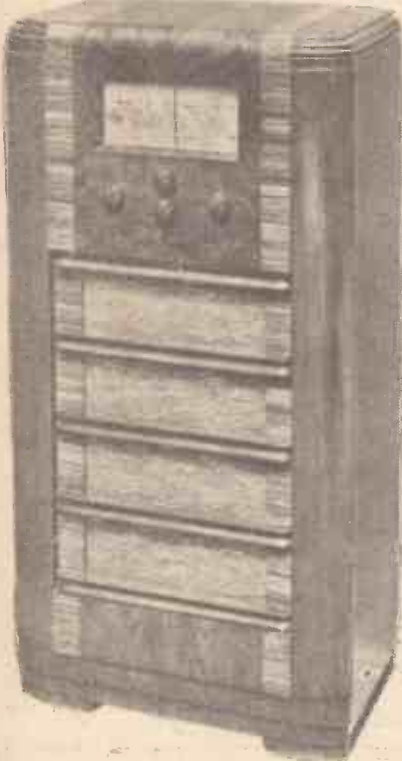
The main feature of the receivers to be shown on this stand is the effective cabinet design. The receivers are quite distinctive, and the cabinets have been designed to provide high-quality reproduction with all the usual cabinet faults eliminated. The tuning dials fitted to some of the models are also of interest, providing a full alphabetical index to the stations for easy location. Television receivers are also to be shown.



Push-button tuning is included in this K.B. receiver, which is to be seen with the above television receiver on Stand No. 41.

NEW LONDON ELECTRON WORKS, LTD., East Ham, London, E.6. Stand No. 34.

An exhaustive range of aerial wires and aerial equipment is to be exhibited here. The well-known Electron All-wave Long Distance Aerial, the Braided and Compounded Aerial, the special Earth Wire and the Globe Aerial are a few of the items to be seen again this year, whilst in addition there will be the Varial (a simple selectivity device), an earth mat, a Screened Superial, insulator pins, and a Simple Strip for wiring a receiver.



Substantial cabinet work is embodied in the Pilot receivers. See these on Stand 37.

PILOT RADIO, LTD., 87, Park Royal Road, N.W.10. Stand No. 37.

In the range of battery and mains table, console and radiograms to be seen on this stand push-button tuning will be featured under the title of "piano tuning." "Pilotune" press-button control is incorporated in other models, and a novel elliptical dial is provided in certain models in the interests of simpler tuning. The models range from a four-valve battery superhet to a 10-valve mains unit in which the wavebands covered extend from 4.5 to 2,200 metres in six bands.

PYE, LTD., Radio Works, Cambridge. Stand No. 31.

In addition to the new portable which will be seen on this stand, there will be an exhaustive range of receivers. Of outstanding interest are the special high-fidelity radiograms and consoles. These incorporate Planetary Selector Units, negative feedback and many other details. The Paramphonic Radiogram is claimed to have an amplifier with an effective response from as low as 1 cycle to 16,000 cycles per second. The circuits also include volume Expansion. Push-button tuning is also included on certain models.

RADIO-AID, LTD., 45, Duke Street, Oxford Street, London W.1. Stand No. 94.

MICROPHONES and deaf-aid equipment will be seen on this stand and a new radio-phonio transmission system will be demonstrated. This apparatus enables people to listen to radio programmes without the necessity of a loudspeaker baring forth. The arrangement incorporates an earphone fitted to an armchair under which is fitted a search coil. The chair may be placed in any part of a room which is wired and no connecting leads are thus needed.

RADIO-GRAMOPHONE DEVELOPMENT, LTD., Globe Works, Newtown Row, Birmingham, 6. Stand No. 36.

An interesting feature of this year's R.G.D. receivers is that provision has been made on all of them for operation by means of a special remote control



One of the Pye Battery receivers—model QAC 38. Note the design of the tuning dial.

REGENTONE PRODUCTS, LTD., Worton Road, Isleworth, Middx. Stand No. 45.

THIS exhibit will include a varied collection of mains equipment of all kinds: receivers with motor-driven and permeability push-button tuning; two battery portables, and mains transportables. In addition a novelty which will appeal to all users of receivers, which has been kept in the "hush-hush" class until to-day, will be shown for the first time, and we understand that it will create great interest among visitors to the Show.

ROTHERMEL, R. A., Rothermel House, Canterbury Road, N.W.6. Stand No. 80.

HERE will be seen the range of piezo-electric microphones and pick-ups. In addition there will be several amplifiers, headphones, faders, attenuators, gain controls and special cables. Of interest to the home-constructor is the announcement that at Olympia will be for the first time a new crystal pick-up head for use with existing apparatus. This will cost 27s. 6d., and is designed to be fitted to any existing carrier or tone-arm. The weight is only 3 ozs., and the output is approximately 1.5 volts.

ROSE (ELEC.), NORMAN, LTD., 43, Lamb's Conduit Street, W.C.1. Stand No. 87.

ON this stand the makers will be exhibiting a wide range of service equipment, test gear and associated equipment. Among the many items present are replacement components such as resistors, pilot bulbs, condensers, transformers, etc.

NEWNES LTD., GEO., Tower House, Southampton Street, Strand, London, W.C.2. Stand No. 9.

ON this stand you will be able to obtain a book or periodical on practically any subject. Messrs. George Newnes Ltd. undoubtedly publish more technical books dealing with radio and television than any other publisher, and in addition to the various books there is a complete range of blueprints to be obtained.

PRACTICAL AND AMATEUR WIRELESS, Practical Mechanics, Practical Motorist and The Cyclist are a few of the leading journals which will be on view. In addition, the wide range of handbooks, amongst which may be mentioned "The Wireless Constructor's Encyclopedia," "Everyman's Wireless Book," the "Television and Short-wave Handbook," "The Practical Motorist's Encyclopedia," "The Home Mechanic's Encyclopedia" will be on view and two new handbooks will be seen this year under the titles "Practical Wireless Service Manual" and "Wireless Transmission for Amateurs." "Sixty Tested Wireless Circuits" has been revised and will appear in an up-to-the-minute form, whilst specimen models of the receivers described in this issue will be on view for inspection. Mr. F. J. Camm and the technical staff will be available to answer readers' queries free of charge. Call and see us.

PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2. Stand No. 51.

AMONG the features to be seen on this stand will be motor-driven push-button tuning; new short-wave technique, and a new car radio. A new type of condenser is employed in the push-button sets and the buttons are so designed that each will control the full movement of the condenser. A simple method of station setting is provided. The short-wave performance of the new sets is improved by the incorporation of a new Silentrion valve. The new car radio provides an unusually high standard of reproduction, is simple to install, and has a much lower consumption than existing models. Large screen television will also be seen here.

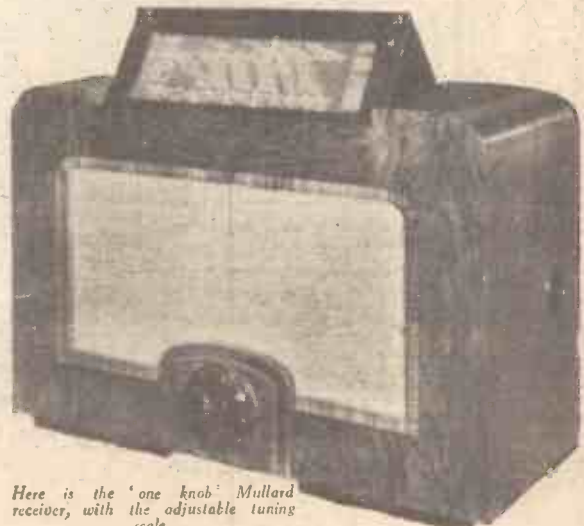


The latest in car radio receivers. The new Philips car radio costs 13½ gns.

unit. This will be seen in two forms, one for use on all models up to the 1153 radiogram and the other with an additional volume control for use on the two larger radiograms. One of these is shown on page 500. In these an interesting point is the incorporation of volume expansion. On other models the new "Auto-tune" dial will present a popular appeal. This has an additional pointer which simplifies tuning settings. In the luxury class Model 1295, at 95 guineas, has a 12-watt resistance-coupled push-pull stage, acoustically balanced pressure chamber (labyrinth) giving improved bass tone, a synchronised electric clock and an illuminated control panel with lamp operated automatically from the lid stay. The high quality delivered by the labyrinth method of cabinet construction sets a new standard for loudspeaker reproduction.

RADIO SOCIETY OF GT. BRITAIN, 53, Victoria Street, S.W.1. Stand No. 10.

AS usual, this stand will be devoted to an exhibition of transmitting and associated equipment designed by members. This will include a Utility Two transmitter, a 56 mc. crystal controlled transmitter, an impedance meter, signal generator, field-strength meter, etc.



Here is the 'one knob' Mullard receiver, with the adjustable tuning scale.



The control panel in this R.G.D. receiver is covered, when not in use, by a roll-top cover.

SCOPHONY, LTD., Thornwood Lodge, Campden Hill, W.8. Stand No. 22.

SCOTT INSULATED WIRE CO., Queensland Works, Westmoreland Road, N.W.9. Stand No. 8.

A COMPLETE range of silk insulated wire, cotton insulated wire and enamel insulated wire will be seen here. This is available in copper and resistance material, and of great interest to visitors will be the demonstration of silk covering which is to be carried out on the stand.

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4. Stand No. 16.

A COMPLETE range of the well-known Full O'Power batteries may be seen on this stand, the exhibit comprising types and sizes suitable for all makes of battery-operated radio receivers.

The Cadet series is intended for modest sets taking 6/7 milliamperes, the special series Super type for receivers taking from 9/10 milliamperes, and Power Type Triple Capacity for sets consuming 12/15 milliam-



Tannoy produce this novel loudspeaker which may be seen on Stand No. 70.

peres. In addition, there are special types of Double Capacity batteries for superhets, and receivers with Class B or Q.P.P. output stages.

The exhibit also includes Full O'Power pocket and torch batteries, dry cells, and a comprehensive range of "Crystacel" L.T. accumulators in glass boxes.

A special feature this year is being made of Tungstam valves for which Siemens are the sole distributors.

The literature available includes a useful reference list of special replacement batteries for various makes of sets, which will be very helpful to the public.

STEATITE & PORCELAIN PRODUCTS, LTD., Stourport-on-Severn. Stand No. 76.

MOST of this display will be devoted to a comprehensive range of insulators and insulating parts made in "Frequentite" low-loss ceramic

material. The range includes aerial and feeder cable insulators, bushings and stand-off insulators, coil-formers, trimmer bases, wave-change switch parts, end-plates and mounting bars for condensers, valve bases, etc. "Faradex," a material of very low-loss at high frequencies, is also to be shown.

STERLING BATTERIES, LTD., Sterling Works, Dagenham, Essex. Stand No. 59.

HERE will be seen a range of batteries of all types, products of this company. Some of the processes involved in the manufacture of the batteries will be demonstrated and should prove of interest to all battery users.

STRATTON & CO., LTD., Eddystone Works, Bromsgrove Street, Birmingham. Stand No. 77.

THIS stand will illustrate the vast range of short-wave components, all of which are made under the Eddystone trade-mark. The products will range from a miniature air trimmer to laboratory and transmitting equipment. In addition to many familiar items on this stand a number of new lines will be seen, and several receivers of interesting design are also to be exhibited. These include an "All-world Eight" as well as an "All-World Two," and of special value to the constructor is a chassis for a 4-band receiver in which a novel all-wave tuner and special die-cast I.F. unit are the main items. The tuning dial on this unit consists of a cylinder 10in. long, rotated by the wave-change switch and providing a separate scale for each frequency range. Calibrations are in metres and megacycles for the short waves and station names and metres for the medium and long waves. It tunes down to 13 metres.



Another fine example of modern receiver design in the R.G.D. range.

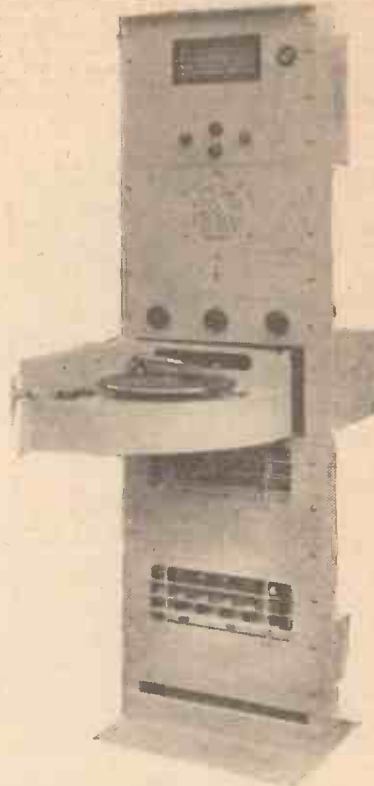
TANNOY PRODUCTS, Canterbury Grove, West Norwood, S.E.27. Stand No. 70.

THE main products of this company are for public-address work, and some interesting specimens are to be shown. These will include a novel loudspeaker which is illustrated on this page. This is so designed that the air column is of the co-axial re-entrant form. The frequency response is excellent for intelligibility and the speaker may be mounted on a car or any other desired position. In addition to this several other speakers will be shown, together with special amplifiers of all types and for all purposes. A power microphone is an interesting development, capable of fully loading a speaker without the use of an amplifier between the two sections. The output is stated to be comparable to that produced by the average 8-10 watt amplifier.

TELEGRAPH CONDENSER CO., LTD., Wales Farm Road, Acton, W.3. Stand No. 81.

A VERY complete range of condensers will be seen on this stand, and in addition to those which were seen in past years a number of new lines will be seen. These will include non-inductive tubular paper condensers, moulded mica condensers with wire ends, silvered mica condensers, ceramic precision condensers, dual wet (surgeproof) electrolytic condensers, surgeproof dry electrolytics, and high-

voltage condensers for television equipment. At the moment a number of these special items will only be available for set manufacturers, but they



For public address installation here is a Tannoy product.

will be eventually available for the home constructor.

TELEGRAPH CONSTRUCTION & MAINTENANCE CO., LTD., 22, Old Broad Street, E.C.2. Stand No. 78.

ON this stand will be seen many special metals developed and used in modern wireless and television apparatus. These will include Telcon materials such as Mumetal, Radiometal, Rhometal, etc. These are employed for the cores of input, microphone and other transformers, shields for C.R. tubes, screening boxes and similar apparatus. Also to be shown are many types of high-frequency cables such as are employed, commercially in such apparatus as relay works, trunk television cables and similar purposes.

TUCKER, GEO., EYELET CO., LTD., Cuckoo Road, Birmingham, 7. Stand No. 58.

THE products of this firm consist of press-ware of all kinds and include eyelets, solder tags and so on. The exhibits, of course, primarily of interest to manufacturers.

ULTRA ELECTRIC LTD., Western Avenue, Acton, W.3. Stand No. 50.

A RANGE of existing receivers is to be seen on this stand, and among the newer models will be several with push-button tuning. This will be seen in two forms, one in which the buttons are arranged horizontally, and in another they will be arranged in circular form. Finger-tip tuning and all-wave coverage are other features of these receivers, and two of the new models are rated to deliver an output of 8 watts.



Here is something new for constructors. A crystal pick-up head from Rothermels. See it on Stand No. 80.



Here is one of the Ultra push-button receivers.

VACUUM-SCIENCE PRODUCTS, LTD., 166, Weir Road, S.W.12. Stand No. 105.

THIS firm will be showing various types of photo-cells, various types of multipliers with a new type of grid control, a midget valve with an indirectly-heated cathode, a still picture transmitter for television manufacturers and various types of cathode-ray tubes. There will also be on the stand for inspection a high-pressure mercury vapour lamp.

VIDOR, LTD., West Street, Erith, Kent. Stand No. 46.

ON this stand two neat portables will be seen, one of the closed or "suitcase" type, and one of the open type which may be used open or closed. Both of these are of the battery-operated type. The remaining receivers in the Vidor range to be seen all include all-wave tuning, and in addition to these there will be seen a complete range of Vidor H.T. batteries.

WESTINGHOUSE BRAKE & SIGNAL CO., LTD., 82, York Road, King's Cross, N.1. Stand No. 35.

A FULL range of Westinghouse metal rectifier units for all purposes in radio and television will again be on view.

These include the high-tension and low-tension types for mains units, battery charging, and loud speaker pot supply: "Westectors" — the high-frequency rectifiers for detection, automatic volume control, battery economy, etc.; "H" and "J" types for television purposes — H.T. supply to cathode-ray tubes, time-base, picture shift circuit, etc.

A full range of commercial battery chargers will be on view,

one of which, the R.G.C.10, will be working to demonstrate the flexibility and ease of operation. All the standard models of this year will again be available for the coming season.

In addition to above there will be interesting exhibits of metal rectifiers, large and small, as supplied for broadcasting and other telecommunication purposes, such as those supplied in large quantities to the G.P.O. for amplifier equipment, etc., etc.

Copies of the latest edition (1939) of the well-known publication, "The All-Metal Way," will be available on request. This book contains an enlarged section dealing with rectifiers for television power supplies, complete with circuits.

WESTON ELECTRICAL INSTRUMENT CO., LTD., Cambridge Arterial Road, Enfield, Middlesex. Stand No. 83.

NO new instruments will be shown this year, but many of the old familiar models will be seen with improvements. A Sensitive Analyzer is probably the most interesting of these. This provides D.C. and A.C. voltage ranges, D.C. and A.C. current ranges, resistance measurements, output measurements and measurements of capacity. Extremely wide ranges are provided on each section, and at £16 10s. this represents a very valuable accessory for the dealer or service man.

WHITELEY ELECTRICAL RADIO CO., Victoria Street, Mansfield, Notts. Stand No. 26.

THE W.B. speakers need no introduction to our readers, and this year, in addition to cabinet

(Continued on page 599.)



A novel W.B. speaker cabinet.

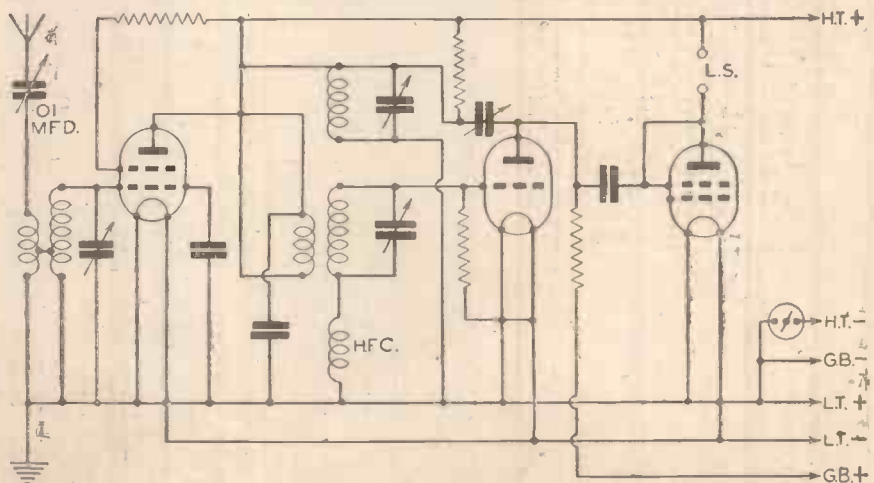
Our Annual Radiolympia Competition

25 W.B. SPEAKERS FREE

IN A SIMPLE FREE-FOR-ALL COMPETITION.

Once again we offer in our annual Radiolympia Competition, twenty-five W.B. Junior Loudspeakers in a simple competition free to every reader. This year you are invited to discover the number of mistakes in the circuit shown to the right. Our artist has been instructed to draw this circuit and deliberately to make a number of mistakes. You must redraw the circuit eliminating the mistakes and submit it to us not later than September 17th. The following are the simple rules :

1. The circuit appended must be stuck to a sheet of paper and the mistakes indicated on it in ink.
2. Readers may send in as many entries as they wish provided that the circuit appended is attached to each entry.
3. Entries should be addressed to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newman, Ltd., Tower House, Southampton Street, Strand, W.C.2, marking the envelope in the top left-hand corner with the word COMPETITION.
4. The prizes will be awarded to those whose corrected circuit most nearly complies with the correct circuit which we shall publish in our issue dated September 24th.
5. The Editor's decision is final and legally binding and this is an expressed condition of entry.
6. We cannot enter into correspondence regarding this Competition.



Competitor's Name.....

Address.....

.....

A FINE TECHNICAL LIBRARY OF STANDARD WORKS

	Price.	By Post.
Practical Wireless Service Manual	5/-	5/6
Wireless Transmission for Amateurs	2/6	2/10
Sixty Tested Wireless Circuits	2/6	2/10
Wireless Coils, Chokes and Transformers and How to Make Them	2/6	2/10
Wireless Constructor's Encyclopaedia	5/-	5/6
Everyman's Wireless Book	3/6	3/10
Television and Short-Wave Handbook	3/6	3/10

See them on our Stand 9, Ground Floor.

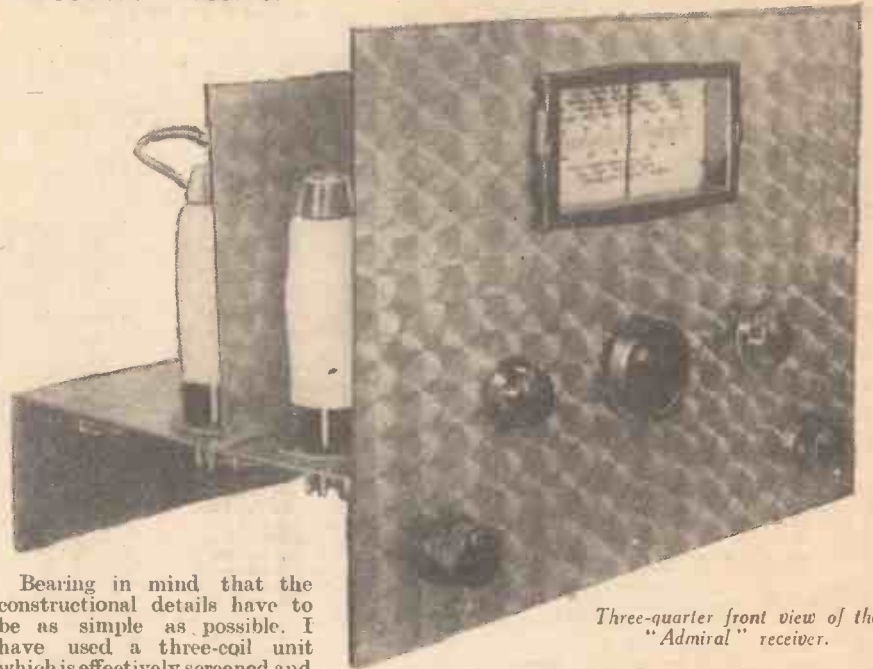
F. J. Camm's "Admiral" 4-valve Receiver

CONSIDERABLE controversy has raged round the question of superhet versus straight H.F. receivers, and in response to numerous requests, I have produced a design which I feel confident will prove that a receiver embodying two tuned stages of H.F. amplification is worthy of every consideration from those who require quality of reproduction combined with a high degree of selectivity and long-range reception.

Space forbids further discussion on the merits of the two schools of thought in this issue; therefore, a brief description of the "Admiral" must suffice and serve as its introduction. Complete constructional details, together with further illustrations, will appear in our next issue.

A 2-H.F. Two-band Broadcast Receiver

Receiver



Three-quarter front view of the "Admiral" receiver.

LIST OF COMPONENTS FOR F. J. CAMM'S ADMIRAL 4-VALVE RECEIVER.

- One coil unit—B.P.116 (Varley).
- One variable condenser—Baby gang, 3-section (Jackson).
- One micro-horizantal dial (Polar).
- Four valveholders (Clix).
- Terminal strips, A, A.1 and E, L.S., P.U. (Clix).
- H.F.C., H.F.10 (Bulgin).
- One switch—S. 139 (Bulgin)
- One aerial series condenser, type 451 (T.C.C.).
- One reaction condenser—Compax. 0002 (Polar).
- One volume control, 50,000 type B (Dubilier).
- Fixed resistances:**
- Three type F. 30,000 1 watt, three type F. 20,000 1 watt, two type F. 1,000 $\frac{1}{2}$ watt, one type F. 1,000 1 watt, two type F. .1 meg. $\frac{1}{2}$ watt, one type F. 50,000 $\frac{1}{2}$ watt, one type F. .5 meg. $\frac{1}{2}$ watt, one type F. 1 meg. $\frac{1}{2}$ watt, one type F. 5,000 1 watt (Dubilier).
- Fixed condensers:**
- One 2.0 mfd. type T.C.C. 50; one 1.0 mfd., type 341; six 0.1 mfd., type 341; two .05 mfd., type 341; one .005 mfd., type 451; one .0002 mfd., type 451; one .0001 mfd., type 451 (T.C.C.).
- Tone-control potentiometer, 25,000 type B (Dubilier).
- Chassis—14in. x 9in. x 3in. Alu. (Peto-Scott).
- Panel—14in. x 10in. Alu. (Peto-Scott).
- Four valves—Two VP210, one HL2, one Pen220 (Mazda).
- Fuse—100 mA (Microfuse).
- Fuseholder (Microfuse).
- One 120-volt H.T. battery and one 2-volt A.H. accumulator (Exide)
- One Stentorian loudspeaker (W.B.).

Bearing in mind that the constructional details have to be as simple as possible. I have used a three-coil unit which is effectively screened and thus reduces the need for external screening. Only one additional screen is used.

A metal chassis and panel is employed which, with the clean and neat layout, presents quite a professional appearance and renders the whole assembly most pleasing to the eye.

Circuit

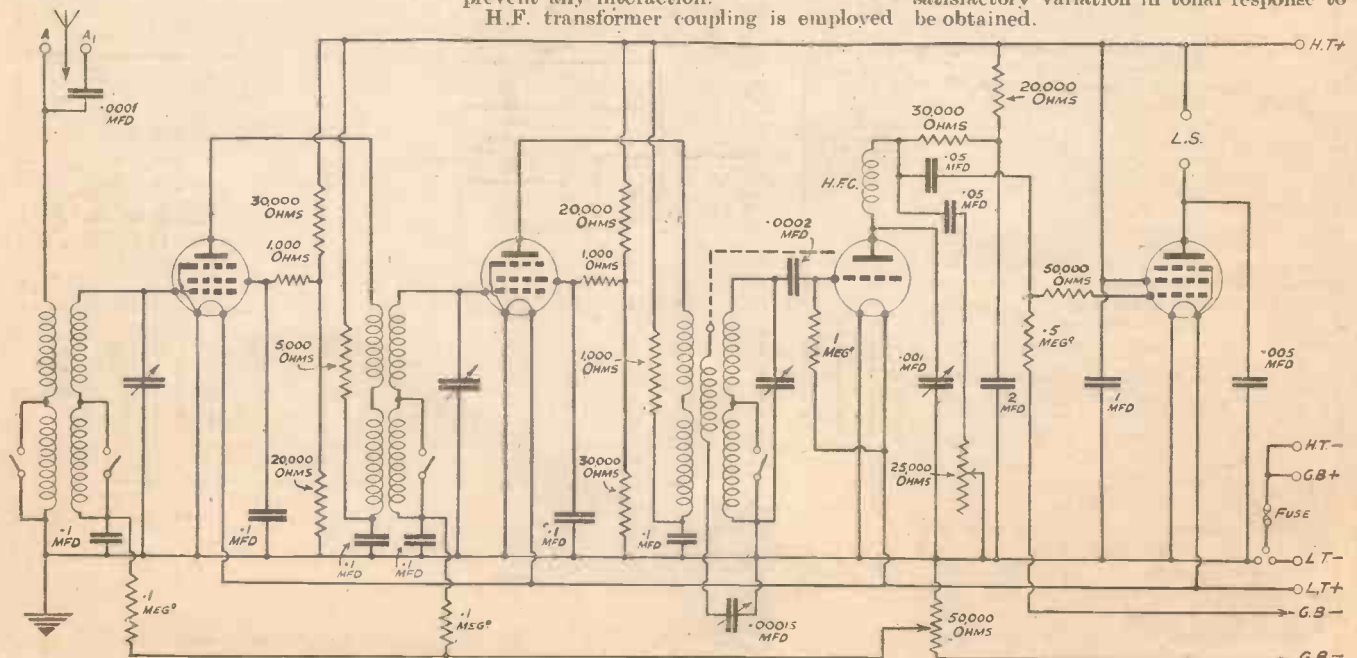
For the H.F. stages, two variable- μ H.F. pentodes are used, the bias being applied to them by means of a normal potentiometer across the bias battery, each circuit being adequately decoupled to prevent any interaction.

H.F. transformer coupling is employed

between the first two valves and the second and third, this bringing the signal to the detector stage in which a normal leaky-grid triode is used.

The output of the detector is fed into the L.F. pentode by means of a standard resistance capacity coupling, but in view of the pre-detector arrangements I have taken ample precautions to provide adequate decoupling.

An efficient tone-control circuit is embodied and this, together with the bypass condenser fitted between the output pentode, anode and earth, allows a most satisfactory variation in tonal response to be obtained.



Theoretical circuit. Note the optional reaction arrangements.



EST.
1919

OUR NEAREST BRANCH— YOUR NEAREST PILLAR-BOX

EVERYTHING RADIO · CASH · C.O.D. · EASY-WAY—(NO THIRD PARTY COLLECTIONS)

PILOT AUTHOR KIT

F. J. CAMM'S ADMIRAL 4
KIT "A" CASH £6:7:6 or 12/- down
balance in 11 monthly payments of 12/3.
Comprising all first specified parts for receiver
including drilled aluminium chassis and panel,
wire, flex and screws.
Set of specified valves 37/9, or add 3/6 to deposit
and to each monthly payment.

THREE-VALVE RECEIVER
KIT "A" CASH £5:14:3 or 11/- down
balance in 11 monthly payments of 11/-.
Set of specified valves 33/-, or add 3/3 to deposit
and to each monthly payment.

FLEET SHORT-WAVE 2
KIT "A" CASH 62/- or 6/- down
balance in 11 monthly payments of 6/-.
2 specified valves 22/-, or add 2/- to deposit and
to each monthly payment.

PYRAMID ONE-VALVER
KIT "A" CASH 47/- or 4/6 down
balance in 11 monthly payments of 4/6.
Specified valve 11/-, or add 1/- to deposit and to
each monthly payment.

JUNIOR CRYSTAL SET
Complete kit, comprising all parts for building,
including Metapax baseboard and drilled panel,
wire flex and screws. Cash or C.O.D. 28/9, or
2/6 down and 11 monthly payments of 2/9.
**DETAILED PRICE LISTS ON
APPLICATION.**

FREE. Send now for complete lists covering
Peto-Scott 1939 range of Push-Button,
All-wave Receivers, Experimenter Kits, Mains
Units, Speakers, A-C and Battery Amplifiers
and Short-wave Receivers.

B.T.S. TROPHY SHORT-WAVE RECEIVERS

TROPHY 5 Junior Communication Receiver (as illustrated).
Continuous wave-range 10-550 metres. Mechanical
bandspreading. A.V.C. and B.F.O. on-off switches.
Alternative scales now available calibrated in metres
or kc/s. Built-in speaker. Pleasing black crinkle
finish metal cabinet, size 17in. x 9in. x 8 1/2in.
deep. For A.C. mains 200/250 volts 40/100
cycles. **£9**

Guaranteed, fully tested. Cash or C.O.D. £9, or
yours for 10/9 and 18 monthly payments of 10/9.

TROPHY 3. Highly efficient self-contained short-
wave receiver. Speaker incorporated. Phone jack. Effective
wave-range 6.2 (television) to 550 metres. Supplied
with tuners for 12-52 metres.

BATTERY MODEL. Cash or C.O.D., £5 15 0,
or 7/- down and 18 monthly payments of 7/-.
A.C. MODEL. Cash or C.O.D., £6 6 0, or 7/6 down
and 18 monthly payments of 7/9.

N.B.—If coils required for complete coverage, 6.2-550 metres, add 16/9 to cash
prices or 1/- to deposit and payments. Complete Trophy Lists on request.



Peto-Scott MICROPHONE

For Home-broadcasting and P.A. Work

Recommended Transverse current type for use
with battery or A.C. Amplifiers. Can be attached
to your existing set via P.U. sockets. Provides
high-fidelity reproduction. On-off switch fitted.

Two models available, supplied
complete with matching trans-
former, 9v G.B. battery and 25
feet of flex.

TABLE MODEL as illustrated, 25/-
or 2/6 down and 11
monthly payments of
2/6. Chromium-plated
FLOORSTAND model,
42/- or 2/6
down and
11 monthly
payments of
4/-.



**2/6
DOWN**

1939 RECEIVERS

BUSH, B.T.S., COSSOR,
EKCO, FURGUSON, PYE

all available on lowest easy-payment terms.
SEND FOR COMPLETE LISTS
and purchase by the famous Peto-Scott
easy-payment plan. Strictest privacy
ensured with no third-party collections.

Peto-Scott PUSH-BUTTON Receivers



MODEL 9033 illus-
trated—a 4-valve
push-button all-wave
battery receiver, is
one only of a compre-
hensive range avail-
able for the new
season and represen-
tative of our usual
policy of supplying
modern and efficient
apparatus at prices
and terms within the

reach of everyone. You are urged to send
for the beautifully-illustrated catalogue,
post free on request.

MODEL 9062. Five-valve 6-stage A.C./
D.C. all-wave receiver. Wave-range 16-
2,000 metres. A.V.C. 2-watts output. 8in.
cone moving-coil speaker provides wonderful
reproduction. Manual tuning only (not
press-button). Beautiful walnut cabinet
similar to type illustrated but with tuning
controls below speaker fret. Price 8 gns.
or 8/6 down and 18 monthly payments of 10/3.

THE PILOT

SHORT-WAVE EXPERIMENTER

8-IN-1 KIT



You can build alternatively
8 short-wave receivers with
this popular kit. Many of
the components employed
are continually specified in
radio journals and further-
more by buying the comple-
te kit you save £2's on
your short-wave component
purchases.

We think we have aptly combined the original name of the
Peto-Scott "Experimenters' Kit" with that of the "8-in-1
Kit." Eight different circuits are provided for the con-
structor, including a simple reacting detector converter,
three valve Bandspread H.F. tuned detector pentode-output
receiver and an efficient battery operated four valver for D.X.
work. The 8-in-1 Experimenters' Kit is supplied absolutely
complete—there is nothing more to buy. Components are
all of well-known manufacture and for the alternative building
of 8 receivers the kit includes 8 low-loss coils covering 8-97
metres, four valves (comprising L.F., Detector, S.G. and
Pentode), drilled metal Chassis and Panel, black crinkle
Steel cabinet, set of eight blueprints and comprehensive
building instructions. For both the experi-
menter and the newcomer to the short-
waves the advantages in possessing the
8-in-1 kit can be readily appreciated. There
is another important factor—by buying the
complete "8-in-1 Experimenters' Kit"
you save money—you avoid the unnecessary
expense incurred by purchasing individual
—and probably unnecessary—components.
Invest in this new kit now. Complete Kit, £5. 15. 0 Cash or
C.O.D., or 7/6 down and 14 monthly payments of 9/-.

**7/6
DOWN**

For building alternatively, 8 Short-wave receivers—
any one available as a separate kit—but it's cheaper
to buy the ALL-IN-KIT. Described fully in the
Peto-Scott "Short Wave Experimenter" booklet
post free on request.

Anti-Noise

ALL-WAVE AERIAL

Minimises man-made electrical inter-
ference. Increases signal strength.

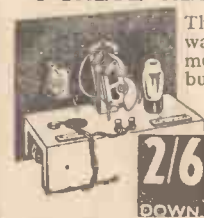
Improves selectivity.
Weatherproof outfit com-
prises set transformer with
changeover switch for short,
medium and long Waves, Du-
plex aerials, insula-
tors, waterproof
"lead-in" wire, with
instructions for
erection.

**2/6
DOWN**

Cash or C.O.D. 17/6
or 8 monthly pay-
ments of 2/6.



1-VALVE ALL-WAVE RECEIVER



This superior one-valve all-
wave receiver covers 18-2,000
metres. Extremely simple to
build—6 connections only
required for special all-
wave tuner incorporated.
Recommended for the be-
ginner or where an efficient
low-powered but low-
priced receiver is required
for all-wave operation.

KIT "A" comprises all parts for building
with drilled panel and chassis, drawings and
instructions. Cash or C.O.D. 29/6, or 2/6
down and 11 monthly payments of 2/9.
Efficient detector type valve 3/9 extra.

**2/6
DOWN**

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PLEASE SEND COMPLETE LISTS

Leaves from a Short-wave Log

Luxembourg on Short Waves

ACCORDING to certain Paris newspapers, as a result of an agreement reached between Radio Luxembourg and the Government of the Grand Duchy, permission has now been granted to the former to carry out broadcasts on a short-wave channel. Transmissions are therefore likely to be made in the very near future, but it is pointed out that for some time they will only be of an experimental nature.

Chiclayo on New Channel

THE Peruvian station OAXIA, *La Voz de Chiclayo*, which has been working on 48.78 m. (6.15 mc/s), has been reported to be testing on 24.98 m. (12.01 mc/s), in view of the congestion on the former channel. The studio is said to be on the ether daily from G.M.T. 00.00-04.00. Address: Apartado Postal, 171, Chiclayo (Peru).

La Voz de Valdivia

CD1190, a short-wave relay station of CD 69, Valdivia (Chile), now operating on 25.21 m. (11.9 mc/s) with a power of 250 watts, carries out three daily broadcasts, namely, between G.M.T. 16.00-19.00; 21.00-24.00 and from 01.00-04.00. Interval signal: Chimes. Man and woman announcers. Address: Radiodifusore CD 69 y CD 1190, Señor Alberto Carrasco, Valdivia (Chile).

Delete from Your List

ACCORDING to official publications the following broadcasting stations have now permanently suspended their transmissions: H14V, formerly on 46.51 m. (6.45 mc/s), and H18A, on 46.3 m (6.48 mc/s), both located at Ciudad Trujillo (Dominican Republic).

New Station in China

NEWS bulletins relative to the Sino-Japanese conflict in German, French, and English are now broadcast daily from G.M.T. 12.00-12.30 from XTJ, Hankow (China), on 25.66 m. (11.69 mc/s), 3 kilowatts.

More Broadcasts from Chile

A MEDIUM-WAVE station CB118, at Santiago (Chile), is stated to have recently inaugurated a short-wave transmitter CB1180, on 25.42 m. (11.8 mc/s). Address: Estación CB, 1180 (Markoff Hermanos Limitada), Santiago (Chile).

And Also from Costa Rica

T1XD, the medium-wave station at San José (Costa Rica), has added to its network a 200 watt relay (T12XD) operating on 25.15 m. (11.93 mc/s). The slogan of the studio coupled to the call is: *La Voz de la Republica*. Address: John Gilbert Daly, Station T12XD, Apartado Postal, 1729, San José (Costa Rica). The station was previously reported as located at Limón.

Broadcasts from St. Kitts

A LISTENER writes that he has picked up a transmission with the call VP2LO, which would appear to emanate from St. Kitts (British West Indies). The wavelength was 47.02 m. (6.38 mc/s).

Although not yet verified, it is believed that the station is on the air daily between G.M.T. 20.00-21.00; it is operated by the Caribbean Broadcasting Service. Reference to this transmitter has already been

made in a former issue of PRACTICAL AND AMATEUR WIRELESS.

La Voz del Corazon

AT Villarrica (Paraguay), the owners of the medium-wave station ZP15 have installed a short-wave transmitter, namely

ZP14 y ZP15, Señores Friedman Hermanos, Villarrica, Paraguay (South America).

As You Were!

RADIO SOFIA (Bulgaria) following a series of experimental transmissions on 35.44 m. (8.645 mc/s), in anticipation of the opening in the spring of 1939 of a 20-kilowatt short-wave transmitter, has now reverted to its former channel, 20.04 m. (14.97 mc/s).

The times of the broadcasts are as under: G.M.T. 10.00-12.00 and 15.00-22.00 on



Some of the competitors and officials round the television camera during the televising of the various events of the European Swimming Championships at the Empire Pool, Wembley, recently.

ZP14, working on 48.78 m. (6.15 mc/s) with a power of 200 watts. In announcements both call-signs are mentioned with the slogan: *Radio Cultura, La Voz del Corazon et Sud America*. Broadcasts are occasionally heard from G.M.T. 22.00 onwards. The station closing down towards G.M.T. 03.00. Address: Estaciones

Monday, Wednesday, Friday and Saturday; G.M.T. 18.00-20.00 only on Tuesday and Thursday. On Sundays and Holy Days an early transmission is made between G.M.T. 05.30-13.00, and the afternoon session, starting at 15.00, lasts until 21.30. Woman announcer. Call: *Radio Sofia*. Address: 19, Moskovska St., Sofia (Bulgaria).

FEATURE FILMS

WITH uncanny regularity the film industry finds something in the television service to which they take exception. The latest is feature films, for the B.B.C., as an experiment, televised a full length film as a Sunday evening programme. The idea was a good one and seemed to find favour with the majority of viewers. As far as the film papers are concerned, however, they state that film television is looming as a new aspect of B.B.C. policy and this first feature broadcast may set the pace for regular transmissions with serious implications for the industry. There is no doubt that the whole position needs regularising, but it should be pointed out that the first experiment was undertaken with a foreign film at least four years old. The B.B.C. have tried repeatedly to reach some form of mutual understanding with the film industry, but so far without success, although they offered to show excerpts from current films in order to publicise them. It is fantastic to keep talking of television as being a menace here and a

menace there; it is developing rapidly both technically and in programme value and the sooner a happy co-operative spirit is engendered by those who feel that television may cause them inconvenience, the better it will be for all concerned. In this connection it was gratifying to find one leading film paper put forward a good suggestion the other day. They stated that the time was ripe for an investigation to examine the possibility of converting television, at least to some extent, into an ally. It was felt that one excellent opportunity was through the medium of big-screen television equipment, which has already been installed in some cinemas. The idea put forward was for the formation of a negotiating committee to draw up a "pact of mutual assistance" with the B.B.C., with the object of securing the right to re-diffuse in cinemas televised items of wide popular appeal. Whether this will culminate in a separate service for cinemas is largely a matter for the Postmaster-General and it would be more satisfactory to have this whole position aired and settled satisfactorily at once than to wait until the television industry has grown to very large proportions.

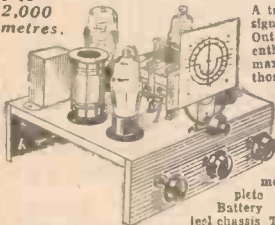
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BARGAIN—
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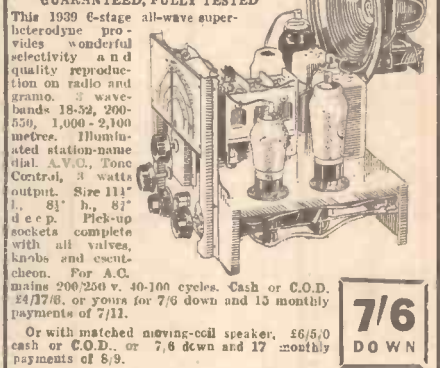
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SPECIAL ANTI-BLIND SPOT CONDENSER, 3 calibrated scales.
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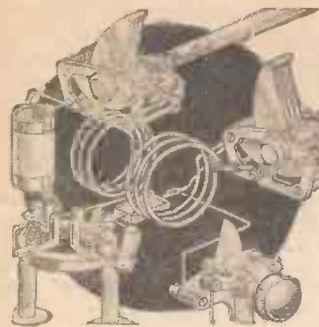
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Short Wave Section

SOME TECHNICAL CONSIDERATIONS

Practical Suggestions on the Choice, Layout and Operation of Components to Ensure Improved Reception on the Short and Ultra-short Wavebands are Given in this Article.
By A. W. MANN

SPECIALLy designed components, improved methods of construction and production, together with most exacting methods of testing, have done much to reduce the possibilities of erratic and unsatisfactory operation, which was often the experience of short-wave home constructors and experimenters. Consequently, the performance of a sponsored design can be taken for granted, provided the designer's instructions and recommendations are noted and adhered to in every way.

When, however, the experimenter specialises in the design and construction of purely experimental receivers, snags are invariably experienced, and the writer feels safe in assuming that the percentage of experimental receivers, built from components to hand, which function in every way exactly as a good short-wave receiver should without adjustment or further alteration after first switching on is very small indeed.

A few years ago we were content if our receivers functioned efficiently between 16 metres and 100 metres. Nowadays, a range of from 9 metres to 180 metres is desirable, and recent experiments show that using low-loss ceramic insulated tuning condensers, a ceramic insulated coil-holder, and valve-base plug-in coils, it is possible to obtain oscillation in the region of 4½ metres to 5 metres.

Layout and Wiring

In order to achieve this, however, careful layout and the minimum of wiring is essential, and such apparatus is, in fact, ultra-short-wave apparatus adapted to suit the higher short-wave bands.

Generally, however, a 9-metres minimum should be aimed at with a view to receiving the various 9.4-metres American experimental transmissions as radiated by commercial stations, in addition to the reception of world-wide 10-metres transmissions.

The fact that it is desired to receive ultra-short as well as short-wave transmissions introduces complications in design and construction. For example, it is accepted and sound practice to use self-supporting coils of about ½ in. diameter and of comparatively heavy gauge wire for ultra-short-wave reception.

As we desire to receive also on wavelengths up to 180 metres, the idea of fitting dual coil-mountings, i.e., a ceramic four- or six-pin coil-base in parallel with a four- or six-socket ultra-short-wave coil-base comes to mind.

Condenser Capacities

This idea can in some instances be made to work. The additional wiring between the two coil mountings, however, introduces considerable losses, even when shortened to extreme limits, and although workable, must be regarded as a compromise.

Now comes the problem of tuning capacity. Tuning condenser capacities of

.00005 mfd. are recommended. Obviously in the case of full S.W. range receivers this capacity value will call for additional coils in order to cover the higher ranges. Selectivity on the higher ranges will thus be affected.

From the theoretical point of view, a capacity of .0001 mfd. is unsuitable for ultra-short-wave reception; nevertheless the writer has found it possible to receive below 10 metres using a tuning capacity of .0001 mfd., a modified 15 mmfd. band-spreading condenser, and standard plug-in coil formers. It must, however, be admitted that careful attention was paid to layout and wiring of the receiver, and careful choice given to the type of detector valve used.

The latter was, however, of standard HL type. A ceramic coil-base and valve-holder were also incorporated.

H.F. Chokes

One of the snags experienced with experimental ultra-short-wave receiving apparatus centres around H.F. choking. When it is desired to tune from 4½ metres to 180 metres, there is a problem to solve.

There are a number of single H.F. pile-wound chokes of various makes which will prove to be most efficient from 5 metres to 180 metres and entirely free from peak resonance points.

The Eddystone No. 1010-5-180 metres type is strongly recommended. Such components, however, should be carefully handled, as the choke windings are of fine-gauge wire soldered to heavier-gauge short connection wires.

To those who are making their first ultra-short-wave and short-wave combination type receiver, adapter or converter, metal panel and chassis construction is not recommended. Condenser extension rods, a wooden chassis and panel are advisable.

Ceramic coil-bases and valveholders, together with special ceramic end-plate type tuning condensers, should be used to reduce losses to the minimum.

Condenser Mountings

This brings to mind the subject of condenser mountings. There are various makes and types of mounting brackets available. Both adjustable and non-adjustable as regards height.

When using an Eddystone type bracket, together with a tuning condenser of the same make, everything is straightforward

and trouble-free. If, however, it is desired to use them in conjunction with the Ray-mart RMX or Premier Trolitule type condenser, a snag arises and some modification is necessary.

For example, twin nuts are fitted to the condenser bushes which are of the one-hole fixing type. The back nut which holds the moving plates assembly in place is the thicker nut of the two. The thinner nut being for panel-mounting the condenser.

The combined thickness of the back nut and mounting bracket is such that it is, at the most, only possible to obtain a purchase of one thread if an attempt is made to fix the condenser in place. Now one thread is insufficient, and any attempt to tighten up will result in stripped threads on bush, nut, or both. If, however, these condensers were mounted on a 20-gauge metal bracket or panel, everything would be satisfactory, as they are obviously intended for this purpose, and designed accordingly.

The most satisfactory modification is to reverse the locking (thick) and fixing (thin) nuts, using the latter as the assembly-holding nut and the former as the panel-fixing nut. The accompanying sketch will make the necessary modification clear.

A.C. Operation

The operation of short-wave receivers from A.C. mains is one of increasing interest. There are, no doubt, many who have endeavoured to adapt existing receivers to mains operation and have failed or achieved but a small measure of success.

When we come to consider A.C. operation, we think of A.C. mains hum and its elimination. If the receiver is to be all A.C. operated the possibilities of hum are increased, and due precautions must be taken to safeguard against it, and provision should therefore be made for additional smoothing.

It is a good plan to change the detector valve, especially if this is of the S.G. type. Hum is in some instances accentuated due to pinch leakages in the detector valve, and having found a satisfactory substitute stick to it, and if H.F. valves of the same type are used, replace them with the same make as the detector. To test for this fault, note if hum is increased when reaction is applied.

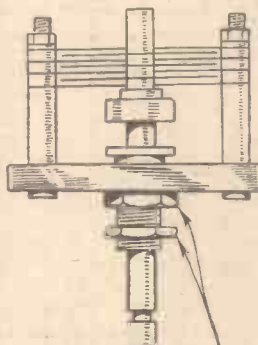
H.T. Eliminators

Now we come to the problem of operating battery type S.W. receivers from A.C. mains for H.T. supply. The majority of standard eliminators are not suitable or designed for this purpose. Nevertheless, some of those produced years ago and in the then high-price class, and employing valve rectification, will, with a new rectifying valve fitted, be found suitable for hum-free headphone operation on short and ultra-short waves, provided decoupling and choke output arrangements are incorporated in the receiver.

In the case of existing H.T. eliminators, where it is found that A.C. hum is not too pronounced, additional smoothing arrangements suggested in past issues of PRACTICAL AND AMATEUR WIRELESS will prove effective.

The H.T. eliminator correctly applied to a short-wave receiver is, in the writer's opinion, the finest combination, together with accumulator L.T. supply, one can have, because it assures constant and never-failing voltage and a dead silent background.

In conclusion, a note of warning. If an H.T. eliminator is to be used with S.W. and U.S.W. receiving apparatus for headphone reception, incorporate choke output arrangements in the receiver in the interests of safety.



REVERSE THESE NUTS (SEE TEXT)

A condenser fixing modification for use with mounting brackets.

What Will Radiolympia Offer the Constructor?

THE curtain has gone up and the show is on. What a day of hustle and bustle. Eager crowds surging along the wide avenues between the stands, which look so spick and span with their exhibits, decorations and paint, as yet untouched by the crowds and the atmosphere. Salesmen, sales managers, and directors all looking very much alive and ready for the fray. Each one hoping that this year is going to be a record, and trying to look as though they are not examining the stands of their nearby rivals.

The same old atmosphere, the same old building; the crowds even seem to be the same, but the exhibits are, thank goodness, somewhat different to look upon.



A Westinghouse metal rectifier—Model HT17—giving an output of 200 volts 100 mA after smoothing.

On Stand No. 9 we were all ready and waiting for the speakers to boom out eleven o'clock, and it seemed that the last stroke had hardly faded away when our first visitors were holding out their hands for the usual bargain of periodicals which is given with certain current issues. The stacks and stacks of supplies soon began to decrease at a rate hardly credible to those who have not experienced exhibition work.

Fortunately, I am free to come along with you round the show, so let's get busy before all the avenues get too packed.

Accumulators and H.T. Batteries

Quite close to No. 9 is Stand No. 15. Here we can see all the latest products of the makers of the famous Exide batteries. Accumulators in amazing numbers. From the tiny unspillable cells for deaf-aids and portables to those massive looking things for house lighting installations. If you want to know anything about the construction of an accumulator, well, now is your chance to examine all details. Dry H.T. batteries, and their like, can also be seen, and as the makers list a type for practically every make of receiver on the market, they can satisfy any wants you may have in that way.

Meters

Next door to the Chloride stand is Messrs. Ferranti (No. 14), and as we can't afford to miss a chance of seeing their latest products, let us go over to their counters. Television and radio receivers, meters and transformers are there for our inspection,

In the first part of our tour, which was described in the last issue, stands exhibiting push-button units, small components, short-wave accessories, variable condensers, fixed condensers and electrolytics, and loud-speakers were visited.

though I am sure that the last two items will prove the greatest attraction so far as we constructors are concerned. Good meters and transformers are always items we can do with and gloat over; if they are made by Ferranti there is really no need to stipulate "good" as the very name is a sufficient indication and guarantee. Now come to Stands Nos. 4 and 5 and meet some very old friends of the constructor fraternity, namely, Messrs. Belling and Lee. Since the earliest days of radio they have always supplied a most useful range of connectors, plugs, terminals, and such like, but this year they are not only exhibiting a more extensive range but are also including all their anti-interference devices and television aerial arrays. As with their original products, they are looked upon as specialists in the last two developments, and it is interesting to hear the effect of various types of interference eliminators which they are demonstrating. A few minutes spent on these Stands will convince you that there is no need to have your reception, broadcast or short-wave, ruined by man-made static interference.

Metal Rectifiers

As we continue our tour, stopping here and there to examine the construction, finish and lines of some of the receivers, which, personally, I find to be most instructive and interesting, we shall come across another very old supporter of the con-

structor movement, the makers of the Westinghouse Metal Rectifiers, on Stand No. 35. Rectifiers from the minute little units for use with D.C. meters to those rather unimportant-looking specimens for use with cathode-ray tubes are displayed, and no constructor can fail to be interested in one or more of the various products. H.T. eliminators, L.T. chargers, Westectors to replace detector valves, rectifiers for A.C./D.C. receivers, and H.T. battery chargers are but a few of the items so closely associated with Westinghouse. If you are contemplating any modifications or additions to your installation or equipment so far as rectifiers are concerned, then here is your chance to get first-hand advice on the matter. By the way, don't forget to bring away a copy of their "All-Metal Way," a little booklet full of valuable information and diagrams.

To leave components and accessories for a few minutes, let's go over to Stand No. 88 and browse over the exhibits of Messrs. Armstrong and Co. There are occasions when even the most ardent constructor cannot spare the time to make up a complete receiver, or when it is desired to make use of some particular cabinet to house a receiver, and, therefore, one does not wish to buy a commercial receiver complete with cabinet. In such circumstances, Messrs. Armstrong can provide the solution as they specialise in producing most efficient receivers in chassis form which, from the examples they are showing, allows one to select a model to satisfy both specification and size requirements. There are battery and mains operated models, and the design, finish and construction leaves nothing to be desired, while the prices are certainly most reasonable. When purchasing one of their chassis, one has the satisfaction of knowing that all testing has been done, so it is only a matter of housing it, and getting on the air right away.

Playing Desks

Speaking of receivers makes one think of radiograms, and in this direction a visit to the Stand of Messrs. Cosmocord (No. 67) is suggested. Here we can see several examples of their neat and efficient Playing Desks, which again allows the constructor to jump a step and convert his receiver into a complete radiogram without carrying out any work. A few minutes' inspection of the models will soon prove that such an easy conversion does not mean a "bits and pieces" arrangement, as the size, finish and construction of the "Desks" are such that they are worthy of being used in conjunction with any good-class modern table model receiver. The model No. 876 is outstanding as regards price, bearing in mind that it is only £4 7s. 6d.

Pick-ups, crystal and magnetic, are also on show on the same Stand.

Testing and servicing are items ever before us, and as these need meters or universal testing apparatus, a visit to the Stand of the makers of the famous "Avo" testing instruments will be most interesting and instructive. The Stand No. is 21.

(Continued on the opposite page)



The "Cosmocord" Playing Desk and record cabinet, Model 130.

ELECTRADIX

3/9
Post
Free



A BARGAIN IN MILLIAMMETERS
8 m/a back of panel illuminated type for D.C., 970 ohms. Plain slot scale, 1" needle with mica panel, back lamp and bracket. Neat, compact job by famous English maker. Can be used as voltmeter with extra res. 3/9 Post Free. Bulgin 8 m/a nudgets, flush, nickel 8 m/a., 6/-; Sifam bakelite, 13" to 10 m/a., 8/6. All other

ranges in stock. Hundreds to select from.

SET EXPERIMENTERS' BARGAIN. New Tuning Meter Movements by first-class maker, pivoted skeleton type D.C. 0.8 m/a., 970 ohms, slotted plain scale 1in., needle 1/4in. long. Size 2 1/2in. sq. with 2in. mica panel back lamp and bracket, 3/9. Post free.

SWITCH DIALS. 10-point Finger Switch Dials, as illus., used on G.P.O. Automatic Telephones. These have spring drive, governor, clutch and contact inside. Price 2/6.



AUTOMATIC SWITCHES. Relay operated, 8 arms., 25 ways each, platinum contacts, G.P.O. model, 10/-.

HAND COMBINATION MICROTELEPHONE. Transmitter and Receiver. For use on any bell circuit, 7/6. **POCKET HEADPHONES, W.D.** all leather headband, strap and cords, 2/6 pair. L.R. type with aluminium headbands, 2/9. Brown's lightweight 4,000 ohms, 4/8. House, Office and Field Telephones, wall and table, 10/- and 15/-.

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DIX-MIPANTA VEST POCKET TESTER. A versatile moving-iron multi-range meter for service on A.C. or D.C. THREE ranges of volts: 0-7.5, 0-160, 0-300. Used for MILLIAMPS, reads: 12 1/2 ma., and 75 ma. In black bakelite case, 2 1/2 in. by 2 1/2 in. with pair of test leads and plugs, 19/8.



WIND DYNAMOS for windmill drive, 6 volts, 10 amps, slow speed, 35/-; Lucas Aero high speed, 6 volts, 5 amps, and 800 volts, 80 ma., 25/-; Electric Pumps deliver 120 galls. to 6 ft., A.C. or D.C., 67/6. Electric Air Compressors for paint spray, etc., 25/15/-; Parcels of Experimental Old Cells, Magnets, Chokes, Wire Switches, Terminals, etc., post free, 10 lbs., 7/-; 7 lbs., 6/-.

SMALL D.C. DYNAMOS. 110 volts 1 amp., 15/-; 200 volts 1/2 amp., 17/6; 200 volts 1/4 amp., 26/-.

MOTORS. All sizes from 1/40 h.p., 15/-; 1/2 h.p. D.C. Motors, 25/-; **MORSE KEYS.** Air Force Keys with indicator lamp, K.B.S.L., 7/8. Practice Sets, complete with buzzer, 4/6.

LIGHT RAY CELLS. Selenium, 7/8; Raycraft outfit with relay and amplifier, 45/-; Photocells, for sound on Film, Television and Ray Work, R.C.A., 25/-.

AMPLIFIERS, to work relay with above; Battery 1-valve, with holder, trans. and switch. Oak case, 25/-; A.C. Mains Model (Phillips), in steel case, 60/-.

1,000 other Bargains in New Sales List "N", Post Free.

ELECTRADIX RADIOS

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

Telephone: Central 4611

GUIDE TO THE SHOW

(Continued from page 591)

extension speakers, public address loudspeakers and amplifiers, relay cabinet speakers, manufacturers' stripped chassis speakers, valveholders, switches, mouldings, stampings, loudspeaker cones, there will be, of course, a range of the Stentorian chassis speakers which have become so well known to our readers. Four new items will be of particular interest. One of these is the Stentorian Pendant cabinet speaker, which is of triangular construction and is fitted with a hook at each side for hanging to a picture rail. The cabinet front faces downwards for correct sound diffusion into the room. There will also be a Pedestal Table and a Coffee table fitted with a speaker beneath the top surface. All models of the cabinet speakers, except the Baby, have a three-winding distortionless volume control in which is embodied a switch for optional use of the Long-arm remote control. There will also be a range of domestic receivers and public-address amplifiers all designed with a particular view to obtaining the utmost quality of output.

WINGROVE & ROGERS, LTD., Mill Lane, Old Swan, Liverpool. Stand No. 106.

HERE will be seen the existing range of Polar, Polar-N.S.F. and Wearite components. In some of these, interesting price variations have been made. Among these components will be seen gang condensers, drives and dials, reaction condensers, volume controls, tubular condensers, resistors and grid-leaks, electrolytic condensers, tuning coils and test instruments. In the Wearite range of test equipment are a number of units which will prove of value to the keen experimenter as well as to the service man or dealer.

FLASHES FROM THE SHOW

SEE the new tuning condenser incorporated in the Mullard and Philips Receivers.

A CRYSTAL pick-up head which may be used with an ordinary type gramophone may be seen on the Rothermel Stand.

DO not fail to call at our Stand, No. 9, and see the new receivers described in this issue. Our two latest handbooks are also on sale there—The Practical Wireless Service Manual and the Amateur's Guide to Transmitting.

NEW types of valve may be seen on the Philips and Mullard Stand. These are designed to provide better short-wave reception.

PUSH-BUTTON tuning for the home-constructor is now possible. See the push-button units on the Bulgin Stand.

SMALL-PICTURE television receivers may be inspected on the H.M.V. and the Marconiphone stands. They are the cheapest yet!

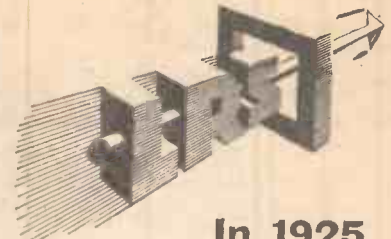
WHAT WILL RADIOLYMPIA OFFER THE CONSTRUCTOR ?

(Continued from previous page)

Such instruments are rather too comprehensive to describe in these columns in detail sufficient to do justice to the products, therefore, while at the Stand, examine all the models and note the amazing number of applications for which even the moderately priced instruments are designed. There is no need to fiddle about and guess when testing a receiver, amplifier, or transmitter, when such efficient apparatus is available at prices to suit all pockets, and no self-respecting constructor should be without at least one instrument of this type of proven reliability.

Although we have by no means visited all the Stands exhibiting items of great interest to the constructor, space prevents us from giving mention to them all.

In case you do forget, let me remind you that Stand No. 9 will be the meeting-place of all keen constructors, and that a warm welcome awaits you there.



In 1925

the London Radio Supply Company was founded to give genuine SERVICE to the Wireless Enthusiast.

The policy of this firm was to offer goods of the highest quality and reliability on terms so favourable and with deliveries so prompt that no keen constructor, experimenter or listener need be without the means of satisfying his urge to become one of the great army of radio-minded citizens.

So there was built up a reputation which has stood the test of thirteen difficult years—without a break—through trade depressions, cut-throat competition and scientific progress with its consequent change in the enthusiasts' requirements.

Always the 'square deal with quick deliveries' policy has been carried out whilst keeping abreast of the times, and to-day L.R.S. is still recognised as the firm to which you may go for anything radio or electrical with complete confidence that you will be really satisfied.

Unlike purchasing through an ordinary Radio Shop, the London Radio Easy Payment Service ensures the strictest privacy in all transactions. There are no dealings with Finance Companies, etc., all instalments being payable direct to us. Cash or C.O.D. orders receive the most careful and prompt attention obtainable anywhere, and all goods are despatched Carriage Paid.

Stocks are maintained of all well-known Sets, Radio-grams, Speakers, Valves, Components, etc., besides all PRACTICAL AND AMATEUR WIRELESS kits throughout the season.

A complete range of McCarthy & Armstrong Chassis and Receivers are demonstrated daily in our Showrooms—you are cordially invited to call and hear them for yourself, without any obligation to purchase.

We also supply Electric Clocks, Fires Table and Standard Lamps, Fans, Vacuum Cleaners, and all domestic Electrical Equipment, all well-known makes being available for Cash or C.O.D. or on specially favourable terms.

Whatever your requirements—write, call or 'phone for our quotation.

3 MINUTES FROM STAMBS

LONDON RADIO SUPPLY COMPANY 1925

ESTD 1925

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STANLEY BARNETT



Stanley Barnett.

A BRIEF BIOGRAPHY

STANLEY BARNETT, whose popular band at the Café Anglais, London, was heard over the air recently in "The Dansant," in the Regional programme.

Stanley studied the violin under Paul Belinfante, the well-known broadcasting violinist and orchestra leader. He formed his own band at the age of twenty. After playing at all the principal towns throughout the country, he took his lads—all in their early twenties—to Copenhagen, and then on to Finland (Helsingfors and Riga), where it proved a little too cold for them.

Later he went to Berlin, where he met and married a German girl and was in the thick of political riots, just missing a street shooting episode by mere seconds. Stanley Barnett will always remember his wedding day in Berlin. He had decided to hold a celebration party at the Restaurant Palais-Am-Zoo, and just as he was on his way from one side of the street to the other, there was a clash between Communists and Nazis, involving shooting. It was an hour or so before police cleared the square sufficiently to allow the wedding guests to go to the reception.

Returned to London and, after important engagements, was spotted by an impresario, who brought him to the notice of Ambrose, dance music maestro. Ambrose engaged Stanley on the spot, and appointed him to the post of director of Ambrose's "Blue Lyles." Barnett then went to Monte Carlo and spent a short season in Cannes, returning to take up work at Blackpool.

When the band went to Copenhagen, after three and a half years at Blackpool, Stanley Barnett took with him the first woman crooner, Aida D'Amato, sister of the famous Chappie D'Amato. By the way, all the six original members of Barnett's outfit are now leaders of their own bands!

NOW READY!

WIRELESS COILS, CHOKES AND TRANSFORMERS, AND HOW TO MAKE THEM.
Edited by F. J. CAMM.

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

ASHTON AND DISTRICT AMATEUR RADIO SOCIETY

ALTHOUGH only formed a few weeks ago the membership already numbers fifteen, nine of whom hold radiating permits. There are several A.A. men among the remaining members.

Membership is not confined solely to amateur transmitters, but is open to anyone genuinely interested in short-wave amateur radio. Prospective members are invited to communicate with the secretary, or to attend one of the meetings which are held fortnightly at the QRA of the Treasurer, Mr. N. Dunkerton (G3NX), Commercial Hotel, Old Street, Ashton-under-Lyne. The next three meetings will be held on August 31st and September 14th and 28th next, and will commence at 8 p.m. Morse practice is given from 8 p.m. until 8.30 p.m., and anyone interested is asked to bring along a pair of 'phones.

It is proposed to hold a Field Day in September, and details will be published later.

Secretary, K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

NEWCASTLE AND DISTRICT SHORT-WAVE CLUB (FORMERLY NEWCASTLE RADIO SOCIETY)

THE above-named club has now decided to devote all its time to short-wave work. At the monthly meeting, Mr. G. C. Castle resigned the secretaryship,

CLUBS AND SOCIETIES

as he will be unable to give his full attention to the activities of the club. Mr. K. Scott was then elected hon. sec. pro tem. Recent meetings have been devoted

to the building and testing of receivers ranging from 5-94 metres. A full programme is being drawn up for the winter session. The next club night will be held on September 4th at the hon. sec.'s address, from 6 to 9.30 p.m., and a cordial invitation is accorded to local enthusiasts. Membership is free.

Hon. sec., K. Scott, 1, Farquhar Street, Newcastle-on-Tyne, 2.


ROMFORD AND DISTRICT AMATEUR RADIO SOCIETY


THIS club has settled down in its new headquarters, and has increased its activities. A team was entered for the DF competition organised by the Brentwood Society, and obtained third place. At the last meeting all members joined in a technical "bee," in which technical questions were asked and answered by members called upon. (The club amplifier should be working very shortly.)

Meetings are held on Tuesday evenings at 8.30 p.m., at the Red Triangle Club, North Street, Romford.



Sec., R. Beardow (G3FT), 3, Geneva Gardens, Chadwell Heath.

Every constructor already has a speaker. Why does Mr. Camm


 include a new one in each specification? Because however


sensitive his receiver,  its results could be spoiled by a

speaker with poor response to weak signals. Because however


good  his set's reproduction,  it could sound


lifeless through a mediocre reproducer. So he always specifies

a speaker he knows—  the most widely used by expert

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which is regularly copied by British and foreign makers—a

Stentorian. Your set  would be grateful if you bought

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at entertainment value—more  entertainment from

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Varley COIL UNITS

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Exhibition Sets

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Camm's Admiral 4-Valve Receiver

The B.P.116 Coil Unit was specially selected for this receiver. Unit comprises one aerial coil and two intervalve H.F. coils complete with screened anode leads. Covers medium and long-wave bands and switch has three positions to control external on-off or radio-gram switch.

B.P. 116 THREE GANG COIL UNIT

PRICE

21/-

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Press Button 3-Valve Receiver

The well-known Varley B.P.114 coil unit is featured for this receiver. Built on similar principles to the B.P.116 coil unit.

B.P. 114 TWO GANG COIL UNIT

PRICE

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Write for complete catalogue of L.F. Transformers, Chokes, Coils, etc.

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Please forward complete catalogue of components.

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P.W.



Impressions on the Wax

A REVIEW OF THE LATEST GRAMOPHONE RECORDS

Decca

IN the "permanent" music series the Decca Company have recorded "Beethoven Symphony No. 7 in A major, Op. 92," on five 12in. discs, *Decca X 206-10*, which are issued in an album. It is played by The Berlin Philharmonic Orchestra, conducted by Carl Schuricht.

Harry Horlick and his Orchestra have made an attractive recording of Strauss Waltz series No. 3 and 4, on both sides of *Decca F 6752*, whilst two evergreens, "The Blue Danube Waltz" and "The Lost Chord," are played by Reginald Foort at the organ—*Decca F 5691*. He also has recorded "In a Persian Market" and "Cavatina" on *Decca F 6720*. Two rumbas, "Maria Antonia" and "Louisette," are played by Don Barreto and his Cuban Orchestra on *Decca F 6717*, whilst Donald Novis, accompanied by Eddie Dunstetter at the organ, sings "Angela Mia" (My Angel) and an old favourite, "Charmaine," on *Decca F 6722*.

Tessie O'Shea, the popular radio comedienne, is extremely humorous in "It All Belongs to Me" and "That 'Kruschen' Feeling," on *Decca F 6723*.

Lawrence Wright's new show, "On With the Show," is featured by Felix Mendelssohn and his Orchestra, who play two tunes from it—"The Blackpool Walk" and "The Girl in the Upstairs Flat."—*Decca F 6726*. This band have also made a "King Revel" selection, parts 1 and 2, on *Decca F 6728*, introducing "When the Steamboat Whistle is Blowing," "Two Dresden Dolls," "You're at Blackpool by the Sea," "Swing and Sway," "The Music of the Fountain" and "The Beat of the Drum." The vocal choruses are sung by Paula Green and George Barclay.

H.M.V.

HARRY RICHMAN, who made his first H.M.V. record last month, makes his second recording with "Down and Out Blues" from "Happy Returns," coupled with "Daddy's Boy," on *H.M.V. B 8770*. Betty Driver is very amusing in "Oh! Ma-Ma" (I want to Marry the Butcher Boy), but is quite serious in "So Little Time," on *H.M.V. BD 575*.

Revnell and West give two of their vignettes of cockney life. As "Two London Costers Making Whoopee," they give examples of coster girls' sentimental "crooning" of a type that is fast disappearing, and their study of urchins trying to negotiate a traffic crossing is extremely funny—*H.M.V. BD 569*.

Dancing Time

THE strict dance tempo enthusiast is well catered for this month by Henry Jacques playing "Something Tells Me" (quick-step), coupled with a slow foxtrot "Moonlight and Roses"—*H.M.V. BD 5381*, and "The First Quarrel" (waltz) and "My Heart Will Never Sing Again" (slow foxtrot), on *H.M.V. BD 5382*. Palais Glide Medley No. 2 has been recorded by the New Mayfair Orchestra—

H.M.V. BD 5385, and a newcomer to the lists, Jose M. Lucchesi, plays two tangos—"Champagne Bubbles" coupled with "Song of the Sea"—*H.M.V. BD 5378*.

Roy Fox's numbers include "I Won't Tell a Soul" and "Two Shadows"—*H.M.V. BD 5379*, also "What is Romance?" with "Chocolate Soldier's Daughter" on the reverse side—*H.M.V. BD 5380*. "So Little Time" and "Says My Heart" have been recorded by Jack Harris on *H.M.V. BD 5383*, whilst "Fats" Waller's contribution is "Beat It Out," coupled with "Lost and Found" on *H.M.V. BD 5377*.

Benny Goodman and his Orchestra have this month recorded "I Would Do Anything for You" and "Sandman"—*H.M.V. B 8764*, whilst his quartet is represented by "Ida, Sweet as Apple Cider" and "Dizz, Spells"—*H.M.V. B 8765*. The swing version of "Coming Thro' the Rye" coupled with "Yearning Just for You" is played by Tommy Dorsey and his Orchestra on *H.M.V. B 8766*, whilst Dicky Wells and his Orchestra have recorded "Sweet Sue" and "Hangin' Around Boudon"—*H.M.V. B 8763*.

Rex

GRACIE FIELDS has chosen two tunes from her latest film, "We're Going to be Rich," for her latest record. The tunes are "There is a Tavern in the Town" and "The Sweetest Song in the World," recorded on *Rex 9325*. Roy Smeck and his Hawaiian Serenaders play "When the Organ Played 'O Promise Me'" and "A Gipsy Told Me," from the film "Happy Landing"—*Rex 9334*. Jack Payne has dug up an old favourite, "Tiger Rag" which he couples with "Lazy Rhythm" on *Rex 9339*. Maxwell Steward's Ballroom Melody give a strict dance tempo version of "The First Quarrel" (waltz) and "Good-night Angel" (slow foxtrot) on *Rex 9336*.

Brunswick

CONNIE BOSWELL, accompanied by Harry Sosnik and his Orchestra, sings "You Took the Words Right Out of My Mouth" from the film "The Big Broadcast of 1938," whilst on the reverse she has Bob Crosby and his Orchestra to accompany in "Mommy"—*Brunswick 02612*. Judy Garland, on *Brunswick 02611*, seems to contradict herself with "Cry, Baby Cry" and "Sleep, My Baby Sleep." Chick Webb and his Orchestra has recorded "A Tisket a Tasket" with Ella Fitzgerald singing the vocal, and couples it with "Liza" (All the Clouds'll Roll Away), on *Brunswick 02614*.

Vocalion

MAXINE SULLIVAN sings in her typical style "It's Wonderful" and "You Went to My Head" on *Vocalion S 194*, whilst Billie Holiday, who sings the vocals, and her Orchestra play "When a Woman Loves a Man" and "Sailboat in the Moonlight"—*Vocalion S 171*.

Stand

35

There is a Westinghouse Metal Rectifier to suit every rectification need. In sound and vision receivers, time bases, detection, A.V.C.

Visit Stand 35 and inspect this very comprehensive range of rectifiers. They are used by the B.B.C., the G.P.O. and the principal broadcasting stations of the world.



Make a point of getting your copy of the new 1939 edition of "The All Metal Way," or send 3d. to Dept. Pra.W.

Westinghouse

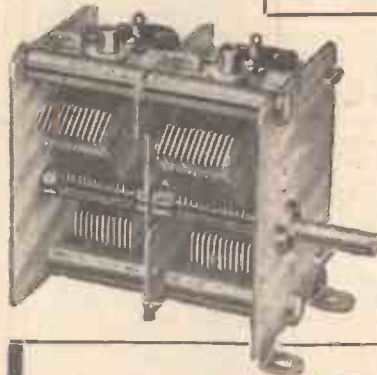
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POLAR

CONDENSERS AND DRIVES

STAND
106
RADIOLYMPIA



POLAR BAR Type 2-GANG CONDENSER

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POLAR MICRO HORIZONTAL DRIVE

Provides two reduction ratios of 10-1 and 50-1 operated by a single knob. Scale marked in station names and degrees. Moulded escutcheon and knob. Lampholders supplied.

Price 9/6



POLAR SPECIFIED

for

ADMIRAL 4-VALVE RECEIVER

1 Micro Horizontal Drive. Price 9/6
1 Compax .00015. Price 2/6

PYRAMID ONE-VALVE RECEIVER

1 Condenser No. 5 .0005. Price 4/6
1 Vertical C.K. Drive. Price 6/6
1 Differential .00015. Price 3/-

PRESS BUTTON 3-VALVE RECEIVER


1 Bar Type 2-gang Condenser 2 x .0005. Price 12/-
1 Semi-circular Drive. Price 5/9
1 Compax .0003. Price 2/6

Send for fully illustrated Polar and Polar-N.S.F. Catalogue.

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*Phone: Temple-Bar 2244. Works: Old Swan, Liverpool, 13.



Practical Television

August 27th, 1938. Vol. 3. No. 115.

An Ingenious Scanner

A VERY ingenious television scanner has been developed by the Fernseh Co. in Germany and was shown for the first time at the Berlin Radio Exhibition. It is a mechanical scanner employing the German standard of 441 lines interlaced and shows an extraordinary increase in efficiency when compared with the earlier forms of mechanical equipment. By means of a simple electrical change-over which can be effected instantaneously it is possible

the light spot method has been resorted to, and owing to the use of very high efficiency photo-electric cells in conjunction with secondary amplification it has been found possible to dispense with arc lamps for all three scanning devices, in spite of the high number of lines. In each case incandescent lamps have been employed, a scheme which is preferable because of the greater degree of reliability, coupled with the simplicity of operation. Mention should also be made of the lighting arrangement of the cabin

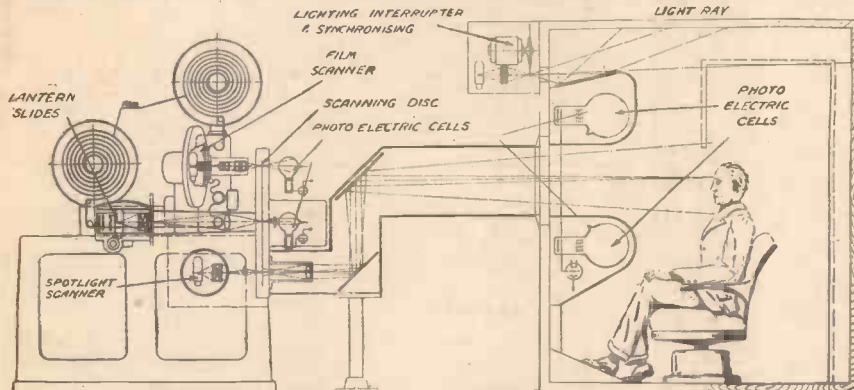


Fig. 1.—Schematic diagram of a universal mechanical television scanner.

to use the machine alternately for film, lantern slide or actual person transmissions. This has been done by employing one single scanning disc which rotates at the very high speed of 10,500 revolutions per minute in a completely evacuated casing. The scanning apertures are arranged in two seven-fold spirals; one spiral being used for the scanning of films, while the other is the medium for scanning persons or lantern slides, as desired. The disc has as many as 882 very fine apertures of about .06 mm., together with 441 slots for the generation of the line synchronising pulses and another set of slots for the frame synchronising. The very high degree of accuracy necessary on account of the large number of apertures, and the use of interlaced scanning has been achieved by a specialised production method developed only after years of research work. The three scanning sets for film, persons and lantern slides are arranged in such a way that they can be operated and supervised at the same time. By using this arrangement the three transmissions are ready for operation at any moment and the engineer in charge is in a position to change over from one transmission to another at any desired moment. This adaptability is useful for many purposes. For example, in the case of a lecture it is possible for the lecturer himself or films and lantern slides illustrating the talk to be transmitted without any delay except a straightforward electrical fade over.

The whole scheme is shown very clearly in the diagrammatic illustration of Fig. 1, where the individual sections of the equipment and their function have been itemised. For individual scanning it will be seen that

for the scanning of persons. Up to the present it has been usual with light spot scanning to have the cabin always in darkness, but with this equipment the small



Fig. 2.—The type of picture produced by a German projection tube home receiver.

studio is illuminated during the fly-back or synchronising pulse period and is then darkened while the picture signal is being generated. The person seated in the studio, therefore, with this arrangement, is quite capable of reading a manuscript, a factor of great importance with either lecturers or

announcements. The demonstration of this apparatus shows quite definitely that for certain purposes mechanical scanning still has specific advantages and the resulting pictures are sharp and clear.

Home Projection Receivers

IRRESPECTIVE of the public demand for the small type domestic television receivers there is sure to be a growing market for the projection tube receiver which gives a picture up to two feet wide. With the present line definition standards employed both in this country and abroad, these pictures must be viewed at a reasonable distance from the set itself, otherwise the line formation of the picture becomes apparent and so tends to detract from the programme value. For clubs and hotels, however, they form an ideal source of entertainment. Under proper viewing conditions the quality of the received picture is good and an idea of the results secured in Germany is shown by reference to Fig. 2. Here the picture is nearly 18ins. wide, while the cabinet housing the equipment is relatively small, approximately 3ft. high by 2ft. square. In most of the sets seen up to the present the picture is back projected by a mirror reflector on to a translucent glass screen. With the set illustrated, however, front projection has been used for the first time in Germany, and the results are certainly of a very high standard. The special lens employed gives a sharp, bright picture and the screen which is fixed to the inside of the lid is completely protected when the set is not in use. A single switch is used for the individual selection of programmes and is arranged to provide television, ultra-short-wave sound, the local medium-wave station and the national long-wave programme. Tuning is pre-set on installation and operation is therefore of an extremely simple character.

A Matter Requiring Settlement

IT has already been suggested that plans are afoot for an early extension of the television service to the Midlands, but it is impossible to secure any official statement on this most important point. Reports have long been current that a second television station is to be established at Birmingham, while others declare that Manchester would be a better choice. Without in any way advancing the claims of either city, the situation is becoming rather intolerable without having a plain official statement of what extension programme is contemplated by the authorities charged with this side of the work. Germany has made no secret of her intentions

with regard to furnishing a much wider public with signals of adequate strength for ordinary receiver operation, so why should Britain after two years' service still keep potential viewers in the dark? The 441 line service is to be inaugurated on October 1st from the transmitter on the Amerika-Haus

at the Adolf Hitler Platz, the highest point in the west end of Berlin. A power of 20 kilowatts is to be employed and in a short time about a quarter of Germany's population will be able to receive television programmes through the opening of equally high powered stations on the Feldberg and Brocken.

TELEVIEWS

Coaxial Cable

WHETHER the Post Office coaxial cable can be employed for television in this country now seems to be a moot point, because of the large revenue which can be obtained by using it for ordinary telephonic purposes. If such is the case a twin wire feeder system could be laid down or a network of inexpensive directional micro-wave link relay stations set up. This is, of course, on the assumption that the major portion of Midland or Northern television programme material must emanate from London. Local programmes would be preferable with a constant interchange of material, so as to provide more variety, and the Television Advisory Committee, which has been working quietly, should take advantage of the great drive contemplated at Radiolympia to make a full official statement, and so clarify what for some time now has been an annoying and entirely unnecessary situation both for manufacturer and potential set user alike.

Relaying Television

THAT the idea of relaying television programmes between two distant points via ultra-short-wave transmitters is feasible is borne out by the investigations which are now being undertaken both in this country and abroad. One of the countries most likely to be affected by programme distribution schemes is America, because of its vast area coupled with tall city buildings. The R.C.A. have been actively engaged on this work and Zworykin has made some enlightening suggestions for tackling the problems. Many variable factors have to be taken into consideration and among these the ionisation of the upper layers of the atmosphere which are now known to cause reflection of the carrier waves is important. If the height above the earth or refractive index of these layers alters, then communication between any two fixed points may be upset completely because of skip distances. This can to a certain extent be offset by changes in aerial configuration and/or alterations in wavelength. In Zworykin's scheme, therefore, a special receiver is provided with two separate aeriels located a certain calculated distance apart. If any atmospheric changes occur, then the strength of the signal received by each aerial will alter. This has the effect of altering slightly the wavelength used between transmitter and receiver, which incidentally are linked by a cable in order that the carrier frequency adjustment is automatic between both points. It is claimed that this form of monitoring is quite effective in countering changes in the ionised atmospheric layers and could be extended to bring about any other necessary alterations which may be additional to or even in lieu of changing the wavelength, as desired.

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of amateur wireless transmitters can be found in the RADIO AMATEUR CALLBOOK. This book is essential to owners of short-wave, or all-wave sets. Contains complete lists of amateur transmitters (with names and addresses) from Alaska to Zanzibar, also short-wave commercial stations, lists of International Abbreviations (the "Q" code), International Prefixes, etc. Price 6/- per copy, post free. Send for lists of other books dealing with amateur transmitting.

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LETTERS FROM READERS

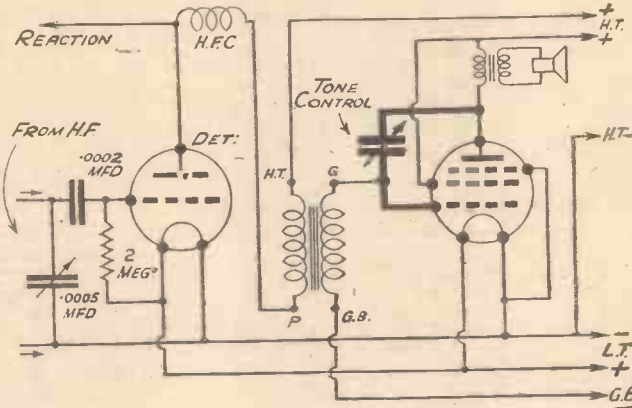
The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

High-note Control

SIR—The recent article on tone-control circuits reminds me of a simple, yet comparatively unknown, method of high-note control. The method consists of connecting a solid dielectric reaction condenser between the anode and grid (not cathode) of one of the L.F. valves, either the first L.F., if there is one, or the output valve. The condenser, which should be of .00015 mfd. or .0003 mfd., must be capable of standing the anode voltage; otherwise the grid and anode will be short-circuited.

Also, of course, the system cannot be used on a reacting detector valve, as it would immediately stop the set from oscillating.

With the vanes of the condenser fully meshed, there is very good control—why there should be such an effective cut-off with so small a condenser I am not certain, but the fact remains that the device is just as effective, and less expensive than the usual resistance and condenser combination.—R. Hook (Surrey).



Circuit diagram showing application of high-note control, as mentioned in Mr. R. Hook's letter.

Swiss Broadcasts

SIR—It may interest other readers to know that the new Helvetic Government transmitter at Schwarzenburg, Berne, is now on the air daily. The station transmits on every day except Sunday, and the schedule is as follows:

19.00-20.00 (B.S.T.) on 31.46 m. (9,535 kc/s).

00.45-01.45 (B.S.T.) on 19.60 m. (15,305 kc/s).

02.00-03.00 (B.S.T.) on 25.28 m. (11,865 kc/s).

Announcements are made very frequently in English, French, German and Italian. This station confirms reports by letter and the address is: The Swiss Telegraph Administration, Berne, Switzerland.—J. L. HALL (Thornton Heath).

Component Construction

SIR—I wish to support the plea of V. C. T. (Blackheath) on Component Construction, which appeared in the August 13th issue.—"ANOTHER CONSTRUCTOR" (Bridgeton, Glasgow).

SIR—With regard to the recent letter by V. C. T., it would be interesting to know what the reader had in mind when he said "certain" components, since so few

can now be made by the amateur; such things as tuning condensers, large fixed condensers, volume controls and even valve-holders are absolutely outside the field of the home constructor possessing normal equipment.

The only components I make at home are S.W. coils, although I have tried making small fixed condensers out of enamelled wire. The latter are, however, more bulky and generally less reliable than their commercial counterparts.

A few components, such as chokes and

transformers, can be made fairly satisfactorily, but it would certainly be more difficult to obtain the required parts, for example, correct transformer stampings, trimmers for I.F. transformers, and also suitable screening cans, than to buy the finished article. Another point not to be overlooked is that in many cases the commercial article would be found appreciably cheaper.—J. L. YARNOLD (Egham).

SIR—I, too, would like to see more articles on home-constructed components, for surely there is no better way of getting a thorough understanding of the action of various parts, both theoretical and practical.

Only once have I bought a commercial coil, which is widely advertised, but it was a failure from the start, and after pulling the set all to pieces and finding nothing wrong with it I wound a coil of my own, and the set is now working perfectly. Since then I have always wound my own coils.

I should like to congratulate you on producing such a grand paper as PRACTICAL AND AMATEUR WIRELESS, and I wish it every success.—J. W. COLLINS (Withyham, Sussex).

SIR—I agree with your correspondent, V. C. T., of Blackheath, as regards his proposed idea of a series of articles on

component construction. I think it is a perfectly sound suggestion, and I am sure there are many other home-constructors who feel the same way about it.

Articles on how to wind transformers, coils, chokes, etc., and many other parts, which are vital to radio experimenting, would be much appreciated.

I found one or two such articles while looking through some old wireless magazines recently.—A. McCASKILL (Aberdeen).

[Articles have appeared in our journal from time to time on the construction of various components. We would also refer you to our book "Wireless Coils, Chokes and Transformers, and How to Make Them." Price 2s. 10d. by post; and "The Wireless Constructor's Encyclopædia." Price 5s. 6d. by post.—ED.]

A "Local Station" Quality Set

SIR—With regard to recent references to special quality sets, I should very much like to see complete constructional details of a "local station" quality receiver to include one H.F. stage, detector, 1st L.F. and push-pull output triodes (such as PX4 or similar). Every stage and component to be designed for best quality only, and to include variable selectivity giving band widths of, say, from about 7 to 15 kilocycles. Such an outfit should surely give at least 6 watts distortionless output.

Since I possess more than one permanent magnet M.C. loudspeaker I am not really interested in an energised model.

I shall be very glad to see an article published on the lines indicated, with full details please, and clearly indicated values of all components.—J. G. CHESHER (Addiscombe).

CUT THIS OUT EACH WEEK.

Do you know

—THAT the new form of automatic station selection may lead to the design of new types of tuning components.

—THAT careful choice of the pre-set condensers is necessary for reliable results with this form of tuning.

—THAT experiments are now being undertaken with a view to improving the reproduction from existing types of cone loudspeakers.

—THAT when using band-spread tuning it is not essential to select the bandspread so that it covers a definite movement of the band setter.

—THAT the above arrangement only facilitates resetting, but does not simplify the actual process of tuning.

—THAT for maximum signal strength there is a definite relationship between inductance and capacity which accounts for the difference in performance at each end of the normal medium-wave band.

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.

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QUERIES and ENQUIRIES

Oscillation Indication

"In trying to test a set I have made up I believe that the H.F. stage is oscillating. I am not certain of this, however, and should be glad if you could tell me how to test for this accurately. I do not possess any test equipment, other than the standard all-purpose (cheap) combined voltmeter and milliammeter."—H. R. (Perth).

THERE are two simple methods which you could adopt in your case. First, by touching the grid terminal, a loud and decided plop should be heard when you touch and when you remove your finger from the grid, whilst the valve is oscillating. The meter would give a more accurate indication, however, and if joined in the anode circuit, the current will drop when the finger is removed from the grid. This is

H.F. Volume Control

"I have made up a set in which I have used a variable-mu H.F. stage. I have tried to control volume by using a potentiometer in series with resistors across the H.T. in the usual manner, the screening being joined to the resistors and a fixed bias resistor being joined between cathode and the arm of the potentiometer. I find, however, that I cannot get good control of volume owing to oscillation. The potentiometer has a total value of 10,000 ohms, and before it has travelled half-way round the set bursts into oscillation. I have used 30,000 and 20,000 ohms for the fixed potentiometer for screen. Can you help me to get over this difficulty?"—D. G. N. (N.1).

THERE may be two or three reasons for your trouble. First, the set may be unstable when the gain is put up to a certain value, and thus a more efficient layout or more effective screening may be called for. On the other hand the type of resistance used for volume control may be wrong. Some of these are graduated and you may have connected yours the wrong way round, or you may be using a special type which gives the wrong control of voltage. Lastly, the value of the resistance may be too high, and to get the same movement of control without oscillation, you may find it desirable to use a 5,000-ohm component with a fixed 5,000 ohms in series, so that the control will then be effective over the 300 or so degrees of the new potentiometer for the same effective resistance variation of your present component.

Frequency Doubling

"I have seen a reference to frequency doubling, trebling and so on in a book, and should like to know if you can explain what this is. It was in connection with a crystal set."—J. E. (York).

WE are afraid you are confused with the material you have read. The term frequency doubling is employed in connection with transmitters and not crystal receivers. A special crystal is employed in the transmitter to maintain constant the rate of oscillation. The crystal is cut to oscillate at a given frequency, say, that corresponding to 80 metres, and then a special stage is connected following the oscillator, and this is tuned to twice the frequency (half the wavelength). Thus a single crystal may be used for working on two wavelengths, 40 and 80 metres, and by using a further doubler it may be used on another wavelength. They are all harmonically related.

due to the fact that the normal current is higher than when the valve oscillates, and the earthing of the grid due to body capacity stops the valve oscillating and thus the current will rise. If your meter is of a type not giving a low reading of current, the needle will simply kick as you touch the grid and when you remove your finger.

Trimmers

"In the short-wave set I have made I find that the movement of the knob is much too fine to let me get the setting right. Is there a better slow-motion dial on the market than the one I have which is a Micro Polar? I should like to get some of the stations which are there but are all jumbled together."—J. S. E. (Dorking).

THE trouble may be due to the wrong type of circuit or wrong values of condenser or coil. On the short waves tuning is extremely sharp, and small tuning

capacities are advisable. A plan which you might try, if your coils and condensers are of the correct type, is to connect a very small trimmer (panel type) in parallel with the tuning condenser or band-spreader, and use this as a final adjustment. For this purpose dismantle an old 15 mmfd. short-wave condenser and re-assemble it with only one plate on each side, double spaced. This will give a very slight variation which will act as a vernier trimmer.

Home-made Television Set

"I should be glad if you will kindly let me know if there has been an article published recently on an up-to-date television set (not mains) with list of parts."—N. K. (Northumberland).

WE have not described such an instrument, and you would find it difficult, if not impossible, to make a set which was not mains operated. The modern cathode-ray tube operates with 4,000 volts on an anode, and the large number of valves needed for satisfactory working also call for mains voltage supplied. Furthermore, you would not be able to receive present-day transmissions at your address—at least it could not be guaranteed.

Substitute Components

"In the July 30th issue of your paper you described the Experimenter's Three. Can substitutes for some of these components be used? I possess these, and I think it a pity to disregard them. Are the mounting brackets metal?"—T. N. L. (Richmond).

ALTHOUGH your components may be of a similar value, there is always a risk in using substitutes for other reasons. In some cases physical dimensions may be important, and also differences may exist in construction which would spoil the performance of a receiver. It is for this reason that we only guarantee our sets when parts which we have used and tried are employed. The same remarks apply to your valves—they may work quite well, but as we have not tried them, we cannot give you a guarantee. The mounting brackets are of metal at the base, with an insulated inset to which the condensers are mounted.

All-wave Coils

"I am thinking of making an all-wave mains five-valve set, and should like to know whether there are any suitable coils to tune from about 4.5 metres up to the long waves."—B. R. (Smethwick).

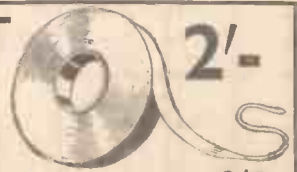
THE Bulgin five-range coils would be suitable for your purpose, and these are supplied as a unit, with switching. They may be ganged in various combinations. Alternatively, the Wearite "P" type coils may be used, and wired and assembled in the required combination to give you the circuit desired.

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