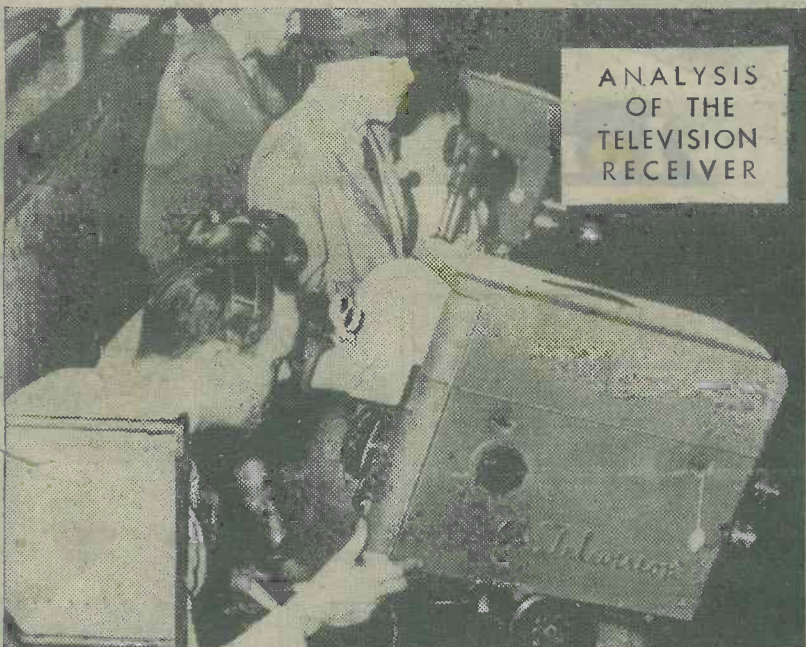
A COMPACT DOMESTIC AMPLIFIER

Practical Wireless

9D EVERY MONTH

Vol. 22. No. 485 || Editor: F. J. CAMM || NOVEMBER, 1946



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Practical Wireless

and PRACTICAL TELEVISION

14th YEAR OF ISSUE

EVERY MONTH

VOL. XXII. No. 485, NOVEMBER, 1946.

Editor F. J. CAMM

COMMENTS OF THE MONTH. BY THE EDITOR

The Television Era

ACCORDING to an American journalist, public expectancy in the television era has been built up to the point where the average person thinks that he will be able very shortly to buy a high-grade television receiver at about the price of a radio set, and at the turn of a dial to enjoy a steady stream of programmes. This writer thinks that this is far from the truth. As far as this country is concerned it is true that the public will have to wait some time before television receivers are available in quantity. This is not due, however, as this American journalist thinks, to lack of technical development in the design of television receivers, but purely because in this country we have only one station radiating television. Everyone knows that the range of a television transmitter is extremely limited. In fact, it can be asserted that satisfactory television reception is not possible outside a radius of about thirty miles. Moreover, television programmes are being radiated on a system which was already obsolete in 1939. We do not state this in any sense of criticism, for the B.B.C. and the Government were most anxious that those who had spent a not inconsiderable sum of money on the purchase of a television receiver before the war should at the earliest possible moment be able to enjoy the service so abruptly cut short when the war started.

It is stated in the American Press that universal television in the home is a long way off. It is only so far off in this country as the maturing of plans for the opening up of the network of television transmitters necessary to serve the whole country. Ignoring freak reception, which is always possible, we think that world-wide reception of television programmes is indeed a long way off. But to suggest that universal television is a dream of the distant future is indeed a mis-statement.

The criticisms to which we have referred come from one who claims to have been the first to use the word television in 1909! The mildest researches on his part would show that this word was used in this country long before that date. As far as America is concerned we agree that only a handful of television receivers is now available (6 regular broadcast stations and 3 experimental stations), and that over a thousand more stations will be needed to cover America. As in this country, so in America, there are not enough television receivers to attract advertisers, but we do not agree as far as England is concerned that the cost of good receivers will be prohibitive. In America, of course, where sponsored programmes are the order of the day, advertising revenue is the key to technical development. It is not so in this country, for our programmes are meticulously vetted and kept free from anything in the nature of commercial advertising or trade puffs. Good television programmes are bound to be costly, and we cannot foresee any developments within the next ten years which will cheapen them. No one has yet discovered a satisfactory method of "bottling" or canning programmes, the difficulty being the wide frequency band involved which does not lend itself to present systems of recording.

Nor can we see any great improvement within the next few years in television technique, but we do not think that it is technically unsound, as does our American critic. We visited the B.B.C. studios a short time ago to inspect television reception, and we found that distortion was taking place at the bottom end of the tube. We do not think that the cathode-ray tube as at present produced is the final word. Some optical system using a tiny tube and correcting barrel distortion may come along. It is, however, not yet on the scientific horizon, and in the meantime we have to make the best of what we have. Like the early motor-car, the early aeroplane and the early wireless set, which seem laughable when considered in the light of their modern counterparts, the television receiver will have to follow the same slow and tortuous technical paths before we can say, as we now can with sound broadcasting and the telephone, that reasonable perfection, still leaving room for improvement, has been attained.

An inspection of television patents shows that no one has yet arrived at an improved system of scanning.

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The Editor will be pleased to consider articles of a practical nature suitable for publication in "Practical 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 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.

ROUND THE WORLD OF WIRELESS

Radio Amateurs' Examination

A COURSE covering the syllabus of the Radio Amateurs' Examination of the City and Guilds of London Institute is being held during the 1946-7 session at the Brentford Evening Institute. The Institute is situated in Boston Manor Road, at the rear of Brentford Library, and is on the 97 bus and 655 trolley bus routes.

Classes commenced at the end of September and will continue up to the date of the examination (which is probably in May, 1947). The fees are: students under 16 years of age, 2s. 6d.; students over 16 years of age, 5s. Full details of this and other technical courses may be obtained from the prospectus which is available on application to the Principal, Chiswick Polytechnic, Bath Road, Bedford Park, London, W.4.

Requests for Viewers' Opinions

TELEVISION viewers are being asked to send in letters giving their reactions to the programmes and making suggestions for their improvement. The request has come to them on the television screen in announcements also asking them to say what times and days they consider most suitable for particular programmes. Information is also sought on the quality of reception in different areas.

Letters should be addressed to: Television, B.B.C., Broadcasting House, London, W.1.

Wireless Transmitting Licences

A POST OFFICE official states that whilst it is generally known that wireless receiving apparatus must not be used without a licence from the Postmaster General, many people do not appear to be aware that it is also an offence against the law to use wireless transmitting apparatus without a licence. The unauthorised use of transmitting apparatus may interfere with important wireless services, including those operated for the safety of life, and is regarded as a serious offence. Within the past few weeks three persons in different parts of the country have been fined and ordered to pay costs for operating wireless transmitters without a licence, and in two instances the Court also ordered confiscation of the apparatus.

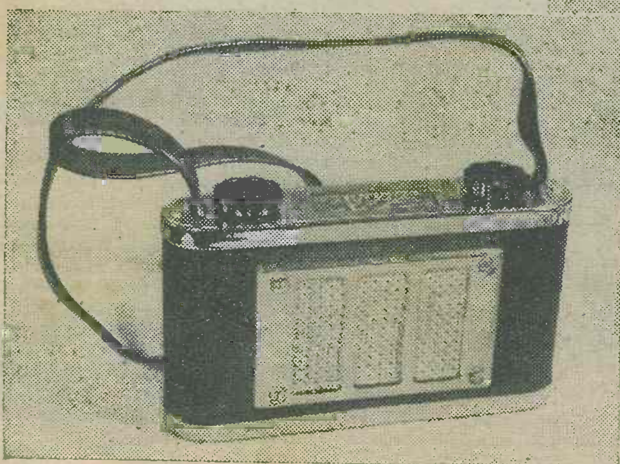
Further Frequencies Released

THE G.P.O. have now released the remainder of the "top band," thus giving the full pre-war allocation, namely 1,715-2,000 kc/s. Power is to be limited to 10 watts input.

As from 00.01 B.S.T., Sunday, September 1st, 1946, the following additional frequency bands were released: 3,500-3,635 kc/s and 3,685-3,800 kc/s. Power limits as for 7, 14 and 28 mc/s, namely, Class A, 25 watts; Class B, 150 watts.

Carry-with-you Radio Sets

THE latest in radio novelties, developed from the tiny models dropped by air to the underground movement in Europe, will soon be on general sale. Weighing 4½lb., and about the size of a biggish folding camera, it is carried by a sling which acts as aerial. Dry batteries provide the power. Manufactured by Romac Radio Corporation, London, it will sell at £18, including purchase tax. The model is on show at the "Britain Can Make It" Exhibition, Victoria and Albert Museum, London.



The latest in radio novelties is a pocket radio, which is no larger than the average ladies' handbag.

Science Broadcasts

SCIENCE broadcasts proved one of the most attractive "lines" with service listeners during the first year of F. E. B. The B.B.C. have now started another series of vital interest, on the relationship between man and the other animals and on the means by which he can increase the world's production of food.

Broadcasts to Schools

THE Central Council for School Broadcasting has issued its new Syllabus for the period September 23rd to December 6th, 1946; 13,410 schools are registered as listening, 923 more than in 1945.

To aid both teachers and pupils the B.B.C. is issuing illustrated pamphlets on some of the lessons. In addition, a wall chart is issued, giving details of the timing and subjects, for posting in each registered school, and a booklet covering the whole range of the syllabus giving a short note on the aims and contents of each series of broadcasts for the school year 1946-7.

A number of additional series designed for Scottish and Welsh schools are included in the 1946-7 syllabus. Also two additional modern language series.

"Production Drive"

SHOOTING has just been completed at Philips Mitcham Works of a sequence of scenes for inclusion in the Government's latest film "Production Drive."

The venue chosen was the main assembly shop at Mitcham, and numerous shots were taken of activity there, including an impressive close-up of radio sets coming off the end of the assembly line with operators at work. A huge stack of Philips receivers ready for export was one of the more imposing items filmed.

The Green Park Film Company is shooting the film on behalf of the Central Office of Information.

"Production Drive" is intended to bring to the notice of the public the problems that industry has to contend with in connection with labour and material shortages. It is 1,000ft. in length and will run for ten minutes. On completion it will be shown throughout the country in most of the main cinemas.

Of the many radio factories considered for use by the C.O.I., the Philips Works was found the most suitable for inclusion in "Production Drive."

New Radiogram

THE R.G.D. Co. now have in production a new high-quality radio-gramophone. Before the war, they had works at Birmingham, but they are now located at Bridgnorth, Shropshire, where until recently they have been fully engaged on the production of radio equipment for the armed forces.

"Ten Minute Alibi"

JAN BUSSELL will please viewers who advocate that a television play needs an interval. He plans to have a three-minute one in "Ten Minute Alibi"—Anthony Armstrong's successful murder play. This question of intervals is a thorny one. Some viewers argue that the play should go through without a break like a film, while others prefer to maintain the theatre atmosphere and stop for refreshments.

Many new features are included in post-war radio and television sets, which are to be seen at the "Britain Can Make It" Exhibition. Above is shown a new large screen television set.

Shooting in progress at Philips Mitcham Works for the Government's new film "Production Drive."

Wireless Receiving Licences

THE number of broadcast receiving licences in force in Great Britain and Northern Ireland continues to increase, and has now reached a total of 10,674,000. Included in this total are 1,750 television licences, but this figure does not give any indication of the numbers of television sets now in use, as viewers holding unexpired 10s. licences need not take out television licences until their 10s. licences expire.

The increase in the total number of licences suggests that the Post Office has already had a good deal of success in its efforts to round up unlicensed receivers, but it is not relaxing those efforts, and during the last five months more than 1,000 persons have been prosecuted for working sets without licences. Statement showing the approximate numbers issued during the year ending July 31st, 1946:

Region	Number
London Postal	2,032,000
Home Counties	1,354,000
Midland	1,540,000
North Eastern	1,645,000
North Western	1,416,000
South Western	885,000
Welsh and Border	617,000
Total England and Wales	9,489,000
Scotland	1,030,000
Northern Ireland	155,000
Grand Total	10,674,000

A Compact Domestic Amplifier

A Useful Unit Built Round "Surplus" Valves. By R. S. MOORE

A COMPACT, lightweight and reasonably cheap amplifier for domestic use was required by a friend, and it was decided to make use of some of the ex-R.A.F. valves available at reduced prices at the present time. The circuit shown in Fig. 1 was finally decided upon, and was found to give sufficient volume and satisfactory quality for home use. A tone control giving fixed "bass boost" and variable "top boost" was included, but if desired bass boost may also be made variable, as will be explained.

Circuit

The first stage employs an EF39 (V1) R.F. pentode as a high-gain voltage amplifier. This is followed by the tone control circuit, and V2, which is a triode phase-splitter, using an EF39 or EF36, connected as a triode, as in Fig. 1, or a 6J5G triode may be used. Two EL32, or the American 1637, output pentodes are used in push-pull in the output stage.

The output transformer, which has a total ratio of about 90 : 1, centre tapped (i.e., 45 : 1 each half), can be quite small, as the anode current of the EL32 is only 36 mA. The push-pull arrangement will avoid core-saturation troubles.

The mains transformer, T1, supplies 350-0-350 volts at 100 mA., 5 volts at 2 amp. for the rectifier heater, and 6.3 volts at about 2 amp. for the other valve heaters. Since the total H.T. and L.T. consumption is less than these figures, it is possible to run a small radio unit, consisting of R.F. and detector stages, from the same power supply if it is desired to use the amplifier for radio listening.

Electrolytics of the new small dry type were used for C1, C2, C3 and C5. All condensers should be at least 450 volts working, except C5, which is rated at 25v.

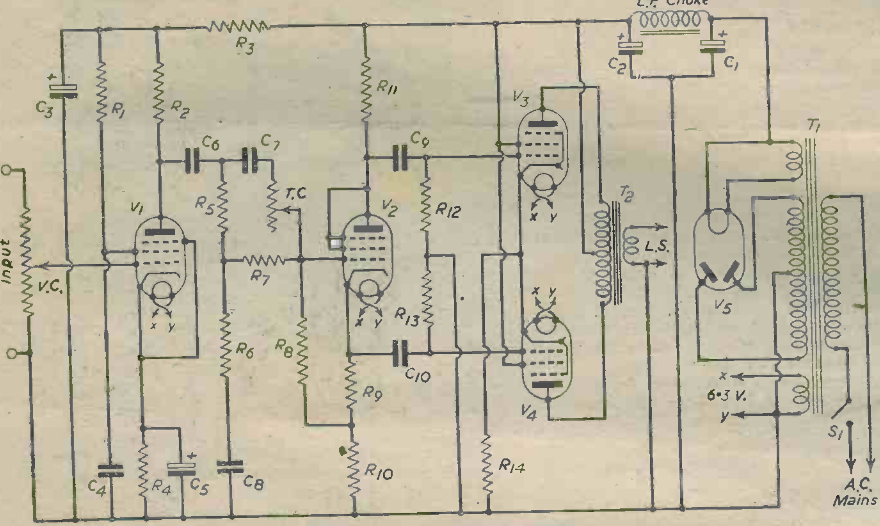


Fig. 1.—The circuit diagram.

R1—250 kΩ.	R8—1 meg.	C1—, C2— } 8+8μF.	C8—See Text.
R2—100 kΩ.	R9—1,000 Ω 1w.	C3—8μF.	C9, C10 } 0.1μF.
R3— 10 kΩ.	R10—50 kΩ.	C4—0.5μF.	VC—250 kΩ.
R4—1,000Ω 1w.	R11—50 kΩ.	C5—25μF., 25v. wkg.	TC—500 kΩ.
R5—100 kΩ.	R12—250 kΩ.	C6—0.1μF.	V1—EF39, V2—EF36 or '39,
R6 10 kΩ.	R13—250 kΩ.	C7—.001μF.	V3,V4—EL32, V5—5Z4G.
R7— 50 kΩ.	R14—300 Ω 2w.		

Tone Control

C6 is the coupling condenser from V1 anode. R5

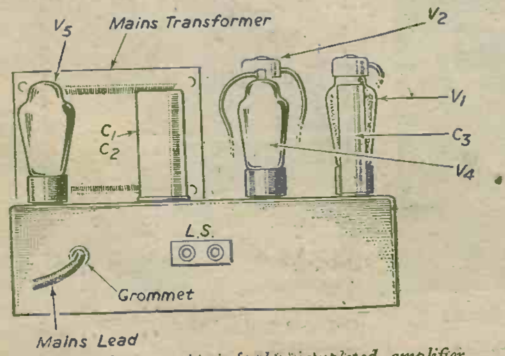


Fig. 4.—A rear view of the completed amplifier.

PIN	1	2	3	4	5	6	7	8	T.C.
EL32	—	H	A	Sc.	—	—	H	C	G
EF36, EF39	Met.	H	A	Sc.	Sup.	—	H	C	G
6J5G	Met.	H	A	—	G	—	H	C	—
5Z4G, 5U4G, U50, U52	—	H	—	A	—	A	—	H	—

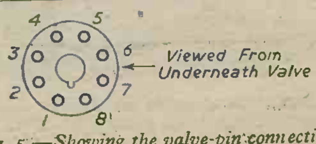


Fig. 5.—Showing the valve-pin connections.

forms one arm, and R6 and C5 together form the other arm of a potentiometer across the output from V1. The signals developed across the lower arm are fed to the grid of V2 via R7, and since the reactance of C8 is greater at the lower frequencies the proportion of the output of V1 reaching V2 will be greater at the lower frequencies. The degree to which this bass boost takes place depends on C8, the value of which normally lies between .001 mfd. and .05 mfd.—a value of .01 was found to be satisfactory in the amplifier built. It should be chosen to suit the loudspeaker used and to suit individual taste. For this reason it may be desirable to make the bass boost variable, and the circuit for this is shown in Fig. 6. If the variable resistance is used, the component should be a 500,000 ohm volume control.

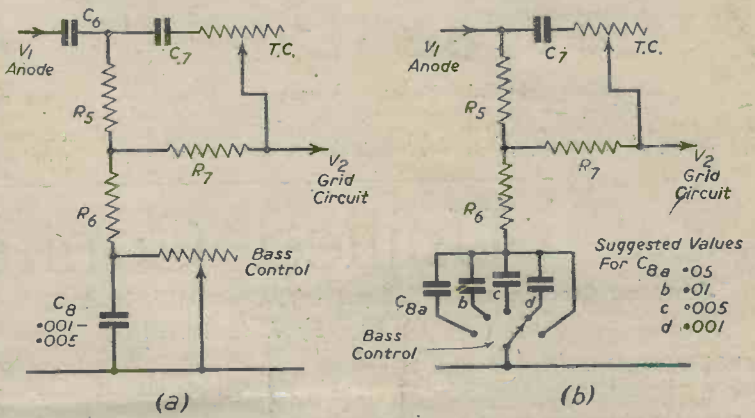


Fig. 6.—Alternative arrangements for variable "bass boost" as described in the text.

The switch used in the alternative arrangement is a single pole 5-way wafer type.

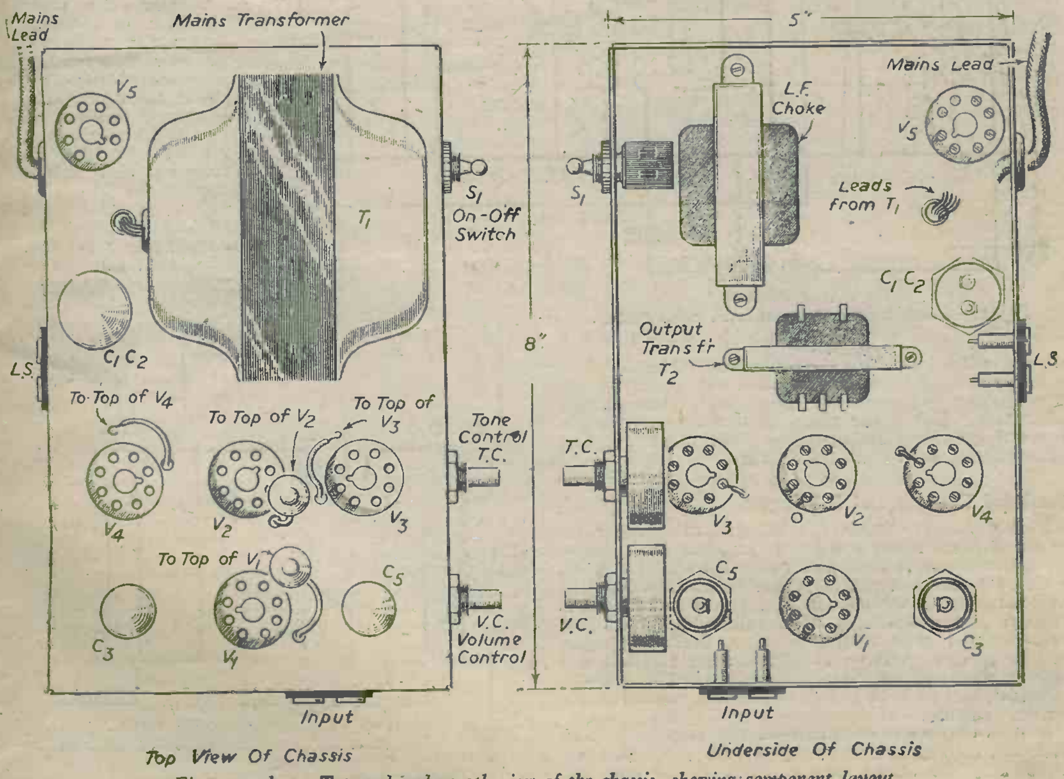
Top boost is obtained by feeding the "high notes" direct to the grid of V2 via C7 and the potentiometer marked T.C. The reactance of C7 will be low at high frequencies, but will be high at the lower frequencies, thus applying only the higher notes to V2. The amount of "top" reaching V2 grid is controlled by the T.C. potentiometer. Though .001 mfd. is given as the value of C7, different values may be tried to suit individual taste.

Chassis

The chassis was made from 16 s.w.g. aluminium. Constructional details need not be given here, as Figs. 2, 3 and 4 provide the necessary information. The piece of metal required is 13in. by 10in., as the chassis size is 8 by 5 by 2½in.

Notes

All grid leads were screened, and top-cap screens used on V1 and V2. The chassis should be earthed to reduce hum, and it is advisable to screen pick-up leads. If there is any instability, it may be necessary to fit



Figs. 2 and 3.—Top and underneath view of the chassis, showing component layout.

"grid-stoppers" to V1, and the output valves V3, V4. These should have a value of about 20,000 ohms, and are placed in series with the grid lead, and close to the top-cap. That for V1 should be placed inside the screen.

The 5Z4G, indirectly-heated rectifier, was used for V5, but directly-heated valves of similar rating may be used, e.g., 5U4G, 5Y3G, U50 or U52.

Electrolytic condensers, C1, C2, C3 and C5, are mounted through the chassis by means of clips, the tags pointing downwards.

If the amplifier is not to be housed in a cabinet, a base-plate may be fitted over the bottom of the chassis. As there are no live points above the chassis (unless a transformer with tags or terminals is used), it is safe to leave the amplifier uncovered.

The output transformer ratio is for a speech coil of 3 ohms.

Unified Control

Combined Reaction and H.F. Input : V.M. and H.F. Input Control : Automatic Reaction

By F. G. RAYER

CONSIDERABLE simplification is possible in the controls of most receivers, and is particularly applicable to receivers for domestic use. Methods occasionally seen, such as the operation of the wave-change switch by pulling the tuning-control knob (which is really no simplification of control but merely reduces the number of knobs on the panel), convey little advantage. But where a control usually used for one purpose only can be made to fulfil other purposes *automatically*, then real benefit arises.

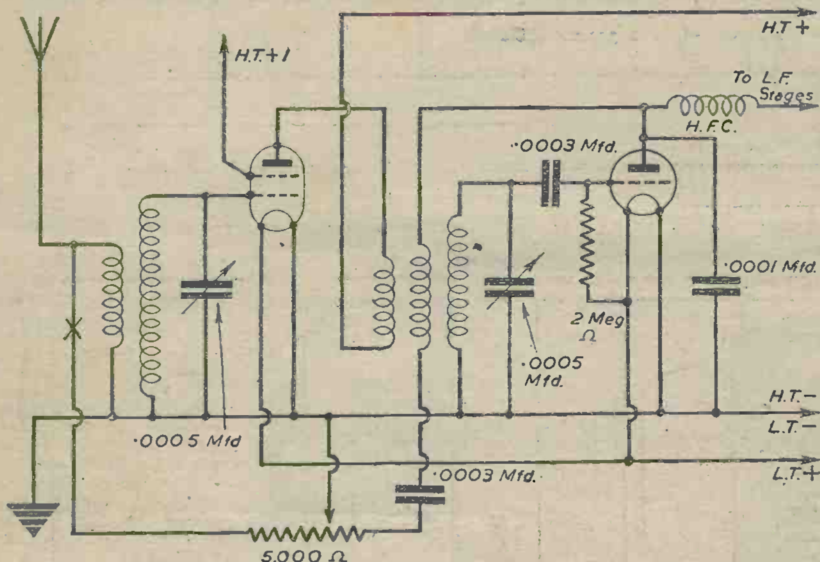


Fig. 1.—Combined reaction and H.F. input control.

Combined Reaction and H.F. Input

This is a good example of real simplification applicable to the straight receiver with one or more H.F. stages. Instead of separate controls for reaction and H.F. gain, a single 5,000 ohm potentiometer is used. When the slider is fully to the left (in Fig. 1), the aerial input is reduced and reaction is at a minimum. With the potentiometer near central position, the aerial input will be scarcely reduced at all; further rotation will increase reaction until oscillation arises. This control, therefore, acts as both H.F. and reaction control in the correct sequence.

If it is desired that signals be not reduced to zero with the control at minimum—a resistor of 50-1,000 ohms may be added at the point X so that the primary of the coil is not entirely by-passed. The .0003 mfd. reaction condenser may be replaced by a pre-set if desired, but with normal coils this is not necessary.

V.M. and H.F. Input Control

Occasionally, receivers are fitted with a "local distance" switch, throwing a resistor across the aerial-earth circuit to prevent overloading on powerful local stations. If the circuit in Fig. 2 is used, this is not necessary.

A 5,000 ohm potentiometer is connected across the aerial coil primary (this will have no noticeable effect in itself), and as the slider is moved upwards the signal will be by-passed. At the same time increasing bias will be applied to the H.F. valve, as the full negative bias is obtained *via* the aerial coil. The input will thus be reduced at the same time as the H.F. gain.

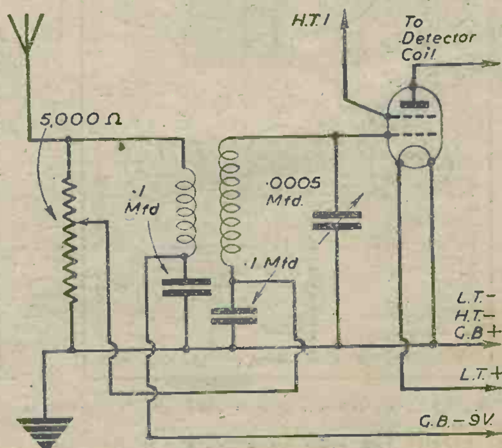


Fig. 2.—V.M. and H.F. input control.

With the slider turned to the other end of the element the full signal will be applied to the valve, with zero bias. It will be noted that as regards H.F. currents the slider is earthed *via* the second .1 mfd. condenser.

The circuit should be adjusted as follows. Tune the receiver to near the minimum-wavelength end of the tuning scale and adjust P1 until the desired reaction effect is obtained (e.g., not quite oscillating). Now tune

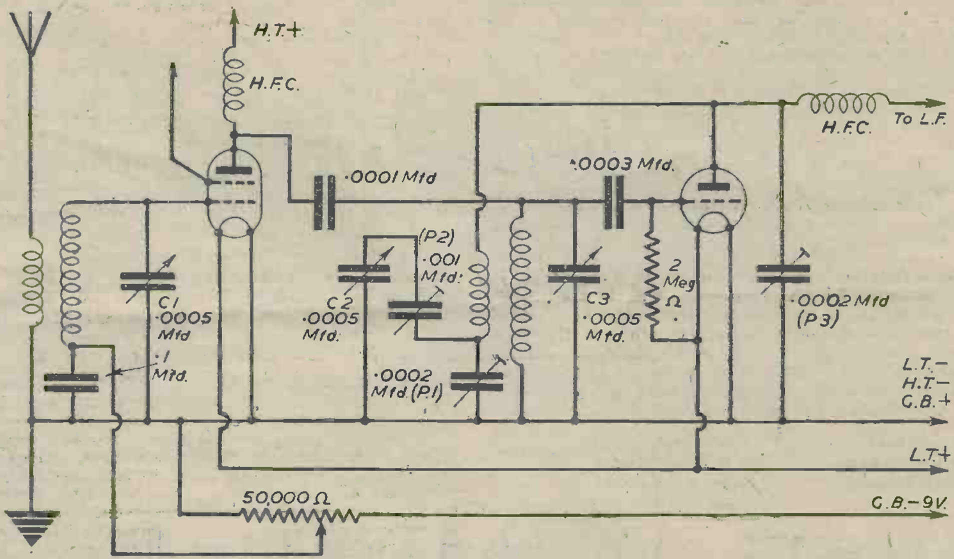


Fig. 3.—Automatic reaction will make the receiver sensitive throughout the tuning range.

Automatic Reaction

By the use of an extra section on the tuning-condenser and the circuit in Fig. 3, reaction may be automatically adjusted so that the receiver is in a sensitive condition throughout the tuning range. Manual reaction can be avoided, and something like the ease of operation of a superhet obtained.

A 3-gang .0005 mfd. condenser is used for tuning and reaction, with the three pre-sets P1, P2 and P3, as indicated.

to the other end of the scale and adjust P2 for the desired reaction effect. P3 should be adjusted to remove any tendency for the circuit to go into violent oscillation near the H.F. end of the range.

If well-designed coils are used, and the detector operated under proper conditions of anode voltage, etc., a slight increase in reaction capacity will be needed as the receiver is tuned to higher wavelengths. This, with the minimum necessary, will be obtained in the correct manner by C2 *via* P2 and P1.

Unfortunately, this circuit is not suitable for S.W. receivers, as the exact adjustment throughout the band necessary is not possible.

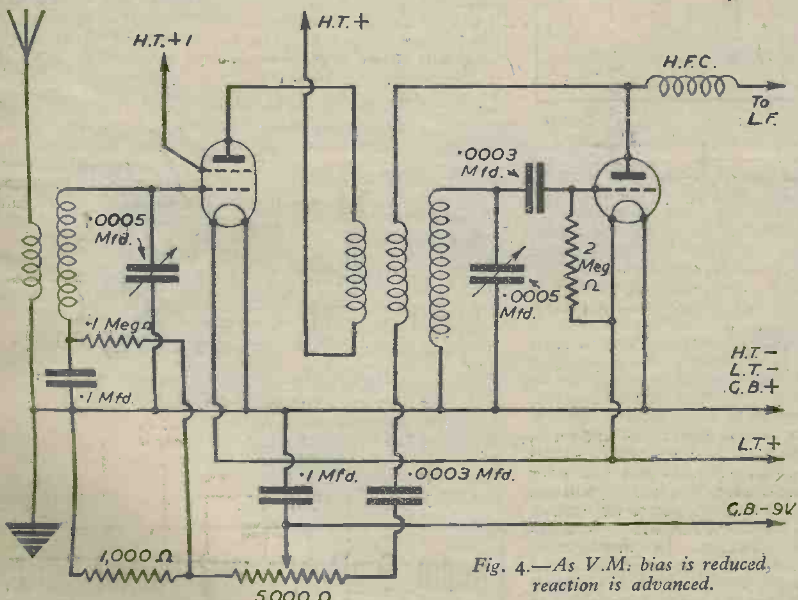


Fig. 4.—As V.M. bias is reduced, reaction is advanced.

Combined Reaction and H.F. Gain

This circuit is similar to Fig. 1, except that H.F. gain control is provided, instead of control of the signal input to the H.F. stage. In some cases this can give some slight advantage, especially when the short-circuiting of the aerial winding, as in Fig. 1, upsets ganging with the particular coils used.

In operation, the slider is earthed as regards H.F. by the second .1 mfd. condenser. This enables the reaction to be controlled *via* the .0003 mfd. fixed condenser as before.

In the H.F. stage the operation is as follows. When the slider is fully to the left (in Fig. 4) the maximum negative bias is applied to the grid and across the 1,000 ohm resistor. If now, for example, the slider is rotated to bring 1,000 ohms into circuit, a network is formed with two 1,000 ohm resistors, the V.M. bias being obtained from the junction. The bias applied to the valve is, therefore, halved. On bringing the potentiometer element further into circuit, the bias is reduced still more, the V.M. bias therefore being reduced in the necessary manner as reaction is advanced.

Even with the potentiometer fully in circuit, some bias will still be applied to the H.F. stage. However, a small bias has no appreciable influence on volume, and instead of the full negative bias being used the tapping may be reduced to such a value as is necessary for sufficient control at the minimum setting of the control. A convenient degree of V.M. control, with reaction, will then result.

Domestic Receiver

Fig. 5 shows the panel of a receiver built up using possible simplifications. In this the right-hand control is a potentiometer with on-off switch. It therefore switches the receiver on, and rotation increases H.F. gain to maximum; further rotation leaves H.F. gain at maximum and builds up reaction until the oscillation point is reached. The left-hand control is the tuning-

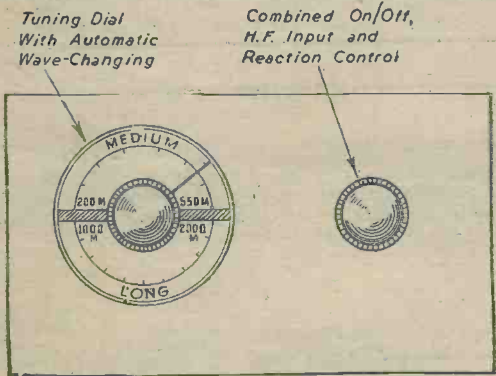


Fig. 5.—Showing simplification of ordinary T.R.F. receiver controls by system described.

dial, the pointer being free to travel the full 360 degrees, and automatic wave-change switching coming into operation as the pointer moves from long-wave to medium-wave scales, or vice-versa. It is merely necessary, therefore, to turn the pointer to any station on either band and adjust the second control for volume.

The combined on-off, H.F. and reaction control is obtained by using the circuit in Fig. 1, with a potentiometer with switch.

The automatic wave-change switching is obtained as shown in Fig. 6. It is necessary to use a gang condenser which can be rotated through a full circle, and the pointer, with concentric or other reduction drive, is also arranged so that it can be fully rotated, several revolutions in one direction if necessary. As shown in Fig. 5, a small space is left between the long- and medium-wave band on the dial. While the pointer and condenser is traversing this space the cam shown in Fig. 6 opens or closes the wave-change switch contacts, depending on whether the pointer is moved from medium- to long-wave parts of the dial, or vice-versa. In consequence, turning the pointer to any wavelength on either band automatically adjusts the set to the necessary wave range and tunes to that wavelength. For example, the set may be tuned up from 200 metres to 550 metres on the M.W. band. Further rotation opens the wave-change switch contacts as the pointer passes the blank space, the tuning-condenser vanes then being fully intermeshed.

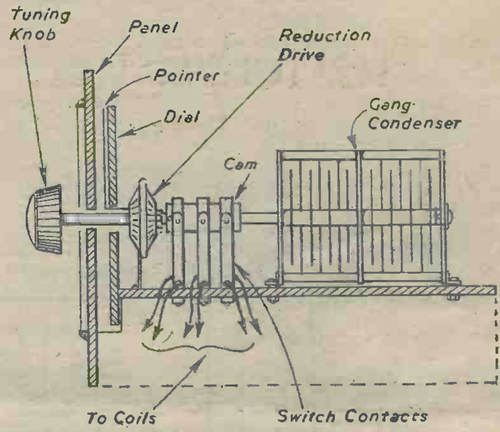


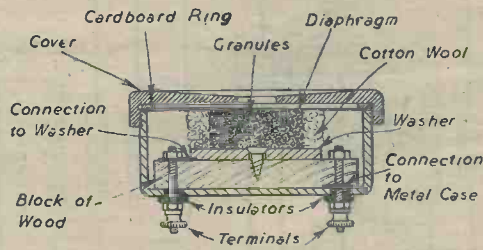
Fig. 6.—Automatic wave-change switching.

Further rotation opens the condenser, tuning down to 1,000 metres if necessary, when the contacts close for M.W. reception if required.

This method may also be used with horizontal or vertical dials, and with three- or four-band receivers, with some slight complication.

A Simple Microphone

I WAS temporarily in need of a microphone and, not wishing to buy one for the occasion, I constructed one on the following lines. I obtained a single earphone and substituted a square piece of wood for the coils and magnet. To this was screwed a large metal washer, so that it was insulated from the metal case, and round it placed a ring of cotton-wool. Inside this were placed the carbon granules. The block is held in place by terminals from which leads are taken, the internal connections being from the metal washer and the case. So that the stalloy diaphragm should make sufficient



Details of a simple microphone.

contact with the carbon granules, the varnish should be carefully removed and a thin ring of cardboard placed on top to hold it tight when the cover is screwed down. As the aperture in the cover is small, one has to speak close to the mike. I take this opportunity to compliment you on your excellent paper.—J. TOOME (Whitstable).

Aerials for Transmitters

Details for the Selection, Erection and Testing of Various Types of Aerial

By W. J. DELANEY (G2FMY)

THE amateur who is already "on the air" will hardly need any advice concerning aerials unless he is finding difficulty in getting across with his existing equipment. On the other hand, the prospective amateur transmitter is probably concerned as to what type of aerial he will eventually put up, especially if he has read some of the publications dealing entirely with aerial arrays. The following notes will no doubt be of value in helping him more easily to arrive at a decision and thereby simplify the work of getting his station erected in readiness for a licence.

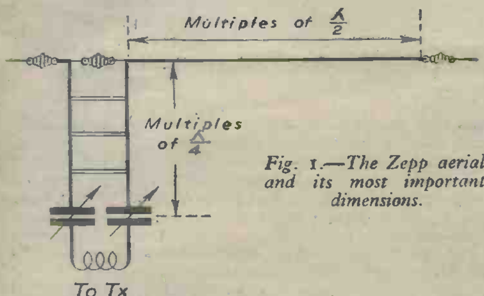


Fig. 1.—The Zepp aerial and its most important dimensions.

Aerials may roughly be classified into simple single-wire elements, or multi-wire arrays. Into the first group come the Hertz, Windom, Dipole, W3EDP, etc., whilst into the second group come the Sterba, Bruce, 8JK, and modifications of these.

Aerial Lengths

Before settling down to the selection of the type, it is necessary to consider what space is available. In this connection it is important to remember that it is not by any means essential to put the aerial out in the open. A really efficient aerial *may* be erected in a loft and in some cases (notably where a small folded array is to be used), the additional height gained by using a loft as compared with the ordinary type of mast which would be used in the normal garden will prove of the utmost value. The first thing to bear in mind in selecting the aerial is the length of the space which is available. For this purpose it is necessary to remember the equivalent wavelengths of the amateur frequencies which are in use, and that the aerial will tune to roughly twice its natural length in metres. As a rough calculation therefore, we may take it that a full-wave aerial on 7 mc/s (40 metres) calls for, roughly, 132ft., 20 metres 66ft., and so on. From this you can see very quickly whether or not a full-wave or half-wave single wire can be erected in your particular location, or whether some form of folded array must be used. Another point to bear in mind is whether or not the actual transmitting room will be at one end of the aerial. In most homes the garden will be at the back of the house, and the transmitter will be in one of the rooms, which means that if an aerial is run straight down the garden, and some type necessitating a centre feed is employed, this feeder has to travel right back to the house and *may* influence the performance. The ideal arrangement where a centre feeder is employed is obviously where the transmitter is situated immediately beneath the centre of the aerial and in the majority of cases this is not possible.

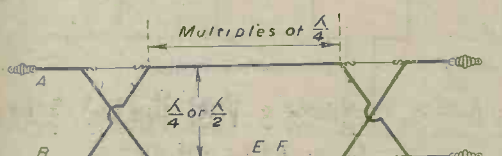


Fig. 3.—The Sterba, and modifications of it, follows the above form. 600-ohm feeders may be taken from AB, CD or EF, according to the size of the array.

Feeders

Furthermore, if the feeder is going to be so very long some form of support has got to be considered, and this again will probably introduce difficulties. Twisted flex or similar low-impedance feeders may be supported by insulators on short lengths of wood attached to a fence, for instance, but 600-ohm feeders or similar spaced wires are much more difficult to support without upsetting the balance.

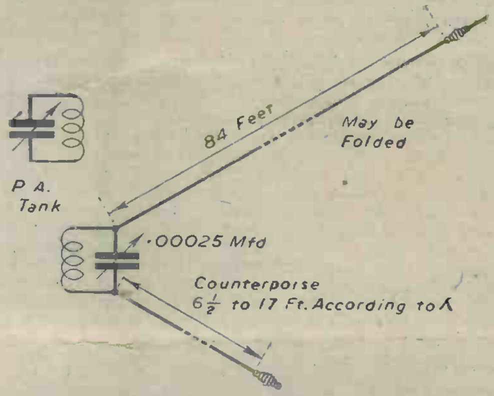


Fig. 2.—The W3EDP aerial, which is very efficient and may be folded to occupy small space without greatly impairing efficiency.

Another point to consider here is that with some single-wire schemes with centre-attached feeders, the latter must drop away at right-angles for at least a quarter wavelength before changing direction, and cannot be run parallel to the aerial proper unless spaced by that dimension. For all of the above reasons, the Zepp is probably the most effective type of aerial which can be erected in the single-wire type. It may be supported at the house end above the window into which the feeder is to be taken, the feeder may drop almost vertically from the end of the wire, and the feeders may be accurately tuned at the house end to compensate for all the effects of nearby objects. It is not a very difficult matter, either, to get the horizontal length *exact* and thereby obtain maximum efficiency from the system.

Arrays

So far as arrays or barrage aerials are concerned there are two important factors to bear in mind. Firstly, there is the length of space which is available (as most of these require at least a whole wavelength in the horizontal direction), and the type of mast which can be used to support the aerial.

These barrage aerials can be erected in a horizontal manner or vertically, and in the majority of cases it will be found that the bottom of the system needs to be more than quarter wavelength above the ground. From this it will be seen that for 14 mc/s, for instance, the bottom of the aerial array must be about 16ft. up, and if the folded system is a vertical one with quarter-wave depth, the top comes 33ft. up, which means a fairly substantial mast to support the weight at that height. Again, the space available will probably mean, in most cases, that these aerial arrays must have centre feeders and these will prove troublesome running up the ordinary garden!

Another point before deciding on the aerial system

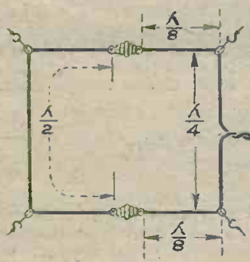


Fig. 4.—A folded dipole with reflector which can be easily fitted up in a loft for 14 mc/s or higher.

is what type of result is to be obtained. That is, do you need world-wide coverage or are you more concerned with working a given area? In other words, after deciding from the space available what types of aerial *can* be put up, you must consider the polar diagram of that type of aerial and see whether it will fulfil your purpose. This may in some cases result in a decision having to be made upon a beam array in order to obtain maximum results in a given direction. As a more or less general rule, it may be taken that a single wire of the end-fed or centre-fed horizontal type to cover the main continents more or less equally will require to be erected (in the British Isles), running slightly East of North to slightly West of South. But, the direction of the aerial as well as its length will be governed by local conditions and these details can only be taken as a guide.

Erecting Aerials

Having decided upon a type which will suit the space, and the objects of erecting the transmitter, there is the question of erecting the aerial. Rope of some kind will be needed, plus masts and insulators. Ordinary clothes-line *may* be employed, but is not the most satisfactory. Ex-Government weatherproofed cord can be obtained in some towns, but failing that, obtain a good cord (the *best* make of clothes-line may be used in this case) and soak it for some hours in molten paraffin-wax. Don't boil the wax, merely get it to the smoking stage, and lower the line slowly into it and stir with a stick whilst still over a hot stove, until all the bubbles have ceased to rise. When bubbling has stopped, take the saucepan or whatever receptacle has been used, with the rope still in, out into the garden and attach the end of it to a fence and stretch it round the garden to dry. Then take an old piece of rag (serge is ideal) and, wrapping this round the rope, walk along and rub it thoroughly. This removes surplus and prevents a crust forming which will break up and spoil the effect. It's a messy job, but prevents sagging or stretching with changing climatic conditions. The same treatment can be applied to lengths of ½in. or ⅜in. wooden dowelling used for spacers in 600-ohm feeders.

Joints in rope supports or halyards are best spliced and afterwards wrapped with insulation-tape. Joints in aerial wires or feeders should definitely be well soldered, my own preference being to lay ends parallel after well tinning and then to bind with thin, tinned copper wire, afterwards well "wiping" the joint with plenty of solder. This will ensure that no high-resistance joints are to be found in the aerial system. The aerial wire itself should, of course, be a substantial gauge of solid wire (not stranded), 14 or 16 s.w.g. being most suitable—and see that it is enamelled, and paint all joints after making to prevent corrosion due to weather.

Masts

For most ordinary purposes, wooden masts are the simplest. Trellis or simple multi-section masts can be made with wooden laths (for instance, 2in. by 2in., or 2in. by 1in), but flag-poles or telegraph-poles are better if you can get hold of them. Metal masts can give trouble due to absorption or reflection effects, and for the same reason, metal guy-ropes should be broken into sections with insulators, making certain that all complete runs of wire are less than quarter wavelength. Of course, on 10 metres and below, a metal mast may be used as an aerial or radiator, whilst small rod beams can be erected for these frequencies and supported direct on a roof. But these notes are for those who have not yet commenced transmitting activities and they are not advised to start on the ultra-short wavelengths!

Inside a loft, weather-effects will not have to be tolerated, and some economy may be effected in regard to the supporting material and insulation. But, remember that the water-tank, if one is present, is a large earthed body and may be made use of as a reflector, or avoided by keeping well away from it. The feeders from a loft aerial may be taken straight down to the transmitter if this is in a room beneath the roof, and a small hole in the ceiling may be covered by using one of the neat feed-through insulators, and a short, direct feeder provided with quite an improvement in efficiency. On 14 mc/s an ideal aerial may be erected in this manner in most houses. A half-wave folded dipole with reflector may be supported on the tie-beam or from the purlins, using ordinary brass cup hooks to which simple egg-type insulators may be attached (See Fig. 4).

Testing the Aerial

Remember that when erected it is not possible to judge the performance of the aerial until it has been in use for some continual lengthy period. Conditions may be bad when it is first put into commission or, alternatively, a false impression of efficiency may be gained due to extra good conditions on the first try-out.

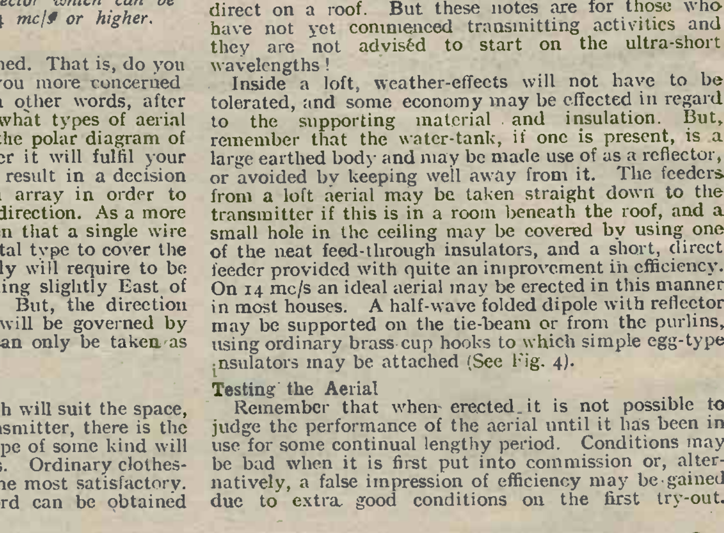


Fig. 5.—A Bruce folded aerial—ideal if there is sufficient room to accommodate it with two or more wavelengths.

ON YOUR WAVELENGTH

By THERMION

Awards to Inventors

MANY of my readers who own patents in connection with radio will be interested in the announcement that the Royal Commission on Awards to Inventors has issued a pamphlet containing the relevant part of its terms of reference, the rules regulating the procedure before the Commission and general instructions for the guidance of intending claimants before the Commission. Copies can be obtained from H.M. Stationery Office, or through any Bookseller, price 2d., by post 3d.

The Commission will not begin its public hearings of claims before 12th November, 1946, and a further announcement of the times and dates of sittings will be made in due course. Details of cases to be heard will be published in the Daily Cause List.

The Royal Commission on Awards to Inventors set up in 1919, after the first European War, issued a number of reports which have been summarised in a pamphlet first published in 1929 and entitled "Statement of the Principles of Assessment Governing Compensation adopted by the Royal Commission on Awards to Inventors." Reprints of this pamphlet can also be obtained from H.M. Stationery Office, or through any Bookseller, price 6d., by post 7d.

Whilst in no way bound by the rulings and decisions of the 1919 Royal Commission, the present Commission will in general have regard to the principles and policy adopted by the 1919 Commission as summarised in this pamphlet.

Communications intended for the Commission should be addressed to the Secretary, Royal Commission on Awards to Inventors, Somerset House, Strand, W.C.2.

Snoopers

ACCORDING to a Daily Paper reporter, police chiefs organising Britain's network of wireless-equipped patrol cars are concerned at the threat to police security through the use by ex-Servicemen of "low-frequency receivers" brought home from the Army. He says that it is known that thousands of discarded Army radio sets, in particular the Number 11 set designed for short-distance work, are now in the possession of demobilised soldiers. Most police messages are now broadcast from headquarters in ordinary speech and these Army sets are capable of picking up the messages. He also says that formerly police messages were issued in code, but this was discontinued several years ago when the danger of interception was known to be negligible. He tells us that "the unauthorised amateur will be prosecuted wherever sufficient evidence can be obtained." As one of my correspondents so aptly remarks this reporter is either misinformed or this is a further threat to the liberty of the subject. For, of course, there is no such offence as unauthorised listening under these circumstances. The only offence is passing on or making use of such information.

Television Recording

IN a recent issue I stated that it was impossible to record television, apart from films, and Mr. N. Bowker, of Luton, writes: "If you care to turn to the pages of any textbook on television you will find details of Mr. Baird's method of recording a television scene on a wax cylinder." I thought everyone knew that low definition television is obsolete, and I was referring to high definition television. I am well aware of the fact that low definition television has been and can be recorded. Details of it appear in our own manual entitled "Newnes Television Manual." Mr. Bowker "awaits my comments with interest." Well, here they are!

Whilst on the subject of television, I have received the following interesting letter from Mr. Lauri Wylie, co-author with Mr. Lupino Lane of "Sweetheart Mine," now running at the Victoria Palace:

"Through the courtesy and hospitality of Mr. S. Lee, whom I found at his offices—of Lee Products (Great Britain), Ltd., Radio House, East Street, Brighton—I was able to 'look in' on Monday at the televising of 'Sweetheart Mine.'

"It was a most enjoyable evening. The entire play, which was written by Lupino Lane and myself, was given and I had the unique experience of seeing the show wonderfully broadcast for sight and sound over a distance of sixty miles.

"To me the effect was almost eerie. Myself complete with comfortable armchair, good companionship and a glass of something at my elbow watching my collaborator, manager, producer and leading actor all rolled into one putting the show over at the London end. It was easy to imagine oneself actually in the Victoria Palace because the laughter and applause of the audience were there as well as the dialogue and music. It was not actually my first experience of this marvel but it was the first time I had ever seen anything of my own televised.

"I was asked whether I thought that Television might, in time, affect the living stage adversely. No! I think, myself, that it will help it. It has been my experience that a good broadcast of a play sends people flocking to the box office—because they like to see in the flesh what they have heard over the air. The same thing should apply to Television. You do not get the Theatre itself but you get a sprinkling of the theatre. It is like giving out handbills with kaleidoscopic illustrations.

"No mechanical medium can, in my opinion, replace the live contact between audience and players which the Living Stage provides, but Television is wonderful—and it is going to be still more wonderful with colour, wider screens and a longer range, and although it may not rival my beloved theatre, so long as it advertises it I will be content.

Yours sincerely,
(Signed) LAURI WYLIE."

"Verboten"

(or, COMEDIANS, YOU HAVE BEEN WARNED!)

[B.B.C. Order.—Comedians must not use the word "squatter" in humorous material.]

Squatter! That word is quite taboo;
And now we make it clear to you,
Its use is quite *verboten*,
Lest mighty ones annoyance feel
Each time that it is spoken.
For Ministers disapprove of chaff,
And think the people should not laugh
If plans of theirs go wrong,
And "Squatter" well might raise a grin
If used in sketch or song.

Although, of course, our land is free,
Comedians most discreet should be—
Beware of humorous skitting.
So cock no snooks at Ministers—
We think that most unfitting.
Although at times they should be spanked,
Their dignity is sacrosanct,
And safe whilst in our keeping.
So watch your step, offend them not,
Our censors are unsleeping!

"TORCH."

Frequency Modulation—3

In This Article C. A. QUARRINGTON Describes the Main Features of the Receiver Design

THE principles and advantages of frequency modulation were analysed in the two previous articles, and attention can now be given to a brief examination of the various stages which go to make up a frequency-modulated receiver, before considering each stage separately, in greater detail. Fig. 1 is a block diagram of a normal receiver of this type, from which it will be seen that the sequence of function of the various stages would be identical with that of a normal superhet, were it not for the fact that the second detector is absent, its place being taken by the limiter and frequency amplitude converter. The limiter, as described in the previous article, performs the function of "blocking" amplitude variations and preventing them from being passed to the next stage. It also provides a source of automatic volume control for the preceding stages. The frequency amplitude converter takes the place of the detector and performs the function of changing frequency to amplitude modulation, that is to say, it converts rate of change of carrier deviation to rate of change of amplitude modulation, and extent of change to depth of modulation. The various stages of a frequency-modulated superhet receiver having been made familiar, they can be investigated in detail and their special requirements examined.

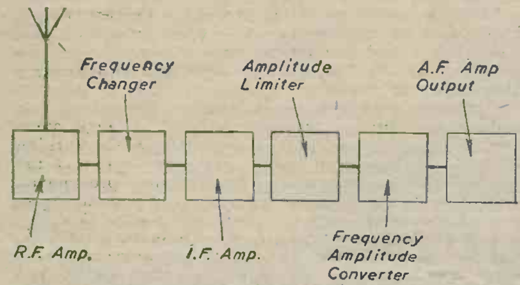


Fig. 1.—This block diagram shows the basic stages of a frequency-modulated superhet receiver.

The R.F. Stage

The radio-frequency stage differs from normal only in so far that tuning must not be so sharp that the outer edges of the bandwidth are seriously attenuated. This remark assumes that wide-band frequency modulation is in mind. On the frequencies at which this system is likely to be used it is unlikely that this difficulty, due to over-sharp tuning, will arise. The main difficulty of the design at this stage is to produce any worthwhile stage gain which should, of course, be as high as possible, in order that the input to the frequency changer may be high and to relieve so far as possible the intermediate-frequency amplifier from having to attain too high stage gain with its attendant danger of instability. As is normal in the R.F. stage of a superhet, adequate selectivity is necessary to prevent interference from image signals and inter-action with oscillator frequency harmonics; adjacent channel selectivity can be ignored in this stage, as this discrimination will take place in the I.F. amplifier. If transformer coupling is used the danger of hum reaching the frequency changer from the R.F. anode circuit does not arise; if, on the other hand, tuned-anode coupling is employed, every reasonable precaution must be taken since the presence of hum in the input circuit of the frequency changer will bring about most undesirable results. Reference to the skeleton circuit at Fig. 2 will show that C.1 and R.1 are a form of potentiometer connected across the H.T. supply, in which significant hum ripple may be present. By making C.1 as small as possible and R.1 as small as possible this danger will be correspondingly reduced, since the impedance of C.1 increases in inverse proportion to frequency, in other words, the smaller C.1, the greater will be the percentage of hum ripple developed across it, and consequently, the smaller will be the hum ripple developed across R.1. It is, of course, the potential difference developed across this resistance which controls the action of the frequency changer grid. There is a prevailing tendency to use an excessively high value of grid resistance following a tuned anode coupling. As already stated, it is desirable that the largest possible signal be fed to the frequency changer, but some care must be taken when working at very high frequencies to ensure that the frequency changer will not become overloaded, as this will tend to cause the oscillator to be pulled off its correct frequency. Some compromise must therefore be effected which may take the form of controlling the R.F. amplifier grid by a portion only of the available A.V.C. voltage. The higher the frequency at which the receiver is intended to operate, the more should be the proportion of A.V.C. used as the danger of pulling the oscillator correspondingly increases.

The F.C. and I.F. Stages

The frequency changer stage is also normal in its general arrangement, but great care in design must be taken to ensure adequate freedom from mains hum, and a reasonable immunity from frequency drift; in addition, the I.F. transformers must be designed to accept the wide bandwidth without serious attenuation of the outer edges. As a matter of convenience this point is considered below with the I.F. amplifier as a whole.

The effect of hum in the frequency changer of a frequency-modulated receiver differs from its effects in an amplitude-modulated receiver. It is both desirable and interesting to investigate the effect of frequency drift and hum in this type of receiver. The reader will be aware of the general effect of frequency drift in an

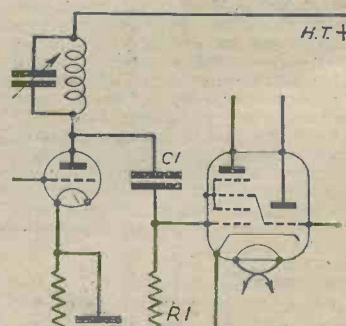


Fig. 2.—With tuned-anode coupling there is always danger of passing hum ripple from the anode circuit to the following grid; and component values should be chosen to attenuate such frequencies as much as possible.

amplitude-modulated receiver; this effect known as frequency distortion is straightforward in character and results in over accentuation of the higher audio frequencies due to the intermediate frequency being slightly incorrect. In frequency modulation the result of this is different, since it limits the carrier deviation frequency by creating a condition where the centre or

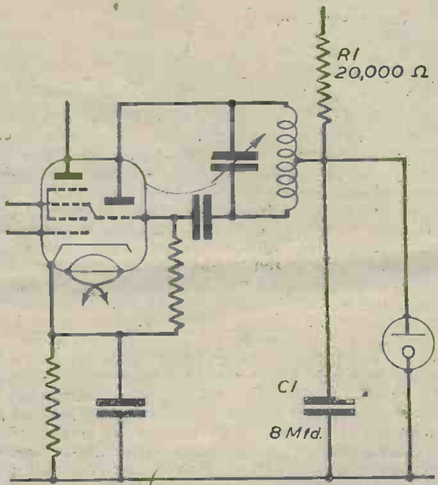


Fig. 3.—The use of a voltage stabiliser to prevent frequency variation caused by audio frequency feed-back or hum.

unmodulated frequency of the received signal will, after passing through the I.F. stages, be out of alignment with the frequency-amplitude converter, thus flattening the upper or lower half of the modulated wave-form, after conversion to amplitude modulation. This flattening of the wave-form results in amplitude distortion which is very much more disagreeable to the ear than frequency distortion for equivalent conditions in either system. The amplitude distortion caused by oscillator drift in this manner occurs only at maximum modulation, unless the frequency drift assumes ridiculous proportions.

The presence of hum in the frequency changer stage of a frequency-modulated receiver can be very severe, and calls for rigorous precautions to ensure that it is not present to an objectionable degree. In an amplitude-modulated receiver, the presence of hum, unless abnormally high, does not appear in the audio output; hum in the grid circuit, or any circuit that can influence it, results in frequency modulation to which a normal detector is unresponsive. (Do not forget that amplitude-modulated receivers have just been discussed and do not be misled by this reference to hum causing frequency modulation.) In a frequency-modulated receiver where the detector is replaced by a frequency-amplitude converter frequency modulation due to hum set up in the frequency changer will appear as an audible note, the volume of which may be considerable, as it will have been amplified by the I.F. amplifier which in this type of receiver tends towards very high gain.

Avoiding Hum

It is difficult to make specific suggestions for reducing hum in an unspecified form of frequency changer, but the following suggestions are generally useful. Obviously, however, the H.T. itself must be adequately smooth otherwise attention to other details will be wasted. It is important to note that adequate smoothing for a frequency-modulated receiver means much heavier smoothing than would be the case in the normal type of receiver. The oscillator anode should be de-coupled using a large capacity electrolytic condenser, which in turn should be shunted by a condenser having a lower impedance at very high frequencies, such as a .001 mfd. mica condenser. Each side of the heater should be earthed through a similar condenser of about .01 mfd., and all de-coupling condensers should terminate at a point on the chassis common to each particular stage. Grid leads should be kept very short and if a separate oscillator is used the inter-connection between this valve and the mixer must be arranged to give the minimum possible length of lead.

The elimination of hum in a frequency changer stage can be extremely difficult, particularly when working at a certain high frequency. The writer had occasion to modify such a receiver to effect certain improvements necessitating a reduction in the overall hum level; investigations with an oscilloscope showed that the largest single contribution of the overall hum level was due to the oscillator. The hum introduced in this stage was being fed back from the output stage and therefore effective de-coupling of the oscillator anode at hum-frequency was necessary. As an alternative this feedback might have been stopped by converting the output stage to push-pull, but it was decided to overcome the trouble by adequate decoupling. Considerations of H.T. voltage available limited the decoupling resistance to 25,000 ohms and even when the

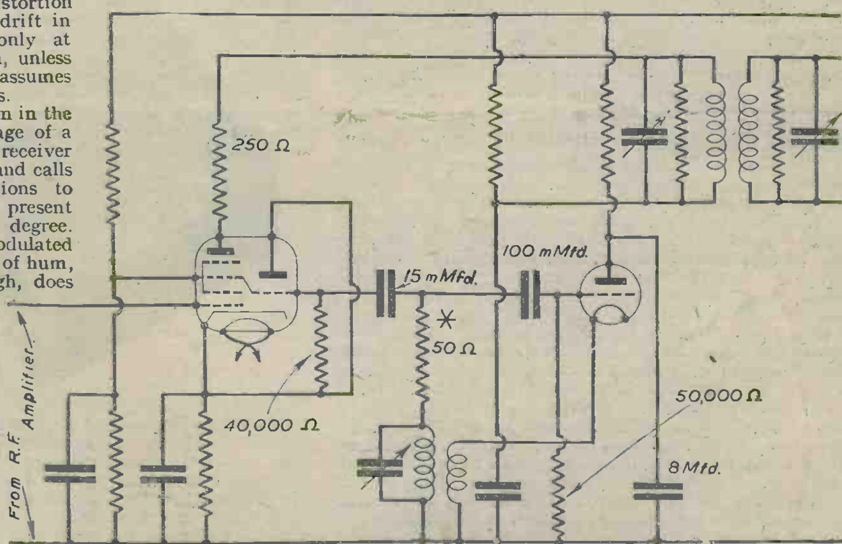


*Fig. 4.—The basic circuit of a frequency-changer stage, used by the writer for 24-30 mc/s; decoupling condensers were all .05 mfd. (paper, except for the 8 mfd.) and all were shunted by .0001 mica. Resistance marked * must be non-inductive. Valves used were 6K8 (triode-hexode) and 6K5 (triode).*

de-coupling condenser was built up to nearly 100 mfd. by connecting various capacities in parallel, the effective feedback was not sufficiently reduced. It was, therefore, decided to adopt drastic measures which took the form of the circuit illustrated in Fig. 3, which it will be seen consists of a normal de-coupling arrangement using 20,000 ohms and an 8 mfd. paper condenser with the addition of a neon voltage stabiliser connected across it. This arrangement proved entirely satisfactory even when the condenser was experimentally reduced to 1 mfd. This idea is not original but is included as a striking illustration of precautions necessary under severely adverse circumstances.

A Suitable F.C. Stage

Comment on the exact type of frequency changer to be used has been avoided as its selection is not governed by the subject under discussion, except that as already explained its frequency stability must be of a high order, an attribute that is highly desirable in any form of frequency changer but particularly so when used in a frequency-modulated receiver. For the sake of completeness, however, a frequency changer circuit is shown at Fig. 4 which the writer has found satisfactory up to 30 mc/s., the highest frequency covered in course of experiment. No originality is claimed for this circuit, the receiver in question being of commercial origin. There is, however, one point worthy of note, the introduction of negative feedback produced by a portion of the oscillator inductance being in the cathode circuit; negative feedback considerably assists frequency stability and also makes a contribution towards amplitude stability.

The I.F. amplifier is again orthodox, with the exception of the design of the intervalve couplings, which must have the necessary wide-band characteristic, again assuming that wide-band frequency modulation is employed. Obviously the aim of the I.F. transformer design will be to approach as nearly as possible a square frequency characteristic. The method of achieving this desirable wide bandwidth with rapid cut off immediately beyond its extremities will, of course, vary to some extent with the intermediate frequency selected, which in turn will be governed by the wave band that the receiver is intended to cover. If it is intended to reach relatively high frequencies, say 40 or 50 mc/s., the chosen intermediate frequency must be the result of compromise, since a lower frequency offers opportunity for greater gain and selectivity and lessens the difficulties of achieving stability, but on the other hand a higher frequency will reduce the number of spurious responses which are liable to intrude.

Spurious Interference

It will be seen that the most straightforward approach to this compromise is to reduce the number and amplitude of such responses by every other available means, such as the reduction of oscillator anode voltage and attention to the selectivity of the R.F. coils and then adopting the lowest intermediate frequency which gives reasonable freedom from spurious interference. Whatever the intermediate frequency chosen difficulty is likely to be experienced in obtaining the desired type of response curve, while retaining high magnification. It should be remembered that the limiter valve will require a minimum input in the region of 3 volts which must be developed by the I.F. amplifier from the minimum aerial input with which the receiver is expected to work. Clearly, then, there will be occasions when a very high overall gain is required from the I.F. amplifier. Unfortunately, the I.F. coils will almost certainly need to be damped in order to achieve the necessary wide response which militates against maximum magnification. In addition to widening the response by damping, further means must necessarily be adopted to obtain an approach to the desired frequency characteristic, the normal solution being the combination of sharply tuned and over-coupled transformers, or a combination of these and a critically coupled transformer. Assuming three I.F. stages are used, there are four I.F. transformers that can be treated in this manner. Possible sequences, counting from the frequency changer, are (1) sharply tuned single circuit; (2) over-coupled transformer; (3) sharply tuned single circuit; (4) over-coupled transformer. With this combination the first tuned anode is usually damped and the second undamped or less damped. An alternative is: (1) critically coupled transformer; (2) over-coupled transformer; (3) sharply tuned single circuit; (4) over-coupled transformer. If three I.F. stages are used there will be a fifth I.F. transformer coupling the limiter with the frequency amplitude converter. Reference to this has been avoided above, as its design is influenced by considerations other than that of shaping the overall frequency response curve.

A "Faked" Curve

Whatever sequence of tuned circuits is adopted, the overall response curve can be "faked" by varying damping across the various tuned circuits. In arriving at the appropriate resistance values for damping the tuned circuit immediately preceding the limiter, it is necessary to bear in mind the heavy damping which that valve will impose. For practical purposes, this damping can be taken as being equal to half of the limiter grid circuit load resistance.

The "Selectest"

THE G.E.C. "Selectest," M.4110, is a universal and portable multi-range testing instrument, which will measure D.C. and A.C. voltages and currents at power and audio frequencies and also D.C. resistances. It contains a single high grade movement with a knife-edge pointer and mirror inset into the scale. The movement is dead beat and gives full scale deflection with a current of 3 milliamps. It is protected against overloads by means of an automatic cut-out which can be reset by the pressure of a push button on the front of the instrument. The instrument has first grade accuracy.

The G.E.C. "Selectest," a universal multi-range testing instrument.

Two range selecting switches are incorporated and are mechanically interlocked to ensure only one range is selected at a time. A control switch is also fitted on the front to set the pointer for resistance tests. There are two scales, one with 75 divisions and the other with 150 divisions, for the current and voltage ranges, and a third scale for resistance. A multiplying switch is included to double the range on the current and voltage scales. The scale length is 5in. The whole instrument is enclosed in a bakelite case with carrying handles.

The ranges cover voltages up to 1,500 A.C. or D.C.; currents up to 30 amps. A.C. and 15 amps. D.C.; and resistances up to 10,000 ohms.

High Gain A.F. Amplification Using Negative Feed-back

Description of an Unusual Form of Amplifier for Short-wave Enthusiasts.

By L. MILLER

It is generally admitted that when building a simple short-wave T.R.F. set, the maximum A.F. gain is desirable to boost up the received signal for good L.S. results. Readers who have had experience in designing high-gain audio-frequency amplifiers will be well aware of the chief snag, namely, A.F. instability, usually taking the form of motor-boating or howling.

"Howling" is, of course, motor-boating at an audio frequency, and, conversely, motor-boating is "howling" at such a low frequency that the individual "pops" are audible separately. But the snag, whether motor-boating or howl, boils down to positive feed-back—unwanted regeneration; in other words, it is due to certain sections of the amplifier and/or power pack being common to more than one stage.

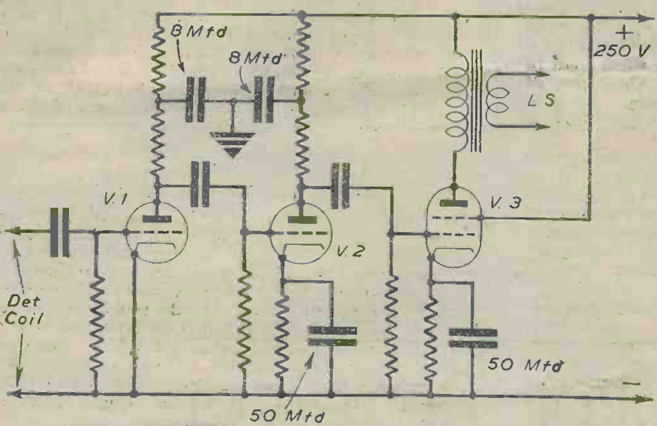


Fig. 1.—Standard L.F. amp. circuit with decoupling.

A.F. instability is not usually encountered when only two stages of A.F. are used (when referring to "stages" one must include the detector, as the detector is in reality a diode detector and audio amplifier combined).

Using a simple reacting triode or R.F. pentode as the detector, followed by an output pentode, the A.F. gain is normally quite high, but if a medium-impedance triode is placed between the detector and output stages the gain is appreciable and extremely useful in boosting up a weak signal. However, many set designers will fight shy of using this extra A.F. stage, on account of the trouble (and expense) of using very thorough decoupling.

Avoiding Expense

Take a glance at the circuit in Fig. 1 of a typical three-stage amplifier, decoupled to avoid A.F. instability.

It was with a view to avoiding expense that the writer decided to utilise *negative* feed-back to counteract instability which is, of course, *positive* feed-back, in the same way that mathematicians add minus two to plus two to get back to zero!

The outcome of experimenting on these lines is shown in Fig. 2, and it will immediately become apparent that the circuit is simplicity itself. It looks more like a "skeleton" circuit in a text-book! Comparing Fig. 2 with Fig. 1, it will be noticed that four costly electrolytics are saved—two 8 mfd. and two 50 mfd.

Now for the technicalities! Negative feed-back is introduced into the stages of V2 and V3, simply by omitting the by-pass condensers, and as this negative feed-back is sufficient to overcome the positive feed-back the decoupling condensers and resistors are no longer needed.

True, a certain amount of amplification is lost, but reverting to the normal 3-stage circuit of Fig. 1 it can be stated with impunity that the volume control would rarely, if ever, be turned full on, as the overall gain is usually too high for practical purposes, using normal mains valves. If, however, a triode detector is assumed to be used in Fig. 1, and a R.F. pentode is used in Fig. 2, the extra A.F. gain afforded by the R.F. pentode would more than compensate for the loss due to omitting the by-pass condensers in V2 and V3 of Fig. 2.

Furthermore, high values of anode resistor may be used to obtain maximum gain from each stage, without involving the risk of instability. If a triode is used as V1, the total amplification is reduced, but may be made to approach that of Fig. 1 by making R1 and R2 200,000 ohms each, but even if they are as low as 50,000 ohms each the total gain is very much more than afforded by any two-stage amplifier.

As negative feed-back is normally used to reduce distortion, it cannot be said that the quality suffers in the circuit of Fig. 2!

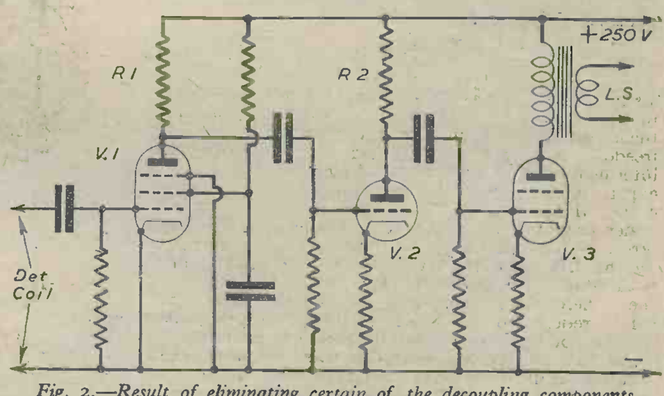


Fig. 2.—Result of eliminating certain of the decoupling components from Fig. 1.

The only criticism that *might* be raised against this circuit is the loss of bass response by the omission of the bias condenser of the output valve V3. This is more apparent than real, however.

How It Works

Very briefly, the theory of this type of negative feed-back is that as the bias resistance is not by-passed by a large condenser this bias resistance now becomes part of the output load; a pulsating voltage, due to the signal, is developed across it which is also common to the grid circuit.

In the case of V2 the anode circuit is purely resistive; that is, the value of the load (in ohms) is the same at any frequency (within limits) and the amount of negative feed-back is always a fixed proportion of the output voltage (this proportion being the ratio between the value, in ohms, of the anode resistance to the value of the cathode resistance), irrespective of the frequency of the signal.

Now V3 has an inductive load in its anode circuit (the primary of the output transformer). When computing the amount of negative feed-back that is applied to this stage the D.C. resistance of the anode load is of little importance, as the impedance, or A.C. resistance, is very much greater and also increases proportionately with frequency. Therefore, the ratio between anode load and bias resistance is not constant with frequency, but is smaller at the higher end than it is at the lower end of the audio-frequency spectrum; consequently the amount of negative feed-back rises inversely as to the frequency, which means that, in theory at least, the low notes are attenuated more than the highs. In practice this low note attenuation is almost negligible, and its effect is least noticeable when the bias resistance is low in value, such as it is when using a low grid base output valve, such as the APP4b or 6V6 types. Even when using a 6F6, with its cathode resistor of 400 ohms, the attenuation is not noticeable when using a standard 8in. speaker.

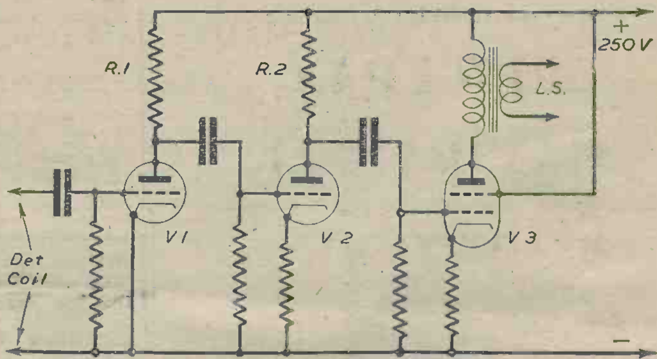


Fig. 3.—A similar circuit to Fig. 2 but with a triode input stage.

The author has used this circuit in a T.R.F. 1-v-2 set, and has experienced no sign of motor-boating or instability, using a 6J7 detector, 6J5 first A.F., and 6F6 output pentode. It should appeal to experimenters on account of its extreme simplicity and low cost.

A Pocket Receiver

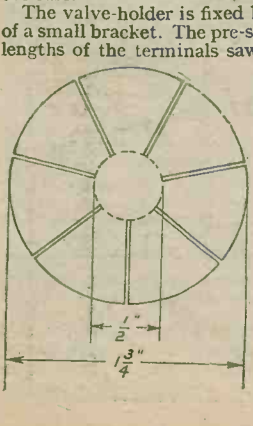
A Compact and Neat Receiver, which, Complete with Batteries, Measures only 4¾in. x 7¾in.

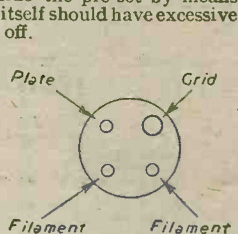
THIS receiver, complete with the necessary batteries and earpiece, can be built in a cigar box, the inside dimensions of which are only 4¾in. by 7¾in. by 1in. deep. In spite of this no special parts except the midget valve are employed, the coils being wound as flat discs, and the batteries being standard types. For tuning, a pre-set is used, and this is quite satisfactory. Further to save space reaction is controlled by moving the reaction coils in relation to the grid coils.

Constructional Details

Fig. 4 shows the location of the parts and most of the wiring. The receiver is built upon a piece of sixteenth-inch thick plywood, 4¾in. by 7¾in. This is later placed in the case.

The valve-holder is fixed beside the pre-set by means of a small bracket. The pre-set itself should have excessive lengths of the terminals sawn off.





Figs. 1 and 2.—(Left) Details of the discs for making the long-wave coils. (Above) Pin connections of the valve.

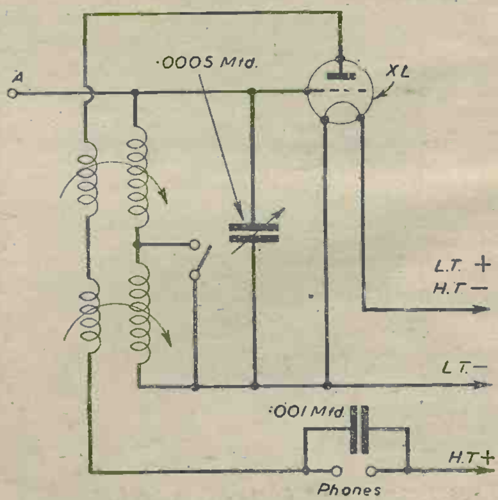


Fig. 3.—The circuit diagram of the pocket receiver.

The medium and long-wave coils are fixed to the plywood with small screws. Each reaction coil is mounted on a narrow strip, pivoted near the edge of the plywood back, so that by swinging each coil the coupling can be adjusted to control reaction. To facilitate this at the centre of each coil a small insulated knob is fitted.

(Continued on page 503)

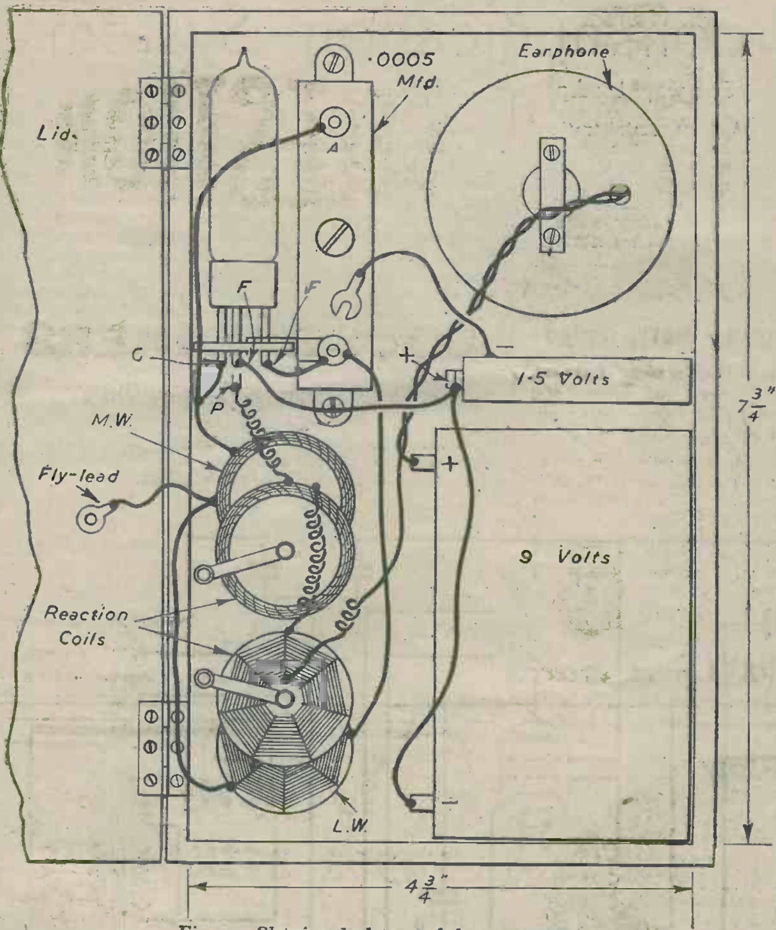


Fig. 4.—Showing the layout of the components.

grid coils are of such a size as to enable the desired stations to be tuned in, this is all that is required.

Wiring and Operating

Figs. 3 and 4, in conjunction with Fig. 2, which shows the pin connections viewing the valve from below, should make all the wiring clear. The reaction coils must be connected with thin flex to permit of their movement.

The top terminal of the pre-set is used for aerial connection, about three yards of thin flex arranged as convenient being used. The bottom terminal is fitted with additional nuts, a small spade being connected to switch on, as there is not room for an ordinary switch. For wave-changing a fly-lead from the junction of the medium and long-wave coils is also connected to this terminal. If an earth is ever used it may be joined to H.T. minus.

The .001 mfd. condenser shown in Fig. 3, is connected inside the earpiece. Reverse the reaction leads if no reaction can be obtained.

As the filament consumption is only .06 amp. a small cell is suitable for L.T. A grid bias battery is used for H.T., although the use of torch batteries would enable the H.T. voltage to be increased to 18.

Results, with a three-yard aerial and no earth, are such that quite satisfactory 'phone reception is obtained from the more powerful stations. The set is not suitable for use in areas where reception is bad unless a fairly good aerial can be erected. The aerial should not be too long, or it will prevent reaction being obtained.

Winding the Coils

For the long-wave coils three discs of card should be cut to the size shown in Fig. 1. There are seven slots, cut to within ¼in. of the centre, as shown. The coils are now wound with 44 S.W.G. single silk covered (or similar gauge) wire, passing it in and out of each slot as winding progresses. Two coils of 120 turns are required for the grid winding, these being connected in series so that both windings are in the same direction. For reaction 130 turns are required.

The medium-wave coils are each wound with 40 turns of 32 S.W.G. double silk covered. The turns are wound in a pile, then each bound with thread and fixed to a disc about 1½in. in diameter. The medium-wave reaction coil is connected in series with the long-wave reaction coil, as shown.

The turns or sizes of wire used on the coils may be varied within wide limits, since if sufficient reaction turns are employed to enable reaction to be obtained, and the

LIST OF COMPONENTS

- Hivac 1.5 volt valve type XL (or similar detector-L.F. type).
- .0005 mfd. pre-set.
- Small-sized earphone.
- Wire for coils and batteries (see text).
- .001 mfd. condenser.

Signal Generator

THE Mail Order Supply Co., 24, New Road, London, E.1, have recently sent us an interesting pamphlet dealing with a "ham" signal generator for transmitters and receivers. The instrument employs a triode hexode valve of which the hexode portion generates the carrier frequency, and is tuned by a variable condenser. The triode section of the valve is connected into a crystal oscillator circuit working at 100 kc/s., and generates copious harmonics. The crystal oscillator modulates the hexode circuit which is the carrier oscillator. The power supply is from a 6 v. battery, and a special clip is supplied which enables 6 v. to be tapped off a higher voltage accumulator. The H.T. supply is from the vibrator unit. The generator measures 8½in. x 7½in. x 6¼in. and weighs 11lb. The instrument is brand new and costs £6 15s. (carriage paid). An extra vibrator, valve and fuses are supplied as spares. Complete circuit diagrams, component lists, working instructions, etc., are available with each generator.

An Intercommunication System

An Easily-made Two-way Loudspeaking Telephone. By C. J. MOORE

TO satisfy the needs of a small factory administration the writer recently constructed the intercommunication system shown in the illustration. The system evolved consists of a master amplifier and five separate sub-stations. The master station can call the sub-stations by the selection of a rotary switch. The sub-stations can answer and call the master station, but cannot call one another.

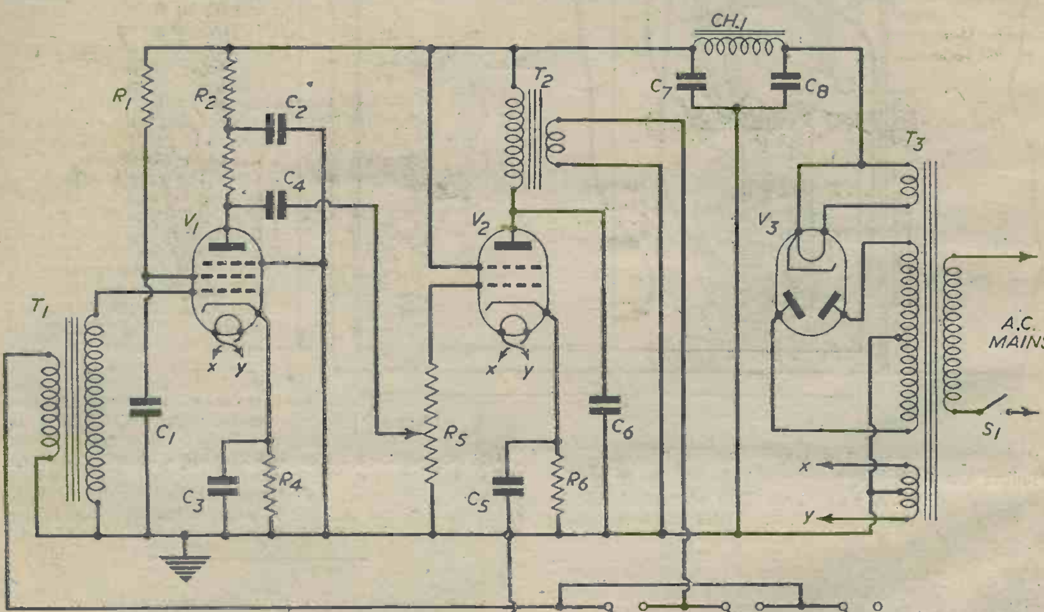
The Control

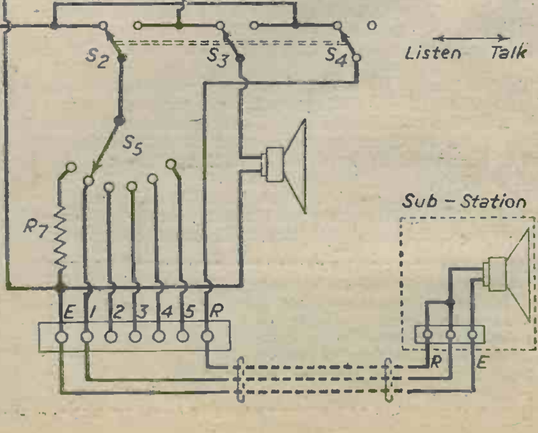
The only controls used on the master station are the "talk-listen" switch, volume control, station-selector switch, and mains on-off switch. A G.P.O. type switch was obtained for the "talk-listen" control. A type was chosen where the switch is spring loaded to return to the original position after being pressed. In this circuit it was arranged that the normal position is the "listen" for the master station, and only pressed when the station wishes to speak. The volume control is left in a set position which is suitable for the whole system of speakers. Station selection is arranged by a single pole, six-way wafer switch. Five positions are used for the selection of the five sub-stations, whilst the sixth position is a "silent" position where the selector is returned after a call is finished. The mains on-off switch is of the normal toggle type. Normally, the unit is left running during working hours, as the consumption is of the low order of 25 watts.

Sub-stations

The sub-stations are all constructed in an identical manner, consisting only of a speaker and a spring-loaded single pole toggle switch. This switch is only closed when it is necessary for the sub-station to call the master, and then only for the duration of the call. When the call is received by the master station the station selector is moved to the appropriate position, when the conversation is carried on in the normal manner.

In the whole of the equipment 3½in. moving coil speakers are used. These speakers were chosen as they are most suitable for use, both as a microphone and a speaker. The amplifier is of a conventional design, using a 6J7G valve working as a high gain audio amplifier, resistance capacity coupled to a 6V6G beam power output valve. Precautions against hum pick-up were taken by screening the input transformer and the associated wiring in the amplifier. It was found unnecessary to screen the three-core cables used for distribution to the various sub-stations.





COMPONENT VALUES

R1 2 meg. ½w.; R2 200kΩ ½w.; R3 500kΩ ½w.; R4 2,000Ω ½w.; R5 ½meg. volume control; R6 200Ω ½w.; R7 10Ω ½w.; S1 S.P. on/off switch; S2, S3, S4, Combined 3-pole, 2-way G.P.O. switch; S5 S.P. 6-way wafer switch; S6 S.P. on/off switch; V1 6J7G.; V2 6V6G.; V3 5Z4G.; C1 1 mfd.; C2 4 mfd.; C3 25 mfd.; C4 .01 mfd.; C5 25 mfd.; C6 .002 mfd.; C7 8 mfd.; C8 8 mfd.; T1 100:1 mike input transformer; T2 output transformer—5000Ω input impedance; T3 250v.-0-250v. at 60 mA., 6.3v. at 2A., 5v. at 2A.; CH1 20H at 80 mA. smoothing choke.

Practical Hints

A Switch Plug

THIS is a design for a switch plug, used to disconnect the heater and smoothing condenser wiring on an A.C. receiver, as well as connecting battery H.T. and L.T. for emergency use.

It consists of an old five-pin valve base, which is fitted into a paxolin four-pin holder with a small hole drilled in the centre to admit the fifth pin. When the plug is pushed home the four outer pins connect H.T. and L.T. supply in the normal way, and the centre pin enters its hole and forces a bolt, which is occupying the hole, inwards. This bolt is screwed to a piece of ebonite on which are a pair of brass contacts. This is held against a similar piece by two springs, as shown in the diagram. This second piece has a hole drilled in the centre to allow the bolt from the upper piece to pass through it.

Thus, when plug is fitted it forces pieces apart and breaks the heater and smoothing condenser circuits in the A.C. layout.

On withdrawing the plug the springs return the contacts to their original position.—J. D. LEE (Leicester).

THAT DODGE OF YOURS!

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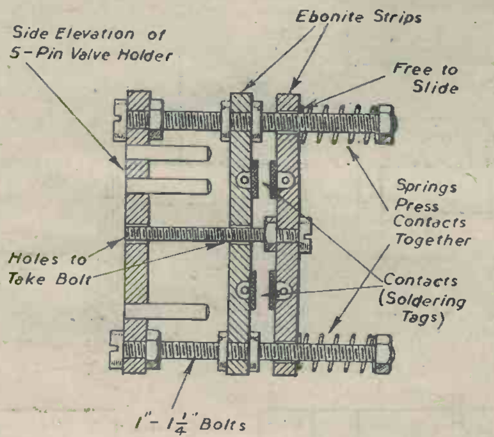
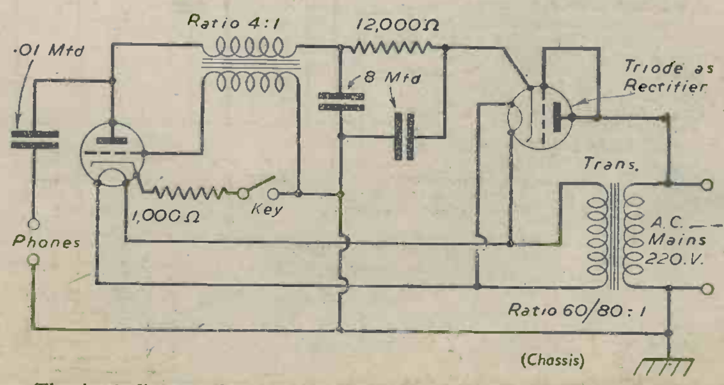


Constructional details of a switch plug for disconnecting the heater and smoothing condenser wiring on an A.C. receiver.—J. D. Lee (Leicester).

Mains Oscillator

I RECENTLY constructed an A.C. mains oscillator from a modified American circuit. I am enclosing the modified circuit.

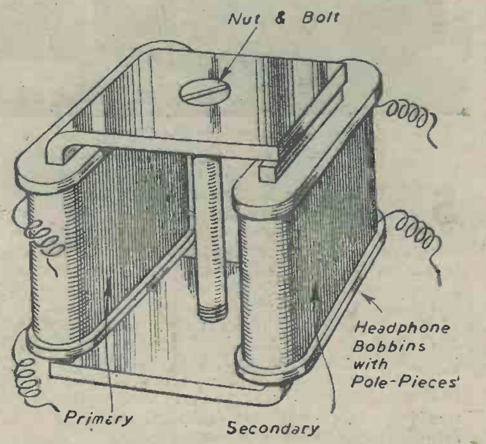
I used the two triodes and in one the grid and the anode were strapped together, and the valve was used as a rectifier. An old speaker transformer with a ratio of about 60 : 1 was used to transform the mains voltage down to a suitable level for the valve heaters. A 12,000 ohm resistance was used to reduce the H.T. voltage, as well as to smooth the supply in conjunction with two 8 mfd. condensers. The rest of the circuit is quite straightforward. A speaker could be used instead of the 'phones, but I found that the volume was not too great to bear. A variable resistance of about 5,000 ohms might be put in parallel with the 'phones as a form of volume control.—J. MCKINNEY (Portstewart).



The circuit diagram of an A.C. mains oscillator.—J. McKinney (Portstewart).

A Midget Transformer

USING the bobbins from a discarded pair of headphones, with their pole-pieces, a midget coupling transformer may be made as in the illustration below.



A midget transformer made from a discarded pair of headphones.—R. Shaw (Darlington).

The original windings will provide a ratio of unity, but a desired ratio may be obtained with a re-wound primary. Due to the limitations imposed by the current carrying capacity of the windings, parafeed should be employed. The original model was placed in a valve base sealed with wax, the valve pins being the connections.—R. SHAW (Darlington).

The German

A Review of Pre-war Po

(Left) The German People's receiver, the V.E.301Wn. (Right) The D.K.E.38.

SINCE 1934 the Nazis controlling the German radio industry have produced several models of People's Receivers in their efforts to control Broadcast reception in Germany, standardise production, and maintain Dr. Goebbels promises of a receiver at a low price for everybody. The sets were in two main series, the V.E.301, so named after the date of the rise to power of the Nazi Party on January 30th, 1933, and the D.K.E.38, or German small receiver of 1938. Both series has models for A.C., D.C., and battery operation.

The first People's sets were the V.E.301W for A.C., the V.E.301G for D.C., and V.E.301B for battery working. V.E.301W and V.E.301G consisted of a simple straight circuit with a triode detector and pentode output. Wavelength coverage was from 200-2,000 metres; the coil assembly, identical for all models, had an aerial coil provided with four taps for medium waves, and three for long waves, to give optimum results with different aerials. Tuning was effected by a .0005 mfd. air condenser through a 7:1 disc drive. Normal reaction was used, and a 1:4 transformer coupled the stages.

Valves Used

All these models were fitted into rectangular plastic cabinets measuring 11in. × 15in. × 6in., and were provided with 8in. moving iron loudspeakers. The metal chassis and other components were of conventional design. The A.C. model used an indirectly-heated 4v. triode, R.E.N.904; and a directly-heated pentode R.E.S.164; H.T. was supplied from a half-wave rectifier R.G.N.354. The D.C. version had two indirectly-heated valves, the triode R.E.N.1821, and pentode R.E.N.1823.

The battery versions of this set were the V.E.301B (4v. valves) and B2 (2v. valves), which used three battery valves in a simple straight detector, L.F. and pentode output circuit, all stages being resistance capacity coupled. These sets used the following valves:

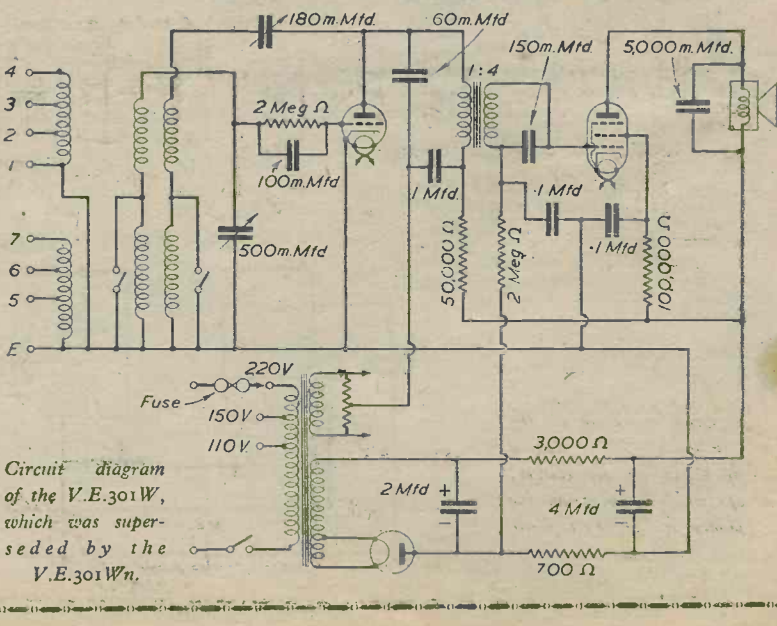
V.E.301B, filament volts 4: triode detector R.E.034; triode L.F. R.E.034; pentode output R.E.S.174d.

V.E.301B2, filament volts 2: triode detector K.C.1; triode L.F. K.C.1; pentode output K.L.1.

These designs provided good local reception, but, understandably, range and selectivity were poor. At night range increased, but swamping by local transmitters was often experienced.

The next People's set was the V.E.301 Wn., in 1936, described as the "Improved People's Receiver." This set had the same general characteristics as the earlier models but used a circuit with a better coil assembly fitted with a swinging aerial coil and using an H.F. Pentode A.F.7 as detector.

This production gave better results than the older models, and under favourable conditions, with a good aerial system, was quite effective. At the present time in the Rhine district the B.B.C. Home Service is regularly receivable on one of these sets, although volume is not good during the daylight hours. These models were retailed at about 64 Reichmarks, which, to a German, probably had the purchasing power of £4 to £5.



Circuit diagram of the V.E.301W, which was superseded by the V.E.301Wn.

People's Receivers

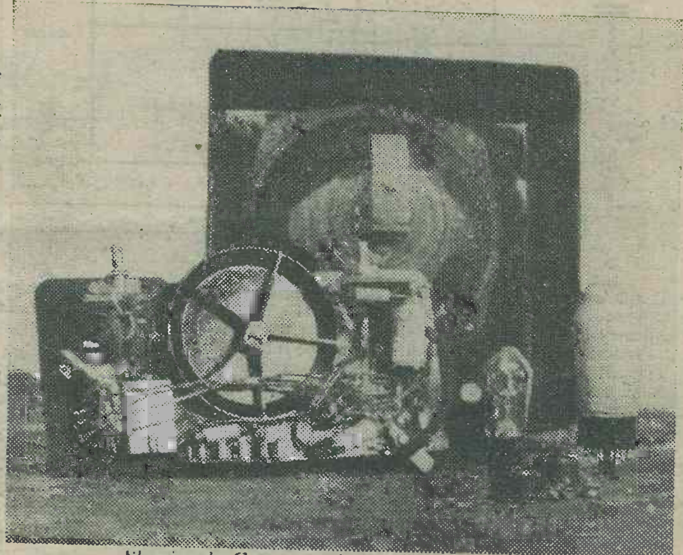
opular German Receivers. By G. A. Kent

An Improved Version

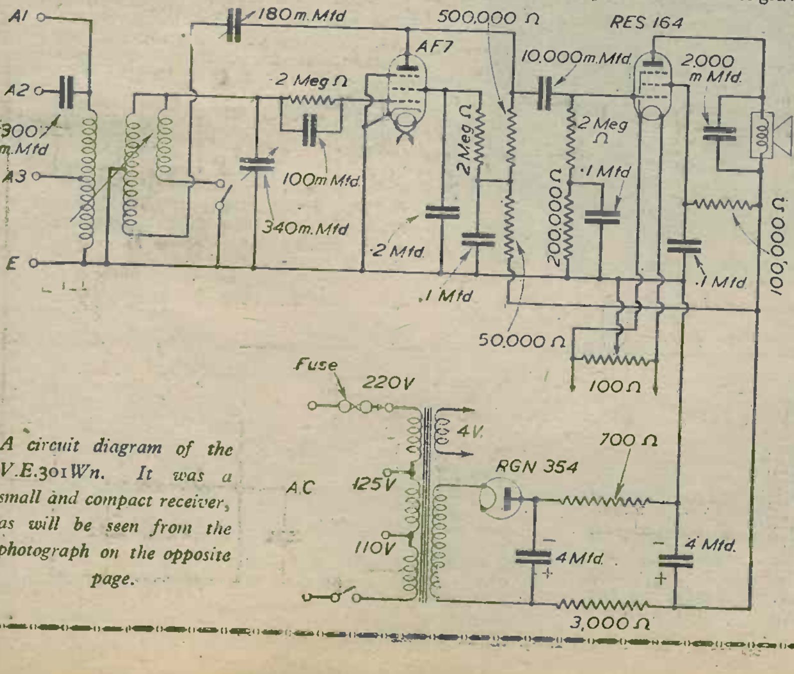
A further improvement was effected in this model by the introduction of the V.E.301 Wn. Dyn., in 1938, which had an energised moving coil speaker and full-wave rectifier, R.G.N.1064. The latest model in this series was the V.E.301 Dyn. G.W., also produced in 1938. This was a universal mains set, using a smaller cabinet, a P.M. moving coil speaker, and a large horizontal dial; however, this set retained the basic circuit of the V.E.301 Wn.

In 1938 a cheaper and smaller series was commenced in an effort to provide a really cheap set within the reach of everybody. This was called the German Small Receiver, D.K.E.38, and was a universal mains set, using a triode-tetrode, V.C.L.11, to provide a triode detector and tetrode output stage in the same envelope. A similar coil assembly to that in the V.E.301 Wn. was used, but perhaps the main interest in this receiver lies in the economic ingenuity displayed in its construction.

The set is provided with a plain plastic cabinet, measuring 9in. × 9in. × 4½in. and a 7in. moving iron loudspeaker having a pressed cardboard chassis. All other components are mounted on a thin sheet of paxolin. The tuning condenser of .00032 mfd., with solid "Trotitul" dielectric, is mounted horizontally above the baseboard, while the large bakelite disc-knob is fixed to its spindle below the baseboard. This knob projects through a slot in the front of the cabinet and is engraved in white over half its circumference for medium waves, and in red over the other half for long waves. A cam mounted on the tuning condenser spindle operates a simple wave-change switch so that the coil selected corresponds with the engraving of the disc-knob visible at that time. The circuit obtains its H.T., when operating on A.C., from a non-standard half-wave rectifier, V.Y.2, having a 30 volt 50 mA. heater.



Showing the German small receiver, the D.K.E.38.

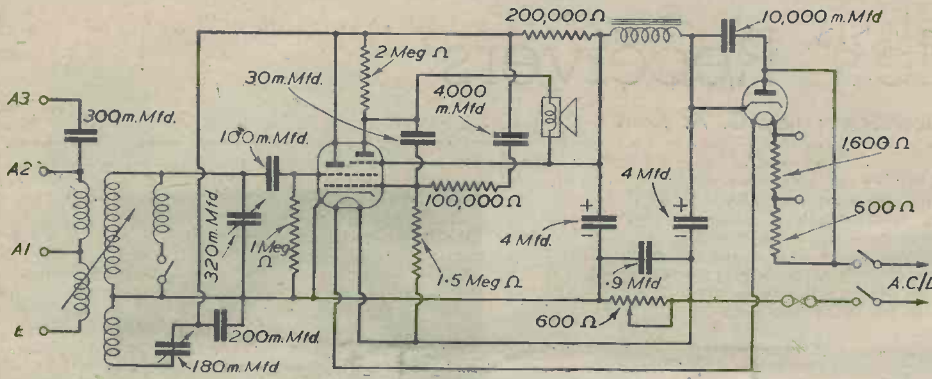


A circuit diagram of the V.E.301Wn. It was a small and compact receiver, as will be seen from the photograph on the opposite page.

Battery Version

A battery version of this set was produced, called the D.K.E.38B2, which used three 2-volt battery valves in a conventional detector, L.F., pentode circuit; the valves are two triodes, K.C.1, and an output pentode, K.L.1, otherwise this set is similar to the mains version. This series provided satisfactory local reception, but beyond that little can be said for its performance, which is governed considerably by local conditions. It was marketed at 35 Reichmarks, which was reasonable enough.

For more discerning listeners various forms of H.F. stage were available for all the different models

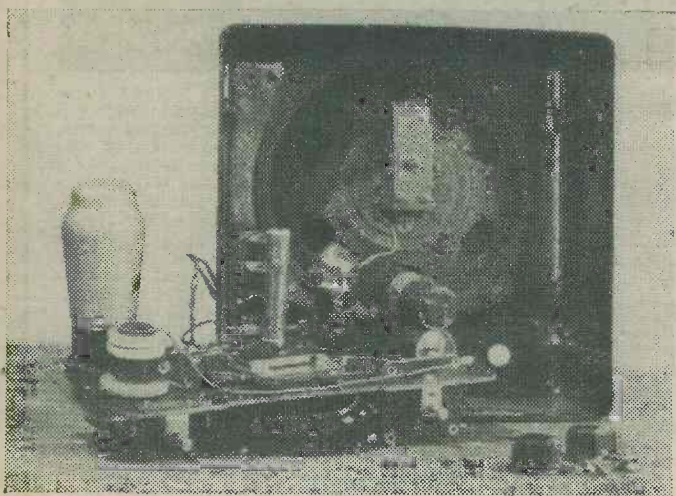


Circuit diagram of the D.K.E.38.

of the People's set. These usually took the form of a screen-grid or H.F. pentode in a conventional circuit, choke capacity coupled to the aerial coil of the set. In the A.C. versions this obtained its H.T. from the set, but heater current was supplied from a small separate transformer. Some of these units were made to fit inside the cabinet, extra tuning controls being fitted at the side. One enterprising manufacturer, "Braun," made an H.F. stage in a matching plastic cabinet to fit into the front of the V.E.301Wn., this had coupling rods enabling all controls to be ganged up. The "Braun" H.F. stage was complete with large illuminated horizontal dial.

Short-wave Reception

In the case of the battery models details were published showing how to make them suitable for short-wave reception. This modification consisted of a simple wave-change switch arrangement to substitute S.W. coils for the original long and medium ones.



Another view of the German small receiver, the D.K.E.38.

Various other attachments were marketed for the People's sets, mainly connected with the aerial system; and, in the case of the earlier models, methods of selecting the correct aerial tap quickly and easily, as this had to be done on tuning from one waveband to another. Many forms of suppressor were available to assist selectivity and prevent swamping in the vicinity of powerful transmitters. Arrangements for attaching extension speakers and record players were also obtainable. To improve the tone from these sets recommendations were made for fitting the whole receiver on to a baffle-board. The D.K.E.38 was to be fitted with its speaker central on an 18in. × 32in. board.

There can be no comparison between the British utility sets and these poor efforts; however, there is no doubt that the designers achieved their purpose in producing a set which could receive very little else but German transmissions at entertainment strength, and at the same time was easy to mass-produce.

Empire Radio School

THE Empire Radio School which opened at R.A.F. Station, Debden, in March this year is now making its first liaison flight to Australia and New Zealand via India.

The aircraft being used for the flight is a Halifax VI (christened "Mercury"), which has been fitted as a Radio Flying Classroom packed with Radar, W/T and V.H.F. equipment. Some equipments carried are not yet in Service use.

The intention of the mission is as follows :—

(a) To discuss and explain all current practices in Radio Training in the R.A.F.
(b) To offer advice in all problems of radio training.
(c) To collect by personal inquiry and to collate material of interest in the development of Radio Training.
(d) To collect data to keep Radio syllabi up to date and to discuss and explain new equipment coming into service.

Visits will be paid en route to A.H.Q.'s Palestine, Iraq, India, Burma and A.C.S.E.A.

Analysis of the Television Receiver—4

This Month We Deal with Synch Separation

THE importance of the D.C. component of the vision signal cannot be too highly stressed when the subject of synch separation is under discussion. Consider the typical vision signals, after detection, of Fig. 20(a). Obviously, in order to separate the synchronising pulses which all lie below the 30 per cent. amplitude line from the picture signals ranging from 30 per cent. to 100 per cent. amplitude, it is necessary to employ some sort of limiting device which will suppress the video-modulation above 30 per cent. while allowing the synch pulses below this level to carry on unaffected. Only the latter will then affect the time-base circuits, appearing from the limiter as shown on the right of the figure. The bottoms of the synch pulses all rest on the same base line and are all cut off at approximately 30 per cent. signal amplitude so that the picture content is completely suppressed whatever its form happens to be. These waveforms have the full D.C. component retained in them.

Now in Fig. 20(b) a series of lines, taken at random from a typical frame, are shown with the D.C. component removed. These lines, as mentioned before in connection with video-distortion, settle down to enclose equal areas on either side of the base line; it will now be seen that it is impossible to draw a straight line through all these signals which will leave all the picture contents on one side of it and the synch pulses on the other. Synch separation by means of a limiting device is consequently impossible. This example points out clearly the importance of the retention of the D.C. component.

One of the simplest methods of achieving synch separation is by means of a diode connected immediately after the detector stage. Two forms of practical circuits are shown in Fig. 21, these being used in receivers where the cathode-ray tube is fed directly from the detector and no video-amplifier is therefore employed. The action of the circuits is simple. In (a) the cathode of the separator valve V_2 is biased positively by R_2 R_3 connected across the H.T. supply, so that the valve remains cut off until the voltage across the detector load rises above a certain value. This value can be arranged to correspond to the 30 per cent. signal amplitude, so that during the picture signal the diode becomes conductive and presents a short-circuit path across the synch output terminals. During the synch pulses themselves V_2 is cut off and so has no effect on the output. The diode must be one of the low-impedance Acorns if the short-circuit effect is to achieve its purpose, and the resistance R_1 must be at least ten times the valve resistance to avoid serious attenuation of the pulses. Taking the valve impedance to be 1,500Ω, R_1 can conveniently be 12,000Ω.

In diagram (b) the diode separator is very similar in action to the one at (a), but in this case a positive bias is given to the anode so that the valve is normally conducting in the absence of a signal. A voltage drop therefore occurs across R_1 approximately equal to the bias voltage. As soon as the signal developed across the diode detector load R exceeds the bias present upon the anode of V_2 this valve becomes cut off and remains so no matter how much the voltage rises across R. The voltage across R_1 consequently falls to zero. If the bias on V_2 is set up to be equal to the synch pulse amplitude across R, then current will flow through R_1 during the synch pulses and develop a voltage across it. Negative synch pulses will therefore appear across R_1 free from the picture modulation. This circuit is not as good as that of (a), for picture modulation can get into the output through the interelectrode capacity of V_2 and is likely

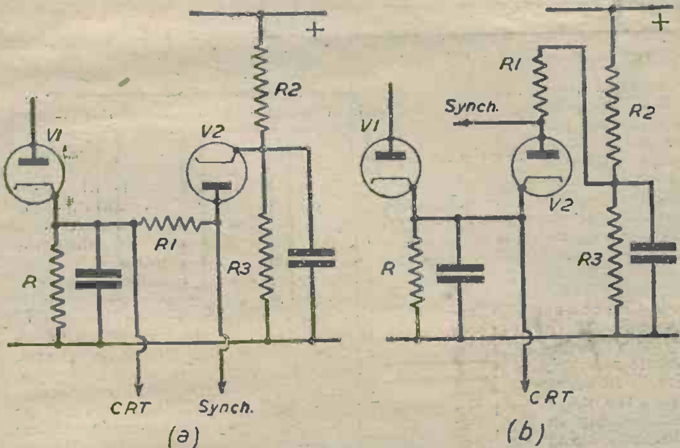


Fig. 21.—Diode separator circuits following immediately after a diode detector.

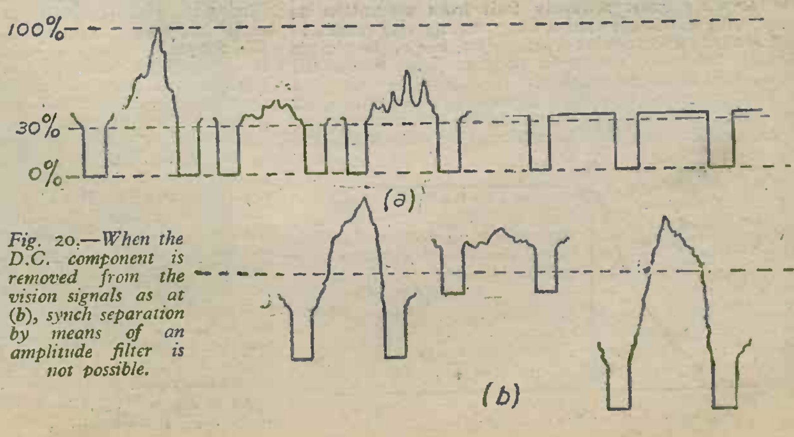


Fig. 20.—When the D.C. component is removed from the vision signals as at (b), synch separation by means of an amplitude filter is not possible.

to upset the triggering action of the synch pulses at the time-base generators.

In both of the circuits, if the diode detector is reversed so that its output is in negative phase, then the synch separator diodes must also be reversed.

Pentode Synch Separation

Where diodes are not employed for purposes of synch pulse separation, pentode valves of the R.F. variety are almost invariably chosen. These are generally more efficient than diodes and lead to cleaner separation, but the diode circuit is, nevertheless, a practical proposition and will give excellent results when carefully designed.

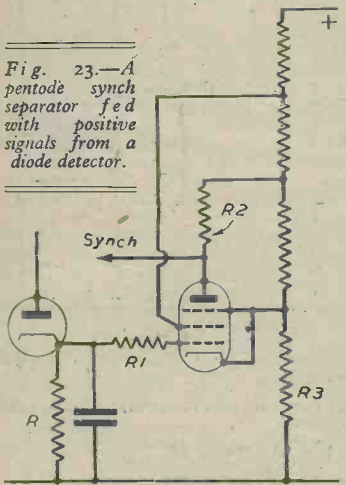


Fig. 23.—A pentode synch separator fed with positive signals from a diode detector.

In general, the principle of using a R.F. pentode for synch separation is to use a valve whose anode current—grid volts characteristic is as shown in Fig. 22. Under this condition of operation the anode current cuts off for a very small negative grid bias, but rises sharply as the bias is reduced, reaching complete saturation at zero bias. In order to obtain an $I_a.V_g$ characteristic of this sort the valve must be run with the screen voltage considerably in excess of the anode voltage, the latter, in fact, being only a few volts positive with respect to cathode.

Figure 23 shows a practical form of pentode synch separator following immediately after a diode detector. The anode of the pentode is tapped well down the H.T. potentiometer to give an anode potential of some 6 volts, while the screen is made off to a higher potential point and receives some 35 volts. The operation of this circuit when vision signals are developed across the diode load resistance R is seen in Fig. 24. The signals are in positive phase, and the pentode is so biassed by the drop across R_3 that the vision signals carry the valve into the region of anode-current saturation. During these periods, therefore, no change in voltage is experienced across R_2. During the synch pulse periods, however, the anode current abruptly falls from saturation to zero, with the result that a large voltage rise occurs at the anode. Rectangular synch pulses, free of the picture signals, therefore, appear in positive phase across the anode load R_2 of the pentode.

The success of this form of separator depends upon the flatness of the I_aV_g characteristic above the upper bend, and this will only be achieved by correct relative

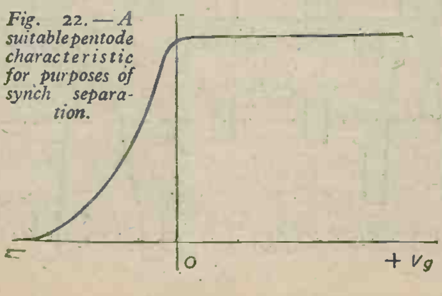


Fig. 22.—A suitable pentode characteristic for purposes of synch separation.

anode and screen voltages. With valves of the MS.Pen. variety an anode voltage of 6 with the screen at 40 volts will give good workable results with the right input. The grid resistance R_1 of the pentode is included to prevent the diode load R being shunted too heavily by the input resistance of the former over the whole of the picture signal; a suitable value is 7,500Ω. The circuit has a slight disadvantage that at least a 10-volt peak-to-peak detector output is necessary to secure proper working, but in cases where the cathode-ray tube is directly fed from the detector this output should normally be obtained.

It is more general to have the synch separator after the video-frequency stage, however, and in this case it is necessary to have some form of D.C. restoration circuit, for the resistance-capacity coupling between the V.F. and the separator stage will normally remove the D.C. signal. A restoration diode may be used as shown in Fig. 25, the separator pentode V_3 working in exactly the same manner as before.

Since the signals from the video-frequency stage are in

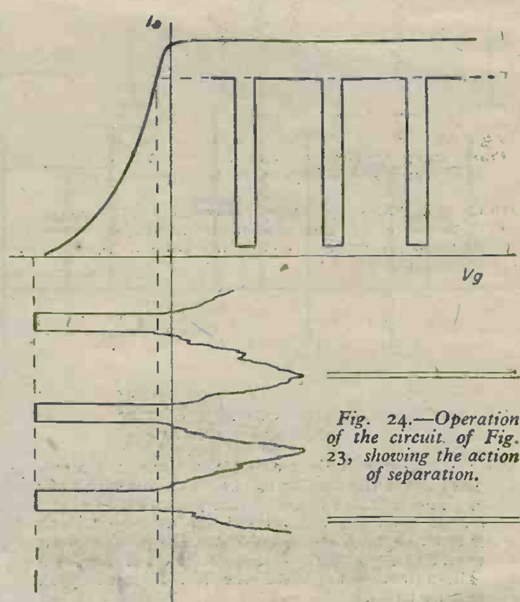


Fig. 24.—Operation of the circuit of Fig. 23, showing the action of separation.

positive phase, some difficulty may be experienced with this circuit on account of grid current flowing in V_3 during the picture signals. The resistance R_2 should be made fairly high, say 0.25 MΩ, to counter this effect, but the frequency response of the separator is bound to be affected by too high a value at this point. It is possible to do away with the pentode separator altogether, utilising the restoration diode to provide the synch pulses. This brings us back to diode separation. The circuit is then exactly the same as that shown previously in Fig. 21(b) with the exception that the resistance R in this figure becomes the resistance R_1 of Fig. 25. This system suffers from the disadvantages already mentioned in connection with Fig. 21(b).

Figure 26 shows a practical form of separator used in some commercial receivers. This circuit differs from those previously described in that V1 is an anode bend detector, giving an output in negative phase. This output is applied to the synch separator V_2 and to the cathode of the C.R. tube; the latter connection is made so that a positive image is secured for a negatively-phased vision signal, a negative signal to the cathode being equivalent to the more commonly applied positive signal to the grid.

V_2 is biased by the potentiometer R_1R_2 across the H.T. supply and, therefore, only conducts when the picture signals have driven the cathode less positive than the anode; during the synch pulses the valve is cut off and these are consequently taken straight off the detector anode through resistance R. In practice, the short-circuiting effect of the diode on the picture signals is not complete, but by using a valve with a sufficiently low impedance and making the value of R some ten times this value, good working may be secured in practice. The system enjoys the advantage that the direct coupling of the cathode-ray tube to the detector stage retains the D.C. component of the signal while remaining quite safe for the tube itself. Should the valve break down the cathode of the tube will be carried at once to full H.T. but the grid will always be negative with respect to this, due to the drop along the chain R_3R_4.

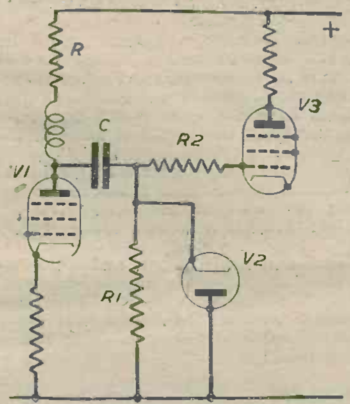


Fig. 25.—When the synch separator is fed from the video stage through a resistance-capacity coupling, a D.C. restoration diode must be inserted as shown.

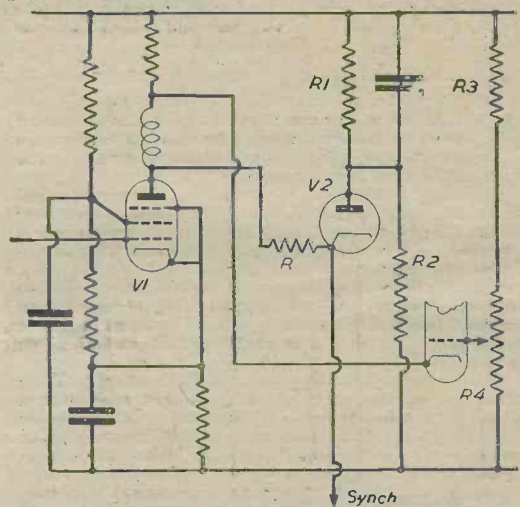


Fig. 26.—Another form of synch separator following an anode bend detector stage.

(To be continued.)

Around the Trade

The Pifco All-in-One Radiometer.

Pifco All-in-one Radiometer

THE Pifco All-in-one Radiometer is now available once again in a new and greatly improved model. Suitable for both A.C. and D.C. testing this Pifco instrument has a multiple scale covering the following ranges:

0–6 volts, 0–240 volts, 0–30 milliamps. An internal battery enables continuity tests to be made while a socket on the front of the bakelite case provides for the testing of 4 and 5 pin valves. In addition to most radio and electronic tests the Pifco Radiometer will be found useful in testing for continuity, shorts and open circuits in domestic electrical appliances and for the testing of car lighting and starting circuits. It can be used on any mains supply, either A.C. or D.C.

Particular care has been given to finish, accuracy and high class workmanship while the price 25/- retail brings the Pifco Radiometer within reach of all.

Short Wave Components

IN order to meet the needs of the short wave experimenter, Stratton & Co., Ltd., Eddystone Works, West Heath, Birmingham, 31, have, after six years of war service, produce a catalogue of "Eddystone" components.

The reputation of "Eddystone" products for high efficiency and outstanding performance, already firmly established, is now further enhanced by experience gained in research to produce equipment for exacting war needs—an undertaking "Eddystone" were well fitted to carry out from their unique position of specialising in equipment for the home and overseas short wave market. Experienced users will require no reminder of the excellent "Eddystone" quality.

The catalogue lists a fine range of transmitting condensers, air dielectric trimmer condensers, coils, dials, knobs, insulators, couplings, extension rods, etc., and various other interesting products.

Technical Notes

More Interesting Sidelights on Phase and Other Problems. By "DYNATRON"

AMONG the more controversial topics I have written about in these columns from time to time is the general ambiguity and mis-terminology connected with modulation and beat effects.

Indeed, "modulation" provides a hunting-ground for innumerable hares. I shall have much more to say on the subject, but return just now to the notion that a superheterodyne mixer is a species of *modulating* device which generates "sideband frequencies."

The idea is fostered in some of the literature. I have been responsible for some quite heated arguments on the question, and a querist now says he is quite unable to see how there should be anything akin to *modulation* in extracting beat-differences.

Neither can anyone else, as far as I am aware! True, advocates of the view would probably offer you a plausible mathematical explanation. For example: that all "sum and difference terms" arise due to multiplicative effects—or "products"—and are, therefore, identical to sidebands.

You may find this rather unconvincing. You may wonder why a frequency-changer was once called a first *detector*, not a modulator, whilst a superheterodyne still embodies *heterodyne* principles! Does the modern mixer involve any radical change in principle, whereby detection becomes modulation?

No doubt you will be told by some that the old view was a relatively amateurish one which no sophisticated technician would dream of putting forward in these enlightened days. Others will try to put you off with a laugh, saying: "It is all a verbal quibble," or question of "terminology."

Terminology and Truth

There is an obvious answer to that, as everyone who has tried to teach technicalities fully knows. Moreover, if a student uses a wrong term at an examination, he will get a blue pencil through it if the examiner does not happen to see eye-to-eye with him!

It will save a lot of writing if you stick to your guns, and insist upon some sort of *physical explanation* of how, say, 1,000 kc/s might be "modulated" by a local oscillator generating 1,465 kc/s? After heterodyning, and *detecting*, is the resulting 465 kc/s anything in the nature of an H.F. sideband?

We may reduce the question to more fundamental terms. If 1,000 kc/s and 1,001 kc/s are heterodyned, is the resultant beat-note at 1,000 c/s anything in the nature of an H.F. sideband? Or, perhaps, an L.F. sideband?

If a 1,000 kc/s H.F. carrier were amplitude-modulated by an independent L.F. note of 1,000 c/s., two high-frequency sidebands of 1,001 kc/s and 999 kc/s would be generated. If you inquire *how* they are generated, heterodyne principles or "harmonics" will not provide the explanation.

Of course, the amplitude-modulation is fairly easy to explain as a sort of complex beat between *three* radio-frequencies. But that will not explain the sidebands.

Modulator or Detector?

"When is a modulating device not a modulator?" I was once told the whole question reduced to a banality of this type.

The question might have been: When is a *non-linear* device functioning as (a) a modulator, (b) a detector? Obviously, it depends what we wish to do—*produce* or *extract* a modulation envelope. If sidebands are generated in (a), there is a little more than "terminology" to the query of whether they are equally generated in (b)!

But, we are told, it is a futile quibble. If one writer chooses to call *beat* sums, or differences, by the name of "sidebands," he is at perfect liberty to do so—even though it may be a little confusing to amateurs!

It is a curious point of view. Scientific and technical terms should have one, exact meaning. They are the means of conveying ideas, and if loose or inadequate, muddled ideas must result.

Thus, sideband frequencies are of the kind ($fc \pm fm$), where fc denotes an R.F. carrier, and fm a very different modulating frequency in the audio scale. Suppose, however, we heterodyned two *radio* frequencies, $f1$ and $f2$.

Wave interference will occur, and after rectification we shall find (among higher harmonics, etc.) two new frequencies ($f1+f2$), and ($f1-f2$). Are these of the same "kind" as the H.F. sidebands ($fc+fm$) and ($fc-fm$) when modulating, or is there some essential difference of principle?

B.S. Glossary 204

Like many things, this is a question of *fact*, not terminology. We can explain how beats occur by the theory of *interference* between two waves of slightly

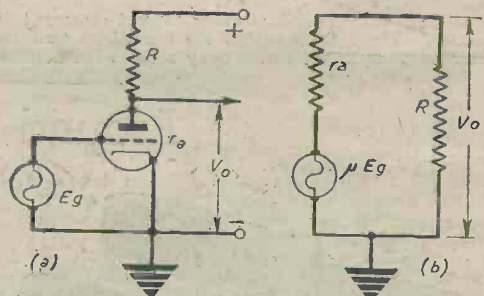


Fig. 1.—Can "phase-reversal" be shown in Fig. 1 (b)?

different frequencies. The equivalent of *rectification* is necessary in order to give us an independent frequency ($f1-f2$).

It is not too difficult to explain, too, how a "sum frequency" ($f1+f2$) should come about. It is altogether a tougher proposition to try to account for sums and differences of the type ($fc \pm fm$) in modulating.

A non-linear circuit element (or its equivalent) is necessary for detecting or modulating, though these processes are obviously not one and the same thing.

If so, the modern frequency-changer is the equivalent of a form of combined oscillator-detector.

But B.S. 204, *Glossary of Terms Used in Telecommunication*, deprecates the use of *detection* in describing modern mixers. It is thought the word really to avoid here is *rectification*. The modern mixer extracts a beat (and in that sense is the equivalent of a *detector*) by a direct multiplicative process without any rectifying action in the usual sense.

If we are careful to use the words "equivalent to" a detector, B.S. 204 cannot very well find fault. It would certainly be more to the point to condemn the misuse of "modulation" and "sidebands" in reference to the subject.

The mixer is certainly more like the equivalent of a detector than a modulator (unless used for modulating). Terms such as "sidebands" are most misleading, and I have seen the jargon extended to straightforward triode or pentode detectors.

"Phase" in Valve Equivalent Circuits

Another subject where rules and conventions seem to be much at variance is the vectorising of valve circuits.

One of the difficulties is to exhibit *phase-reversal* in a valve equivalent circuit such as Fig. 1(b). In the actual circuit 1(a), the output voltage Vo has a 180 deg. phase-reversal relative to the input signal Eg.

The question is: how may this fact be adequately represented in an equivalent A.C. circuit, such as (b)? To the writer, it appears a tough nut to crack, even if attempts are made to represent A.C. and D.C. conditions.

From an A.C. point of view, Fig. 1(b) denotes a *purely resistive* circuit, in which there is an alternating current Ia, developing voltages IaR and Iara, across the resistances R and ra. In any circuit comprising entirely pure resistances, the p.ds IaR and Iara are necessarily in-phase with Ia, and with themselves.

Thus, the total E.M.F., μEg, is simply the *arithmetic* sum (IaR+Iara), there being no question of any phase-differences—when *vector* addition would become necessary. True, it is still arithmetic (or algebraic) addition for the case of 180 deg. phase-difference, but in the circuit shown there is no reason whatever for postulating such a phase-shift.

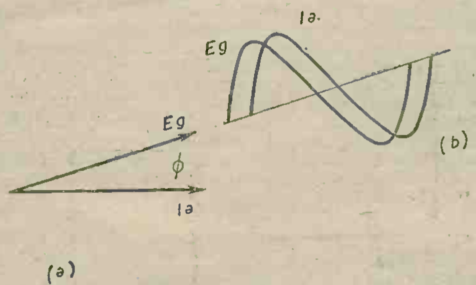


Fig. 2.—Is this possible in a valve circuit at ordinary frequencies?

To repeat: the voltage-drop across each of any number of resistances in series across an E.M.F. μEg must be indicated *in-phase with the current throughout the circuit.* Unless we take liberties with fundamental A.C. conventions, it is hard to see how this statement could possibly be altered even by inserting batteries, etc., to denote D.C. conditions.

No amount of conventionalising can get away from the basic fact that an A.C. component flowing in a pure resistance develops a potential-drop in-phase with itself (the current)—whatever D.C. component there may be there.

It seems, therefore, we should regard the equivalent circuit as purely an A.C. device for simplifying quantitative relationships such as *voltage amplification*, *dynamic mutual conductance*, etc. As it stands, it certainly takes no account of the relative phase of Eg and Vo in Fig. 1(a).

Misleading Negative "Signs"

In discussing phase questions in valve circuits, I have often made reference to the misleading nature of + and − signs.

For instance, in Fig. 1(b), we have: μEg=IaR + Iara, or IaR=the "output voltage" Vo = μEg−Iara. This is a simple statement of Ohm's Law applicable to any and every such circuit (including D.C.), and the negative sign before Iara tells us absolutely nothing about the "phase-reversal" in Fig. 1(a).

Neither is it so helpful as it may seem to try to denote phase-reversal by prefixing a negative sign before μEg in (b)—as is often done in textbooks. It has no effect whatever upon the *relative phase* of the p.d.s across R and ra, i.e., the voltage-drop across each will still be in-phase with μEg, and consequently no phase-change of 180 degs. is exhibited across the individual resistances.

The real meaning of the negative sign is discussed in another article in this paper. There, it is shown how the internal p.d. across even a pure resistance is really of *opposite sign*, or is at 180 degs. to the *applied E.M.F.*, and if certain points in a circuit are at "earth" (or cathode) potential, an "output voltage" similarly phase-reversed may be obtained.

There does not seem any very great advantage in trying to show the fact in Fig. 1(b). Perhaps the best advice is: to forget phase-reversal when using valve equivalent circuits to arrive at formulæ, etc., and study how it comes about in the actual valve circuit.

Another Vector Puzzle!

One occasionally comes across vector diagrams in textbooks which depict a result such as the one drawn in Fig. 2(a), and by sine curves in 2(b)!

Here the A.C. component of current Ia supplied by a valve is shown lagging (or leading) by some small angle, ϕ degrees, upon *its cause*, Eg. The result is usually arrived at in depicting the phase-shifts in oscillators.

Unless a reader has a very vivid imagination he will be hard put to it to try to visualise this state of affairs in any actual valve! Except at ultra-high-frequencies where electron transit-times affect the issue, it seems impossible that Ia and Eg can be *out of step* in this fashion.

By complicated conventions it is possible to regard Ia and Eg as being 180 degs. out of phase but not any lesser angle such as ϕ. The simplest and most obvious convention is to say both are exactly *in-phase*—as much in-phase as, say, the magnetising current and flux in a transformer.

Of course, under certain conditions there can be a phase-shift *in the grid circuit.* For example, Eg may be out of phase with the E.M.F. actually induced in a coil in the grid-circuit—particularly if this coil is tuned by a condenser. Or, again, the grid-cathode inter-electrode capacity may cause a similar shift.

But this is not what ϕ indicates. If, as in the diagrams referred to, Eg is the actual, effective, grid-cathode potential, then at ordinary frequencies Ia must be absolutely in-phase with Eg. The phase-angle ϕ should fall between vectors other than those shown in a correct diagram, i.e., if, as stated, Eg is the grid-cathode potential *afters all other phase-shifts in the grid circuit have been allowed for.*

Regarding "Economy Condensers"

Discussions arise from time to time regarding the economy effected by the use of a condenser instead of a resistance for dropping *A.C.* volts—remembering, of course, that we could hardly expect a universal set to "work" off D.C. with a condenser in the heater circuits!

Exactly how is the economy effected? Things sound a little abstruse when referring to *power-factor*, cosines of phase-angles, etc. Even after a mathematical explanation, it is at least doubtful if the reader who has little time to wade through A.C. textbooks can see very clearly why a condenser should cause an electricity meter to revolve more slowly!

While it is quite interesting to learn that if you connected a purely reactive load like a condenser across the A.C. mains, the resulting "idle current" will exert no turning effort on an ordinary electricity meter, the full explanation tends to become too technical.

But have you thought about the question in this way: a transformer will effect a very considerable power saving over an ordinary resistance—provided you use a fairly efficient step-down transformer. Why?

Well, simply because a transformer gives you a *true* voltage step-down, by inductive action, whereas a resistance "drops" volts by frittering away electrical energy as *heat*. Though probably more expensive than a condenser, a series choke coil would also cause much less loss than a resistance, but would be rather dangerous in an A.C./D.C. set!

For the sake of argument, let us take some simple figures. Suppose 10-watts at 10-volts are required for valve heating—a current of 1 ampere from the mains. If the mains were 210 v., this means that 200 v. must be dropped in a series resistor. At 1 ampere, this represents a heat loss of 200 watts, or a total power from the supply of 210 watts.

With A.C. supply, we might use a transformer having a 10 v. 1 A secondary. The power in the secondary circuit is now 10 watts. In a transformer of this size we may suppose that a further 10 watts roughly will be lost in the core, making the total power taken from the supply on the primary side about 20 watts—*less than one-tenth* of the total power taken when using a dropping resistor.

The mains are still 210 v., but we are taking a current of only 20/200=0.1 ampere approx., as against 1 ampere with a resistance.

Meaning of "Power Factor"

If we substituted a condenser for the transformer, it would have to carry 1 ampere, exactly the same as a dropping resistance.

This is probably where difficulty arises. In each case we are taking from the mains 1 A. at 210 v. Therefore, is not the power 210 watts in each case?

You must beware of applying simple D.C. rules to reactive A.C. circuits. Obviously, the statement cannot be true. A condenser is not a *dissipative* device like a resistance. Energy is not wasted as heat, but is returned into the supply during the intervals when the condenser is discharging.

Put another way: although 1 A. flows through the entire series circuit, the portion of the 210 v. dropped across the condenser is not really "lost" at all (in the sense of power dissipation). Hence we are not justified in saying, 210 v.×1 A.=210 *watts*. They are really *Volt-Amperes* (V.A.).

The *true power* is 10 watts, which we can calculate by multiplying 210 V.A. by a certain "factor," 0.0476 in this case. The circuit has a *power factor* of 0.0476. Mathematically, it can be shown that this factor is also the *cosine* of the angle by which the current is leading on the voltage.

From a Table of Cosines this angle works out to about 87 deg. 18'. Thus, although 1 ampere flows from the supply, it is leading the voltage by nearly 90 degs. or the power factor is not far short of *zero*.

Another rather odd fact about reactive dropping devices is that the voltage-drop must not be calculated by simple arithmetic—at least, not always. We required 10 v., and the mains were 210 v. How many volts must be dropped across the condenser?

If you say 200 v. in this instance, you will not be far wrong. Arithmetic subtraction will do, but don't take it as *the* rule. Suppose you wanted 100 v. Then your condenser would have to drop, not 110 v., but about 174 v.! Vector subtraction must be used, which is a good point at which to leave the subject for the present.

Points About Half-wave Rectifiers

A half-wave rectifier supplies current for half-a-cycle. Is this quite correct?

When a rectifier is switched-on the mains, but with no load connected to the output circuit, what exactly happens? The answer to this will help to arrive at the correct answer to our first question.

If you measured the output voltage on no-load with a very high-resistance voltmeter, you would find the almost evident fact that it is at a maximum. If you had accurate A.C. measuring instruments, you would notice another peculiar fact.

This maximum output voltage when no current is drawn from the rectifier is practically equal to the *peak* A.C. volts across the transformer secondary. In fact, the arrangement forms the basic circuit of a *diode peak voltmeter*. When a load is switched on, the *average* output voltage falls to a lower figure than the peak obtainable on no-load. The larger the load, the lower will be this "average."

This suggests a condenser discharging. The "mean voltage" depends how rapidly it is discharged, and re-charged again by the action of the valve. If there is no discharge (no-load), it simply charges up to the peak voltage above referred to.

The reservoir condenser, C (Fig. 3), is the one we are concerned with. Many call this a "smoothing condenser," but they will fail to understand certain faults without remembering something other than the effect it has on smoothing.

For instance: what will be the effect of a "break" (not a "short") in this condenser? Most modern receivers would be quite unworkable, because the mean output voltage with the set switched-on will seldom be more than some 50/60 v. To get a sufficiently high average, C should be 8-16 mfd.

Rectifying valves supply current *intermittently*—usually over a small portion of an A.C. cycle. During the non-conductive intervals, the reservoir C (which has received a charge during the previous interval of conduction) supplies current into the load.

If the capacity is too small (or the load too large), the discharge will pull down the voltage more rapidly. When next conducting, the valve will again recharge C to some higher voltage. But it is easy to see that the *average* output voltage will depend upon the relative rates of charging and discharging.

Well, what will happen without any discharge at all? The condenser goes on receiving energy, without having to supply any, and obviously there must be some limit to this process. C will continue to charge, until it can receive no more charging current, when the voltage will be at the maximum possible.

When will this be? There are two ways of explaining. First, if we really desire to shirk explanations, we might content ourselves with saying that the "back E.M.F." in the condenser is equal and opposite to the peak positive

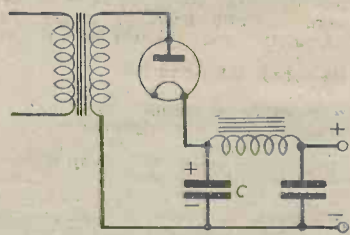


Fig. 3.—What would be the effect of a "break" in the reservoir condenser C?

(and therefore negative) A.C. volts developed in the transformer secondary, and leave the matter at that.

Our explanation would be fairly complete if we carried it a step farther. The "forward" E.M.F is exactly annulled by the "back" E.M.F., so—what? *The valve anode can no longer become positive*, and hence all rectifying action ceases.

The second way shows more clearly why the valve ceases to conduct. The lower plate of C is receiving *negative* charge. The valve anode has a D.C. path through the transformer secondary to this lower plate, and so is also becoming more and more negative. Eventually the negative potential of the anode will exactly counterbalance the peak of a positive A.C. half-cycle, the anode no longer becomes positive.

Now, under load the same argument applies, only that C can never become charged as far as the *peak* of the transformer volts. Suppose first it was charged to the peak. We now switch on the load. The voltage falls, until—when?

Well, until the *positive* volts in the secondary *just exceed the negative charge on the lower plate*. The valve then "strikes" (commences to supply current), and the condenser volts rise to an extent depending on the amount of discharge, etc. They will continue to rise until the secondary volts (positive) *fall below the negative charge on the lower plate*.

Hence, the valve does not supply current for anything like a half-cycle of the transformer voltage, but only between the above limits. For an appreciable interval in the half-cycle the charge in C will stop conduction.

Underneath the Dipole

Television Pick-ups and Reflections. By "THE SCANNER"

THE television service has now settled down to what is almost a routine of good, varied entertainment. The number of viewers increases slowly—very slowly—however, owing to the scarcity of new receivers and the tardy delivery of spare parts for the pre-war sets. It is surprising the number of pre-war television receivers which have been in dock for months awaiting servicing. In several radio service shops I have seen dozens of pre-war sets of all makes, collecting dust, queueing up for their turn in the workshop. The dates on which they were "turned in" for servicing, together with the names of the owners, are marked on the sides of the cabinets in waxed pencil, with details of components still required to complete the repair. Many have thus been occupying storage space for months, and the service men are becoming weary of giving the same reply to enquiries: "Almost ready, sir, but we're still awaiting delivery of a mains transformer (or what ever it is!) from the manufacturers."

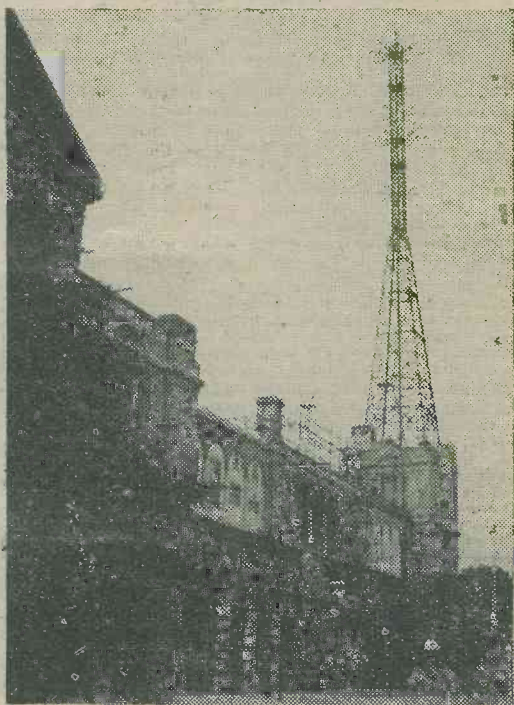
Such a large percentage of television receivers had gone out of order through lack of use that one dealer told me that it was scarcely an exaggeration to say that the television service restarted up to an audience comprised almost wholly of B.B.C. employees and members of the radio industry! Judging from the increasing number of dipoles that have been erected or re-erected on London chimney stacks lately, however, I think this state of affairs—if it ever existed—has passed. Mind you, I do know of several dipoles which were carefully fixed up weeks and weeks ago and which still await the sets beneath them.

Recording Television

Television programmes are here to-day and gone to-morrow. It seems a pity that so many good ones are being missed by viewers both of the near and distant future. The recording of the programmes, "canning" them up for repeat performances at a later date or for "Scrapbook" programmes of ten years or a hundred years hence, is not yet practicable. The filming of some of the most important outside-television events has been carried out with kinematograph cameras by the side of the Emitron cameras, I know, but the results have not been particularly impressive. This has been partly due to the fact that the tele-cine apparatus at the Alexandra Palace, both sound and picture, has been lagging behind the direct transmissions, so far as quality is concerned. But great improvements have been made in the last few weeks, particularly in the sound side. In any case, films thus made never recapture the authentic television treatment and production methods to which we are becoming accustomed; their technique is more in line with the news-reel or documentary film. What is wanted is a method of recording the television impulses so that they can be played off like gramophone records. Baird did actually use gramophone discs and cylinders for recording low-definition television many years ago, but such a system would be quite inadequate for dealing with the ultra-high frequencies of the present transmission standards.

"Canned" Television Programmes

The ideal system would be to arrange a means of photographing on cine film, from the end of a cathode ray tube, at a higher standard of definition than is used on the transmission itself. Films thus made would be a true recording of a programme. This suggestion is not so fantastic as it might seem. Already, two or three firms are developing apparatus for scanning cinematograph films at about 1,000 lines, with the idea of transmitting the pictures by land line to cinemas for reproduction on large screens. One film studio in England is experimenting with a television line between laboratory and studio, so that the results of the scenes photographed on the film can be "wired" back to the studio as soon as it comes off the developing and drying machines. Results, I am told, are "promising." The time will come—and it won't be long now—when it will be possible for one copy of a film to be scanned and transmitted via line or ether to hundreds of cinemas. One copy of a film will thus do the work of forty or fifty copies. It will be used for topical events, chiefly, I think, because the cinema is making great progress with colour and will temporarily leave television behind in this particular field. But to come down to earth again, to our own everyday television programmes, it would seem to be comparatively simple for the process to be reversed, for the televised scenes to be photographed (with very high definition) on film.



The British Broadcasting Corporation's television mast at Alexandra Palace, London, N.

History—and the B.B.C.

The "Scrapbook" programmes have always been a most popular item on the ordinary radio, and it is to be hoped that the Television Department are gathering together material for a similar type of presentation. The recent successful exhibition in London, celebrating the fiftieth anniversary of the cinema, enabled several thousand people to see, not only pieces of apparatus illustrating the progress of the film industry, but excerpts from several early films—historical, comedy and (highly!) dramatic. Here is wealth of interesting pictorial material which could be incorporated in such programmes. There are still many thousands of feet of pre-1914 silent films in existence, and the British Film Institute has an excellent library of them. One could imagine a television "Scrapbook" of 1914, comprising excerpts from newsreels of that year, interviews with prominent people, photographs, diagrams and maps illustrating the changing political situation of the year, and, perhaps, a studio-acted reconstruction of one or two important happenings. Another kind of scrapbook which would interest in particular all radio men would be a pictorial history of the progress of the B.B.C. itself. Many of the earliest events, such as the first broadcasting of the nightingale and the first relay of American broadcasting, were filmed by various newsreel companies and by Pathé Pictorial. The opening of various stations and the historic transmitters at Marconi House and Writtle were all photographed and filmed, and the personalities of Lord Reith, Captain Eckersley, Mr. Burrows and Captain Round were well in the public eye. There was a glamour about those very early days of radio which has long departed, but the spirit could still be—and should be—recaptured and "canned up" for future use. There was a glorious uncertainty about reception in the days when the "home constructor" was in a majority so far as valve sets was concerned, and even the owners of shop-purchased crystal sets spent happy hours scratching about on their "Dayzite" or "Magikite" crystals in search of the elusive specially-sensitive spot.

Highspots of Radio History

Apart from broadcasting, however, radio is rich with dramatic occurrences which in themselves mark the milestones in the early progress and development of wireless-telegraphy. Producers who plan a television scrapbook of such incidents will have a difficult job in satisfying both the veteran technical man and the ordinary man-in-the-street. But the man-in-the-street is not quite so uninterested in semi-technical matters as he used to be. There are, as it happens, many highly-dramatic events in the early days of radio which should satisfy all. What would you select as "highlights" suitable for inclusion in such a programme? My selections are: The radio call from S.S. Volturno burning in mid-Atlantic, which resulted in ten vessels coming to the rescue and the saving of 521 lives (1913); the arrest of Dr. Crippen on an Atlantic liner; the first transmissions from an aeroplane to the ground; Marconi's first experiments with radio-telephony between ships. Each of these events could be dramatised in the form of a one-scene playlet.

News from the Clubs

THE WHITEFIELD AND DISTRICT RADIO SOCIETY

Hon. Sec.: E. Fearn, 4, Partington Street, Newton Heath, Manchester, 10.

ALL radio amateurs in the Manchester, Prestwich, Whitefield and Bury areas are invited to the weekly meetings of the Whitefield and District Radio Society, which are held every Monday evening at 7.30 p.m. at the Stand Grammar School for Girls, Higher Lane, Whitefield.

Membership is open to anyone with any interest, no matter what branch, in amateur radio, and groups are to be formed to cover all branches of radio, including transmitting, receiving, morse instructing, and UHF, including television, whilst a beginners' section to cater for the absolute beginner is being planned, and, in all, a most interesting programme is being arranged for the coming meeting nights.

It is hoped that all local G.'s, S.W.L.'s, and any readers with even the faintest interest in amateur radio, will come forward and help to swell the ranks of this up-and-coming club.

THE SURREY RADIO CONTACT CLUB, CROYDON

Hon. Sec.: L. Blanchard, BRS 3003, 122, St. Andrews Road, Coulsdon, Surrey. (Uplands 3765.)

THE August meeting of the club was again well attended, when forty-three were present to hear G2WS give a very interesting talk and demonstration on 58 Mc/s Portable Work. G2WS gave some very useful information and tips to those present as to how to go about and set up and operate a portable station under the best conditions. At the conclusion of the talk several present asked some very interesting questions about portable operation which the speaker dealt with in detail.

WEST MIDDLESEX RADIO CLUB

Hon Sec.: N. Priest, 7, George Road, Hayes, Middlesex.

THE first meeting of the above was held recently at the Southall Labour Hall, when thirty-six radio fans from Southall, Hayes and Uxbridge attended.

The object of the club is to extend interest in experimental work in radio receiving, transmitting, television and sound recording; members are assured of learning a great deal from other members, who include well-known amateur radio transmitters.

Another interesting feature of the club is home recording and high-quality reproduction; this alone will no doubt appeal to many whose desire it is to record their own efforts in speech or music.

It is also proposed to open a class for beginners to learn the morse code.

The club, which hopes to meet at least twice a month, has elected the following officers: Chairman, Mr. W. Wicks (G6WK); secretary, Mr. N. Priest, 7, Grange Road, Hayes, Middlesex; treasurer, Mr. Bowler; and Messrs. Gott, Spark and Ager as committee members.

GRAFTON RADIO SOCIETY

Hon. Sec.: W. H. C. Jennings, G2AHB. (Stamford Hill 3891.)

THE Grafton Radio Society, Grafton L.C.C. School, Eburne Road, Holloway, London, N.7. (immediately by Nag's Head Junction), meets on Monday, Wednesday and Friday, 7.30 p.m.-9.30 p.m. Instruction and practice (absolute beginners to advanced) in morse is given every evening as above.

A regular weekly series of lectures covering the City & Guilds Amateur Radio Examination Syllabus is a new feature.

Two transmitters are now operating under G8DF and G2AHB, and further transmitters are scheduled to be built in order that all bands may be covered.

Short-wave receiver components to the value of £60 have been purchased in preparation for the construction of additional receivers.

The membership fee is very moderate, namely, two shillings per term of 13 weeks (less than 2d. per week!).

N.B.—This Society has been officially appointed the North London Chapter of the British Short Wave League. All S.W.L.s are cordially invited to attend our meetings.

SLADE RADIO

Hon. Sec.: L. A. Griffiths, 47, Welwyndale Road, Sutton Coldfield, Birmingham.

MEETINGS are held at Broomfield Road, Erdington, at 8 p.m., on the fourth Friday of each month. The following is the current provisional programme:

October 25th: "Telearchics," a discussion night held jointly with the Model Aero Club.

November 22nd: A.G.M.

THE READING AND DISTRICT RADIO CLUB

Hon Sec.: S. Nash, 9, Holybrook Road, Reading.

AT a recent meeting of the above club, Mr. Holloway, BRS 12070, gave an interesting talk on "Receiver Noises." Noise limiter and suppressor circuits which could be used to overcome them were explained thoroughly.

Many interesting questions were raised by members who went away after the meeting having learnt more of a subject which is foremost in our minds at the present moment.

Any offers by interested persons to give lectures and demonstrations at our meetings would be more than welcome.

Meetings are held on Saturdays at 6.30 p.m. at the Palmer Hall, West Street, Reading, and all are welcome.

PRACTICAL AMATEUR RADIO CONSTRUCTORS CLUB

Hon. Sec.: J. Keogh, 8, New Ireland Road, Rialto, Dublin.

THE first general meeting of the above was held recently at Foresters Hall, 41, Parnell Square, Dublin, and members have been meeting every Friday evening since that date.

Membership is increasing and a series of lectures have been arranged. Mr. Gaskins gave two very interesting lectures, the first was on Aerials and the second dealt with Simple Receivers. Two other lectures dealing with Elementary Electricity were given by Mr. O'Farrell the lectures were fully illustrated with diagrams; and were enjoyed by all.

We are seeking a clubroom where members may construct and operate sets. A well-stocked and up-to-date library is ready and books may be borrowed as soon as the clubroom is available. A club transmitting station is also planned, and for that reason morse classes will soon be started so that members may brush up their morse for the Post Office Examination. We should be pleased to hear from prospective members resident in Dublin. As we had many enquiries from amateurs outside Dublin, we hope in the near future to form a special section that will cater for them.

Programme Pointers

In This Article MAURICE REEVE Discusses the Current Tendency of Dealing with the Classics

THE Promenade Concerts are over, and the world's greatest mass-produced body of music hangs fire for another year. Before the season commenced I expressed the hope, in these pages, that the B.B.C. would see fit to broadcast the whole of the first part of each concert, so that all the important works performed during the season could be placed within listeners' reach, and final selection of what was wanted —if the whole was not welcome—left to the public to decide.

But in their wisdom, they decided against. And not the least vocal of the protests raised against this policy is none other than the B.B.C.'s own forum of self-criticism, "The Listener." In its issue of August 8th last, its music critic, Byneley Hussey comes out in the strongest language against "those august personages who decide what may and what may not reach the ears of subscribers of one pound a year to the funds of the Postmaster-General. . . ." All of which leads me to the question of "matching up" items or blending them up one with another AND that horror of horrors, that most vulgar product of the age, that excrescence of cacophonous unpleasantness, to wit, the signature tune.

Absorbed as I am to "classical" music—deep as my personal interest in it is, and much as I resent intrusion into it when it is being performed for my delight—I willingly admit that the world cannot be ordered or fashioned just to please me. I have to muck in with everyone else. I have to submit my likes and dislikes to conform with the tastes and wishes of others. And I must take my share of what does not appeal to me, though I sometimes feel that temperaments fashioned on the lines mine is have to accept more of the disagreeable and the nerve-racking than some.

Why the Mixture?

But why the "Knightsbridge March," "The Bells of St. Clements," or similar works (admirable in their proper sphere), should be brought into the closest juxtaposition to Bach or Beethoven, and in totally, raspingly, unrelated keys at that is more than I can fathom. Between studio items there is seldom half a minute's interval between these blatant inanities concluding a dance band, music hall or "light" number of some sort or other, and the, to us, ethereal other-worldliness of a Brandenburg Concerto or a Debussy Image. It is too bad and totally unnecessary. At the very least, the infernal things might be scored in all the keys and the right one chosen to match up with the ensuing item—if oil and water can be blended.

It is an important ascetic question. The age is ugly enough, in all conscience. All of us, at some time or other during the pursuit of our lawful occasions, are brought face to face with these unwelcome nuisances and annoyances. It doesn't matter whether it is a signature tune, a queue, an income tax demand note, dried eggs for breakfast, or what not; the noises, smells, tastes, sights and touches of this modern age are not all pleasant and agreeable sensations. They are all too plentiful and the worst of them abominable. Therefore, why, in the name of Moses, incur self-infliction? And I do suggest that the "signature tune" is unsurpassed for vulgarity, banality and a complete and cynical disregard of all ascetic and artistic considerations. In short, they are "Pygmalion awful"!

Further Objections

Another interesting phenomena of these times, doubtless fostered by the aforementioned brat, is the scoring, or re-scoring, of famous pieces, or excerpts from large works, for any instrument or combination of instruments which any lady or gentleman, or combination of ladies and gentlemen, may think fit to play on the particular instrument with which they happen to be adept.

Now the original conception of a piece of music came from its composer's thoughts, which were centred down a certain particular ascetic and emotional path. Tone colour, i.e., the medium—instrument—which would be chosen for its interpretation would obviously be a factor of prime consideration. Men like Mozart, Beethoven, Tschaikowsky, Saint-Saëns, Schubert, etc., etc., were masters of all the instruments both singly and in combination, and if they selected a soprano voice as their instrument for one work, a piano for another, a string quartet for this and a symphony orchestra for that, we must not only presume and admit that they thoroughly knew what they were doing, but that their taste in deciding as they did was impeccable. It should be our law as the laws of the Medes and Persians.

Murdering Good Music!

The whole emotional and cerebral character of the work is most intimately linked up with the character of the instrument for which it is written—a voice being as much an instrument as anything held underneath the chin or standing on three legs. And a soprano song sung by a baritone, a violin piece played on a piano, a string quartet played by combinations of other instruments, should, to the artistic and musically minded, be unthinkable. As for the murder of lovely music on such "things" as cinema organs, accordions and what not; well, I'll forbear from all discussion!

But the general impression would seem to be that, so long as the tune is a good one and the sentiment expressed in the words is appealing—love, trees, Drake Goes West, or whatever it may be—then it is good, i.e., profitable meat anywhere and anyhow. Tenors may sing the Serenade, sopranos the Earl King, fiddlers play Chopin's Nocturnes and quartets complete with harmonium, One Fine Day or The Swan. Whilst all the time the Wurlitzer gives us The Messiah, 1812, or the Marriage of Figaro. Dear, oh dear!

The tragedy is that, whilst millions can whistle these "tunes" quite correctly, they only delude themselves if they think they know them. Their real beauty and meaning are closed books, and they don't know a fraction as much about them as a cinema goer knows about a foreign country through having seen it frequently on the screen.

As to the propriety, or otherwise, of presenting the minor classics in any other than their original dress, my readers may like my views next month. Here, I have endeavoured only to touch upon the heinousness of the crimes that are daily committed upon the classic masterpieces. They get buffeted, kicked around and insulted in our search for new, and still more new, entertainment. Fortunate, indeed, are the sister arts, which cannot, by their nature, be switched on and off for the vulgar and idle to gaze at in distorted and bruised shapes.

Short-wave Listening

List of Short-wave Broadcasting Stations Located Throughout the World as Furnished by the International Short Wave Club, London

CALL	MC/s	METRES	LOCATION. All times G.M.T.
	60.0 58.5	5	Amateur Band.
Vision Sound	45.0 41.5	6.67 7.25	B.B.C. Television.
	30.0 28.0	10	Amateur Band.
GSS	26.55	11.30	B.B.C.
GSR	26.40	11.36	B.B.C.
GSK	26.10	11.49	B.B.C., 11.15—15.15
GSQ	25.75	11.65	B.B.C.
GVT	21.75	13.79	B.B.C., 15.30—16.30
GVS	21.71	13.82	B.B.C.
CHLA	21.71	13.82	Sackville, Canada.
VLCIO	21.67	13.84	Shepparton, Australia, 06.50—07.25
GVR	21.67	13.84	B.B.C., 12.15—12.45
WLWS	21.65	13.85	Cincinatti, U.S.A., 13.00—14.45 15.30—17.00
GRZ	21.64	13.86	B.B.C., 13.00—15.15
WNBI	21.63	13.87	N.B.C., Radio City, New York
WGEA	21.59	13.98	Schenectady, N.Y.
WCBX	21.57	13.91	C.B.S., New York.
GST	21.55	13.92	B.B.C., 16.00—16.30
WBOS	21.54	13.93	Boston, U.S.A.
GSJ	21.53	13.93	B.B.C., 10.00—13.15
WGEA	21.50	13.95	Schenectady, N.Y.
GSH	21.47	13.97	B.B.C., 10.00—15.15
WRUL	21.46	13.98	Boston, U.S.A.
WNRA	18.16	16.52	N.B.C., Radio City, N.Y., 10.45—13.30
GVO	18.08	16.59	B.B.C., 11.00—15.45 17.00—19.15
GRQ	18.02	16.64	B.B.C., 10.00—14.00 15.00—19.15
WLWL	17.95	16.70	Cincinatti, U.S.A., 13.00—14.45
	17.91	16.75	Moscow, U.S.S.R.
GRP	17.87	16.79	B.B.C., 15.30—17.30
KCBF	17.85	16.81	San Francisco, Calif., 22.00—00.30
WCBN	17.83	16.83	C.B.S., New York, 13.15—16.00
CKNC	17.82	16.84	Sackville, Canada, 12.00—19.30
GSV	17.81	16.84	B.B.C., 07.00—09.00 10.00—14.00
WLWO	17.80	16.85	Cincinatti, U.S.A.
GSG	17.79	16.86	B.B.C., 11.00—12.45
WNBI	17.78	16.87	N.B.C., Radio City, N.Y., 13.00—17.00
PHI	17.77	16.88	Eindhoven, Holland
KWID	17.76	16.89	San Francisco, Calif., 22.00—00.15
	17.76	16.89	Leopoldsville, Belgium Congo., 13.30—14.30, 16.30—17.15
WRUW	17.75	16.90	Boston, U.S.A., 13.15—16.00
GVQ	17.73	16.92	B.B.C., 07.00—10.00 11.00—13.30 17.00—19.15
GRA	17.71	16.93	B.B.C., 07.30—10.00
GVP	17.70	16.95	B.B.C., 06.00—10.00 15.30—16.15
	15.71	19.09	Moscow, U.S.S.R.
GRD	15.45	19.42	B.B.C., 15.00—19.15
GWE	15.43	19.44	B.B.C., 13.40—15.00
GRE	15.37	19.51	B.B.C.
WRUA	15.35	19.54	Boston, U.S.A., 10.45—13.00 15.30—15.45
KNBI	15.34	19.55	San Francisco, Calif., 22.00—06.00
WGEO	15.33	19.57	Schenectady, U.S.A., 10.45—12.00 13.15—15.45
VLC4	15.31	19.59	Shepparton, Aust., 02.00—05.00
GSP	15.31	19.60	B.B.C., 06.00—10.00 15.45—21.00
GWR	15.30	19.61	B.B.C., 10.00—11.00 19.15—21.15
WRUL	15.29	19.62	Boston, U.S.A., 14.00—15.45 16.30—17.00
VUD3	15.29	19.62	Delhi, India.
WNRE	15.28	19.63	N.B.C., Radio City, N.Y., 10.45—13.30 21.00—21.15
WCBX	15.27	19.65	C.B.S., New York, 10.45—17.00
GSI	15.26	19.66	B.B.C., 15.30—21.00
WLWK	15.25	19.67	Cincinatti, U.S.A., 13.00—19.15
VLG6	15.23	19.69	Melbourne, Aust., 02.00—04.00
WLWL	15.23	19.69	Cincinatti, U.S.A., 13.00—17.00 22.30—23.00
CHTA	15.22	19.71	Sackville, Canada
PCJ	15.22	19.71	Eindhoven, Holland
WBOS	15.21	19.72	Boston, U.S.A.
WLWS	15.20	19.73	Cincinatti, U.S.A.
WOOC	15.20	19.73	C.B.S., New York, 10.45—13.30 16.15—16.30
XGOY	15.20	19.73	Chungking, China, 00.00—01.00
VLA6	15.19	19.74	Shepparton, Aust., 21.15—23.00 04.00—05.00 07.30—11.45
TAQ	15.19	19.74	Ankara, Turkey, Irreg.
CKCX	15.19	19.75	Sackville, Canada, 12.00—20.15
GSO	15.18	19.76	B.B.C., 06.00—10.00 11.00—15.00 18.45—21.00
	15.18	19.76	Moscow, U.S.S.R.
	15.17	19.77	Leopoldsville, Belgium Congo., Irreg.
VLG7	15.16	19.79	Melbourne, Aust., 20.00—22.00
SBT	15.15	19.79	Motala, Sweden, 18.00—20.30
WRCA	15.15	19.80	N.B.C., Radio City, N.Y., 13.00—19.15
GSF	15.14	19.82	B.B.C., 06.00—09.00 13.00—15.15
WRUW	15.13	19.83	Boston, U.S.A., 10.45—19.15
WLWS	15.13	19.83	Cincinatti, U.S.A.
WRUX	15.13	19.83	Boston, U.S.A.
HVJ	15.12	19.84	Vatican City, Irreg.
	15.12	19.84	Dublin, Eire, Irreg.
GWG	15.11	19.85	B.B.C., 06.00—13.30
	15.04	19.95	Moscow, U.S.S.R.
WNRX	14.56	20.60	N.B.C., Radio City, N.Y., 10.45—15.45
WCDA	13.44	22.32	C.B.S., New York,
WNRI	13.05	22.97	N.B.C., Radio City. N.Y., 10.45—15.45
WLWR	12.96	23.14	Cincinatti, U.S.A.
CNR	12.83	23.38	Rabat, Morocco, Irreg.

Call	MC/s	Metres	Location All times G.M.T.
TFJ	12.22	24.52	Reykjavik, Iceland, Sun., 21.00—22.00
GRY	12.09	24.80	B.B.C., 06.00—08.00 15.30—19.15 11.00—22.30
GRV	12.04	24.92	B.B.C., 22.00—02.15
PHI	12.00	25.00	Eindhoven, Holland, Irreg.
	12.00	25.00	Moscow, U.S.S.R.
	11.97	25.06	Brazzaville, 18.45—19.00
GVY	11.95	25.09	B.B.C., 13.40—16.15
GVX	11.93	25.15	B.B.C., 04.00—09.00 10.00—12.00
	11.91	25.19	Moscow, U.S.S.R.
XGOY	11.90	25.21	Chungking, China, 09.00—11.30
WNBI	11.89	25.22	N.B.C., Radio City, N.Y., 18.30—19.15
OR3	11.88	25.25	Melbourne, Aust., 18.20—00.00 01.45—07.45
VLG5	11.88	25.25	Melbourne, Aust., 15.15—15.45
	11.88	25.25	Paris, France, 11.30—13.00
WOOW	11.87	25.27	C.B.S., New York
WNBI	11.87	25.27	N.B.C., Radio City, N.Y., 10.45—15.45
GSE	11.86	25.30	B.B.C., 23.00—03.15
CSW	11.84	25.34	Lisbon, Portugal, Irreg.
GWQ	11.84	25.34	B.B.C.
VLG4	11.84	25.35	Melbourne, Aust., 16.00—16.45
VLC7	11.84	25.35	Shepparton, Aust., 05.10—05.45
VLW3	11.83	25.36	Perth, Aust. 03.30—10.15
	11.83	25.36	Moscow, U.S.S.R.
WCRC	11.83	25.36	C.B.S., New York, 10.45—14.45
GSN	11.82	25.38	B.B.C., 06.00—10.00 14.30—17.15 18.00—21.00 22.00—01.30
WCRC	11.82	25.38	C.B.S., New York, 15.45—17.00
GWH	11.80	25.42	B.B.C.
WRUS	11.79	25.45	Boston, U.S.A., 10.45—13.30 22.30—23.00
KNBA	11.79	25.45	San Francisco, Calif., 22.00—05.00
	11.78	25.47	Saigon, F. Indo-China, Irreg.
GVU	11.77	25.49	B.B.C.
KCBA	11.77	25.49	San Francisco, 22.00—00.30
VLA4	11.77	25.49	Shepparton, Aust.
	11.76	25.50	Voice of America in N. Africa, 11.30—16.30
	11.76	25.50	Moscow, U.S.S.R.
VLG10	11.76	25.51	Melbourne, Aust., 08.10—08.55
GSD	11.75	25.53	B.B.C., 06.00—09.00 11.00—15.00 15.30—02.00
WRUL	11.73	25.58	Boston, U.S.A., 10.45—12.00 13.15—13.45
WRUW	11.73	25.58	Boston, U.S.A.
GVV	11.73	25.58	B.B.C.
PRL8	11.72	25.60	Rio de Janeiro, Brazil, 17.30—18.00
CHOL	11.72	25.60	Sackville, Canada, 20.00—23.00
VLG3	11.71	25.62	Melbourne, Aust., 05.15—08.30 09.00—14.00
	11.71	25.62	Moscow, U.S.S.R.
WLWK	11.71	25.62	Cincinatti, U.S.A., 13.00—17.00
GVW	11.70	25.64	B.B.C., 06.00—10.00 15.30—21.00 23.00—02.15
CKXA	11.70	25.64	Sackville, Canada
	11.70	25.64	Kuibyshev, U.S.S.R.
GRG	11.68	25.68	B.B.C., 11.00—14.00 15.45—17.00 21.00—00.00
WCBN	11.14	26.92	C.B.S., New York
WCDA	11.14	26.92	C.B.S., New York
XGAP	10.26	29.25	Pekin, China, 11.00—16.00, Irreg.
HH3W	10.15	29.59	Port au Prince, 23.00—01.00
	10.14	29.59	Leopoldsville, Belgium Congo
SUV	10.05	29.85	Cairo, Egypt, 19.00—21.00
	10.04	29.88	Kuibyshev, U.S.S.R.
GRU	9.91	30.26	B.B.C., 15.15—20.30 22.00—01.30
WBOS	9.89	30.31	Boston, U.S.A., 22.00—23.00
WGEX	9.85	30.43	Schenectady, U.S.A.
GRH	9.83	30.53	B.B.C., 21.15—02.00
	9.78	30.66	Leopoldsville, Belgium Congo
KCBF	9.75	30.77	San Francisco, Calif., 00.45—05.00
WNRA	9.75	30.77	N.B.C., Radio City, N.Y., 22.00—23.00
WRUS	9.70	30.93	Boston, U.S.A., 18.30—19.00
WLWL	9.70	30.93	Cincinatti, U.S.A.
LRAI	9.69	30.96	Buenos Aires, Argentina, 21.00—01.00
GRX	9.69	30.96	B.B.C., 06.00—10.00
EQC	9.68	30.99	Teheran, Iran, 15.00—17.00
VLW6	9.68	30.99	Perth, Aust., 22.00—01.45
VLA3	9.68	30.99	Shepparton, Aust., 15.15—15.45
VLC2	9.68	30.99	Shepparton, Aust., 07.30—08.30
	9.68	30.99	Berlin, Germany, Evenings
GWT	9.67	31.01	B.B.C., 06.00—10.00
WRCA	9.67	31.01	N.B.C., Radio City, N.Y.
WNBI	9.67	31.01	N.B.C., Radio City, N.Y.
KGEI	9.67	31.01	San Francisco, Calif.
	9.66	31.04	Leopoldsville, Belgium Congo, 20.00—24.00
GWP	9.66	31.06	B.B.C., 13.45—15.15
VLQ	9.66	31.06	Brisbane, Aust., 01.45—07.15
LRX	9.66	31.06	Buenos Aires, Argentina, 14.00—02.00
HVJ	9.66	31.06	Vatican City, 18.00—18.45
WCBN	9.65	31.09	C.B.S., New York
LLH	9.64	31.10	Oslo, Norway, Evenings, Irreg.
GVZ	9.64	31.12	B.B.C., 18.00—04.00 06.00—10.00
CHMD	9.64	31.12	Sackville, Canada
XGOX	9.63	31.15	Chungking, China, 14.00—14.30
CKLO	9.63	31.15	Sackville, Canada, Irreg.
	9.63	31.15	Milan, Italy, Evenings, Irreg.
VUD4	9.63	31.15	Delhi, India, 13.30—15.30
GWO	9.62	31.17	B.B.C., 00.00—03.30 04.00—06.45
	9.62	31.19	Paris, France
VLC6	9.61	31.22	Shepparton, Aust., 09.00—10.00
HP5J	9.61	31.22	Panama City, 20.00—00.50
WLWO	9.59	31.28	Cincinatti, U.S.A.
PCJ	9.59	31.28	Eindhoven, Holland, Evenings at 19.30
	9.59	31.28	Dublin, Eire, Irreg.
VLG	9.58	31.32	Melbourne, Aust., 14.00—15.00

Call	Mc/s	Metres	Location All times G.M.T.
VLR	9.58	31.32	Melbourne, Aust., 08.00—13.30 20.00—21.10
GSC	9.58	31.32	B.B.C., 18.45—19.15 21.15—02.00 04.15—04.45
KWID	9.57	31.35	San Francisco, Calif., 00.30—03.15
	9.56	31.38	Paris, France, 18.30—20.00
GWB	9.55	31.41	B.B.C.
	9.55	31.41	Singapore, S.S. 12.00—15.30, Irreg.
VLC5	9.54	31.45	Shepparton, Aust. 13.00—13.45
SBU	9.53	31.46	Motala, Sweden, Daily
WGEO	9.53	31.48	Schenectady, U.S.A.
	9.53	31.48	Moscow, U.S.S.R.
GWJ	9.52	31.50	B.B.C., 09.00—09.30
	9.52	31.51	Moscow, U.S.S.R.
VLW7	9.52	31.51	Perth, Aust., 10.30—15.30
	9.52	31.50	Johannesburg, S. Africa
GSB	9.51	31.55	B.B.C., 17.15—20.30 21.00—09.00
XEWW	9.50	31.56	Mexico City, 11.00—04.00
WCBX	9.49	31.61	C.B.S., New York
GWF	9.49	31.61	B.B.C.
TAP	9.46	31.70	Ankara, Turkey, 19.30—20.30
	9.45	31.75	Brazzaville, 18.45—20.00
GRI	9.41	31.88	B.B.C., 22.00—03.30
	9.32	32.19	Madrid, Spain, 21.00—21.45
COCX	9.27	32.26	Havana, Cuba, 13.00—00.50
WCDA	7.83	38.30	C.B.S., New York
WOOC	7.80	38.44	C.B.S., New York
	7.77	38.61	Moscow, U.S.S.R.
	7.52	39.89	Moscow, U.S.S.R.
GRJ	7.32	40.98	B.B.C., 19.30—21.00 23.00—03.15 04.00—05.30
VUD2	7.29	41.15	Delhi, India, 13.00—14.45
ZOY	7.29	41.15	Accra, Gold Coast, 16.00—18.00
VLA	7.28	41.21	Shepparton, Aust., 12.45—15.00
GWN	7.28	41.21	B.B.C., 00.00—03.45
VLC8	7.28	41.21	Shepparton, Aust., 15.15—15.45
GSU	7.26	41.32	B.B.C., 21.15—04.00
GWI	7.25	41.38	B.B.C.
WNRX	7.25	41.40	N.B.C., Radio City, 22.00—23.00
WRUA	7.25	41.40	Boston, U.S.A.
VLQ	7.24	41.44	Brisbane, Aust., 20.00—00.00
GSW	7.23	41.49	B.B.C., 16.00—19.15 02.15—04.45 06.00—09.00
VLQ2	7.21	41.61	Brisbane, Aust., 07.30—13.30
GWL	7.21	41.61	B.B.C.
	7.21	41.60	Salisbury, S. Rhodesia, 16.00—16.30
	7.20	41.67	Moscow, U.S.S.R.
GRK	7.18	41.75	B.B.C., 23.00—0305.
GRT	7.15	41.96	B.B.C., 22.00—01.34
GRM	7.12	42.13	B.B.C., 22.00—01.30 06.00—08.45
GRS	7.07	42.40	B.B.C., 17.30—22.45 04.00—08.30
WGEX	7.00	42.86	Schenectady, U.S.A.
CHLS	6.91	43.40	Sackville, Canada
ZLT7	6.91	43.40	Wellington, N. Zealand, 10.00—10.10
HIT	6.63	45.25	Trujillo, 23.00—02.00
COX4	6.39	46.95	Havana, Cuba
HI9B	6.39	46.94	Santiago, 20.00—02.00
COCW	6.32	47.47	Havana, Cuba, 12.00—04.00
HIIZ	6.31	47.50	Trujillo
HIIN	6.24	48.08	Trujillo, 22.00—01.30
GRN	6.19	48.43	B.B.C.
HVJ	6.19	48.47	Vatican City
GRO	6.18	48.54	B.B.C.
KCBA	6.17	48.62	San Francisco, Calif., 01.00—05.00
GWK	6.16	48.66	B.B.C.
CHAC	6.16	48.70	Sackville, Canada
GRW	6.15	48.78	B.B.C.
	6.14	48.86	Moscow, U.S.S.R.
COCD	6.13	48.92	Havana, Cuba
	6.13	48.94	Kuibyshev, U.S.S.R.
GWA	6.12	48.98	B.B.C.
HI9T	6.12	49.00	San Cristobel, Dom. Republic
WOOW	6.12	49.02	C.B.S., New York
GSL	6.11	49.10	B.B.C., 21.15—05.30
ZRJ	6.10	49.20	Johannesburg
CKOB	6.09	49.26	Sackville, Canada
GWM	6.09	49.26	B.B.C.
WLWK	6.08	49.34	Cincinatti, U.S.A.
GRR	6.07	49.42	B.B.C., 00.00—03.15
SBO	6.06	49.50	Motala, Sweden
GSA	6.05	49.59	B.B.C., 23.00—00.00
	6.04	49.67	Voice of America in N. Africa, 22.00—23.00
GWS	6.03	49.71	B.B.C.
	6.02	49.70	Voice of America in N. Africa, 21.00—23.00
GRB	6.01	49.92	B.B.C.
HRN	5.87	51.11	Tegucigalpa
GRC	2.88	104.2	B.B.C.

COMPLETE NEWS OF THE WORLD FROM U.S.A.

On 25.62m, 25.44m, 25.40m, 25.27m, 22.97m, 20.60m, 19.83m, 19.80m, 19.74m, 19.73m, 19.70m, 19.67m, 19.65m, 19.63m, 19.62m, 19.57m, 19.54m, 16.90m, 16.87m, 16.85m, 16.83m, 16.70m, 16.52m, 13.86m, at 15.30 G.M.T.

NEWS FROM CANADA

On CKNC 16.84m & CKGX 19.75m at 12.45 G.M.T.
On CKCX 19.75m & CHOL 25.60m at 22.15 G.M.T.

NEWS FROM AUSTRALIA on VLG 31.32m, at 14.35 G.M.T.

NEWS FROM N. ZEALAND on ZLT7 43m at 10.00 G.M.T.

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Impressions on the Wax

Review of the Latest Gramophone Records

THE latest addition to H.M.V. Album Series is Beethoven's Fourth Pianoforte Concerto in G Major, which is second only to the Emperor (his fifth, in E Flat) in universal esteem and popularity. It was written during 1805—that is, at about the same time as the Fifth Symphony—and there could be no more eloquent proof of the amazing vigour, power and resilence of Beethoven's mind than that, at the time when he was beset with worries, he should compose two of his greatest works.

This work, which has been recorded on four 12in. records—*H.M.V. DB*6303-6—occupies an important position in the history of the concerto as a musical form. In his first three pianoforte concertos Beethoven had been satisfied to adhere to the rules laid down by Mozart as to the design of the solo concerto. But with this work we find him opening up new vistas by regarding the concerto (which Mozart had developed from the aria) in the light of the symphony. The Philharmonia Orchestra, under the able baton of Issay Dobrowen, and Artur Schnabel (pianoforte), give a very polished performance of this delightful recording.

Beethoven is also featured on *H.M.V. DB*6300-2, with his Quartet in F Major, Op. 18, No. 1, played by the Busch Quartet. Adolf Busch and the three fine players of his quartet have produced a set of records of quite outstanding beauty. Many people are unaccountably shy of chamber music; this set should persuade them of the very real enjoyment to be had from this intimate and lovable music.

Solomon in his latest recording plays two of Chopin's pieces—Mazurka No. 48 in A Minor, Op. 68, No. 2, and Waltz in E Minor, No. 14, Op. Posthumous, on *H.M.V. C*3509. It is undoubtedly in the pieces for solo piano that the true Chopin is revealed, magnificent though the concertos are from the pianist's point of view. Among his gifts was an infallible sense of rhythm; he took traditional Polish dances like the polonaise and mazurka and transformed them into beautifully moulded pieces. On the reverse side of this record are two delightful imitative pieces, of which the titles give the clues to their contents. Daquin's "Le Coucou," which was originally written for the harpsichord, and de Severac's "Musical Box."

Songs of Hugo Wolf

THE songs of Hugo Wolf stand very high in the list of the great Lieber, initiated by the genius of Schubert. It is probable that if Wolf had lived longer he would have devoted more time to opera and instrumental music; but he died at the early age of forty-three in an institution for the insane. He seems to have possessed something of Schubert's power to assimilate the essence of a poem almost at a glance, fitting to it music which is the inevitable complement to the text. There are two famous sets of songs pre-eminent among the many he wrote; the "Spanish Song Book," and the "Italian Song Book," from the latter of which come the two songs "Auch Kleine Dinge" and "Und Willst Du Deinen Liebsten Sterber Sehen," which Elizabeth Schumann sings on *H.M.V. DA*1860. Gerald Moore accompanies her in both these beautiful examples.

Grieg's famous song, "I Love Thee" (Ich liebe dich), must be one of the greatest love-songs in the world. Often heard, it seems to contain that kind of immortality which defies analysis: certainly its soaring phrases are as thrilling as any avowel of love could be, and its idealism is unshakable. On the reverse side of this recording, which is sung by Webster Booth, is Schumann's "Devotion," a piece which portrays a more sober but none the less beautiful kind of attachment. In both songs this famous tenor finds ample opportunity to display his fine technique, and the accompaniments by Gerald Moore are delightful examples of his artistry.

New Recording of the "Unfinished Symphony"

AMONG the highlights of the new releases is a new recording of Schubert's "Symphony No. 8 in B Minor (Unfinished)," by the Liverpool Philharmonic Orchestra, conducted by Dr. Malcolm Sargent, on three 12in. records—*Columbia DX*1266-8. The first two movements of the B Minor symphony are of such an astonishing high level that it may well be that Schubert simply felt unable to sustain the quality through a third and fourth movement. In 1822 he put aside the score with its opening allegro and its andante completed, made sketches for a scherzo, and that is all. However, the symphony is so well known in its present form that the thought of a "Finished Symphony" seems almost sacrilegious. Attempts and even competitions to attach the missing movements have never found success; the only man who might have accomplished it died in 1828. This recording is by the Liverpool Philharmonic Orchestra.

Another outstanding set of records is the first recording of Mahler's "Symphony No. 4 in G," recorded by Bruno Walter conducting the Philharmonic Symphony Orchestra of New York, on six 12in. records—*Columbia LX*949-54. This Fourth Symphony was first given, under Mahler's own direction, at Munich in 1902. It bears the sub-title "Ode to Heavenly Joy," and is sung by Desi Halban.

"Giselle" is one of the oldest and most famous ballets in the repertoire of the dance, though its composer is not often heard of in any other connection. Adolphe Charles Adam was born in Paris in 1803, and died there in 1856. He was mainly a composer of operas, and his music is tuneful and pleasant, carrying much of the bouquet of Rossini's style. The Opera House Orchestra give a brilliant performance of Adam's score on *Columbia DX*1270-1.

Cecil Armstrong Gibbs studied at one time under Vaughan Williams at the Royal College of Music. His fertile output includes more than a hundred songs, for which he has selected poems of a lyrical nature, setting Walter de la Mare frequently. "Dusk," here played by the Queen's Hall Light Orchestra, shows the fine taste to be found in his work. As a companion piece Sinding's ever popular "Rustle of Spring" reveals attractive new aspects—*Columbia DB*2230.

Variety

"*MAKE Mine Music*," the Walt Disney film which has now been generally released, includes a number of fascinating tunes and a selection of these is played by Peter Yorke and his Concert Orchestra on *Columbia DB*2229. Sinatra fans will be pleased with his latest recording on *Columbia DB*2227. He revives an old favourite "Begin the Beguine," coupled with one of the latest songs "All through the Day," which is from the film "Centennial Summer." This last song is also sung by "Hutch" (Leslie A. Hutchinson), on *H.M.V. BD*1141, on the reverse of which he sings "Do you Love Me."

Dance fans can take their pick from "As Long as I Live" and "It's a Beautiful Day," played by Carroll Gibbons and the Savoy Hotel Orpheans, on *Columbia FB*3237; "You and I Must Dance" and "Prisoner of Love," played by Victor Silvester and his Ballroom Orchestra, on *Columbia FB*3240; "As if I Didn't Have Enough on my Mind" and "The Wonder of You," by Harry James and his Orchestra, on *Parlophone R*3011; "The Mission of the Rose" and "Bless You," by Archie Lewis with the Geraldo Strings, on *Parlophone F*2170; and finally Ivor Moreton and Dave Kay with their 74th Tin Pan Alley Medley, on *Parlophone F*2173.

Open to Discussion

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).

Ultra Midget Receivers and an Appreciation

SIR,—Having returned from overseas and secured my "demob" I am able to ramble through a large pile of "P.W.s" which have accumulated in my absence. In common with so many more readers I would like to express my appreciation of the hard work put in by the editorial staff and contributors to "P.W." to maintain a high standard during the past seven years. Particularly am I very pleased with the size of these monthly issues and when newsprint restrictions are eased, and eventually lifted, I hope the present size will continue even though the number of pages may increase or the publication revert to a weekly issue.—ARNOLD S. LONG (Dewsbury, Yorkshire).

Amateur Contact Wanted

SIR,—I find your magazine extremely interesting. I am far more fond of a good high-quality T.R.F. than a superhet, so why not give us a good circuit for one. I should like to get into touch with another amateur (of about my age) in this district, so that we can exchange ideas, etc.

I should also like to put forward a claim as being a young amateur. I started building sets, a one-valver, at the age of nine, and am now 14. I have built several good short-wave sets, and obtained good results.—T. CULLIMORE (138, London Road, Headington, Oxford).

An Amateur's Views

SIR,—I am rather surprised that anyone should find the time to listen to commercial transmissions with such enthusiasm as our friend M. Harrison, who took up the challenge of my last letter.

I will now list, for his benefit, some of the reasons why I hate, detest, and loathe commercial transmissions of any sort!

Commercial transmissions are the sole reason why amateur stations are now allowed to use the whole of the frequency spectrum. It may rightly be argued that commercials have a more important duty to perform than the average ham, though, of course, amateurs are sometimes just as important under QRR conditions, but when anyone who is really interested in ham-radio switches on to 7 megs, and hears a weird jumble of heterodyne QRM, and cw morse piling up on top, they have only commercial transmissions and unsympathetic authorities to blame!

May I ask him which is the "better DX," the *average* ham, who uses around 50-100 watts, coming through very crowded bands, or the *average* commercial, coming through a pre-arranged *clear channel*, with a power of anything up to 150 *kilowatts*! Has he ever heard of a ham using more than a kilowatt? How many commercials, with their inevitable large financial backing, run *less than* a kW.?

After giving me that bit of advice saying that I might get some good DX without ham listening, he goes on to talk about WNRI using 50 kW. This, I presume, is some of his DX!—G. C. BAGLEY, BSWL2561 (Ironbridge).

GNF and GYKU

SIR,—Thank you for printing my letter regarding GNF and GYKU, I hope that it will stimulate a little interest in the commercial traffic medium frequencies. The information should not be without a little interest to "Dx hounds," for long distance contacts are possible and as exciting as S.W. Dx as any ex-commercial operator will tell you.

Also I would be obliged if you would print a small correction as I don't want any newcomer to these bands to be misled or commercial ops. to think I'd commit such "boners."

Seaforth's call sign is GLV (V for victor), not GLU, and Burnham-on-Sea's is GRL not PRL. I suspect that these were both the inevitable printer's error!—JOHN M. BYRNE (Glasgow).

Spanish Broadcasts

SIR,—May I encroach into your columns and request readers for reception reports of broadcasts of Spanish transmitters? As their regular correspondent in this country, I have direct contact with "La Sociedad Española de Radiodifusion," and other radio departments and so reports are assured of rapidly reaching their destination.

It may be of interest to your readers that a full list of Spanish medium and short-wave transmitters is being prepared and will be sent to those who require them. A provisional written list will be sent in the meantime when replying to reports sent.

The following details may be of interest:

Arganda (Madrid) is now on 32.02 metres (9,369 kc/s). The power is 40 kW. and the schedule is as follows: 19.45 G.M.T., Russian broadcast; 20.00 G.M.T., English broadcast; 20.30 G.M.T., Arabic; 20.45 G.M.T., Spanish for African colonies; 21.00 G.M.T., French; 21.30 G.M.T., Portuguese; 21.45 G.M.T., German; 21.51 G.M.T., Italian; 22.00, G.M.T., Close down. 23.30 to 02.00 G.M.T., broadcast directed to Spanish-speaking America. Other additional broadcasts are planned.

F.E.T.22 (Oriedo) is now back on the air after an overhaul. It is on 42.6 metres, approximately, at from 10.00 to 11.00 G.M.T.; 11.30 to 13.30 G.M.T. and 19.00 to 23.00 G.M.T., and comes over quite well.

Radio Seu, Madrid (station of the University Students' Union, S.E.U.), has altered its wavelength to 42 metres, approximately. Its schedule is 14.00 to 18.00 G.M.T. and 19.00 to 23.30 G.M.T.

Other Stations:

F.E.T.1, Valladolid, GKW, 42.83 metres, 7,006 kc/s; Radio Nacional de España en Malaga, 42.8 metres; Radio Mediterraneo de Valereia, 42.63 metres; F.E.T.15, Cordoba, 42.6 metres (now off the air); EAJ8, San Sebastian, 42.4 metres, approximately; EAJ7, Cuenca (Radio Nacional de España), 42.25 metres; EABD, Jaen, 42.75 metres, approximately, sometimes calling Tetuan, etc., on R./T.; Radio Falange de Alicante, 37.7 metres, 7,950 kc/s; Radio Tetuan, 49.45 metres, suffers from bad interference. Programmes often in Arabic. EAQ, Aruryuez, 30.43 metres, 9,860 kc/s, does not broadcast now and is solely on W./T.; EAY, Madrid, 29.77 metres, 10,050 kc/s; EDS, Madrid, 20.01 metres, 14,985 kc/s, often heard working fone with American Telephone and Telegraph Corporation.

Other transmitters like EAK (13,740 kc/s); EAW (13,980 kc/s); EAR, etc., have appeared in PRACTICAL WIRELESS, so I will give no further details. It might be noted that Spain has adopted Double Summer Time (G.M.T.+two hours).

The Spanish broadcasting authorities are reorganising their stations to improve all broadcasting services, particularly those directed to foreign countries, and so they would welcome reports from the British Isles particularly.

I shall welcome correspondence to my address here and replies to queries will be sent immediately.

Conditions for Dx have been variable recently to say the least and the usual Dx has been heard from South America, and elsewhere, but nothing outstanding has been heard.—K. DOBESAY (43, Walnut Ave., Parklands, Chichester, Sussex).

Midget Sets

SIR,—I note with interest your article in PRACTICAL WIRELESS, July, 1946, issue, on a IC5 short-wave receiver and would like to point out that I have been using a one-valve set since 1939 with the type IC5 as detector.

This set has given me wonderful results. My circuit differs a little from Mr. Brownrig's. I am using a 50,000 ohms pot. for controlling reaction.

This gives a very smooth control, and does not affect tuning as much as the reaction condenser. The complete set is very small and compact. It is housed in a 4in. cube made of sheet aluminium.

The tuning coil is plugged into the side of the cabinet, which makes the changing of coils rather easy.

The complete set, with 'phones, coils and 45 volt battery goes into a very small case, which makes it very light for carrying about.

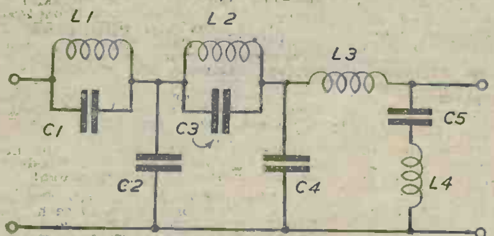
If any readers are interested in complete data—coils cabinet, etc.—I will be only too pleased to supply them.—R. W. WELLS (Battersea, S.W.11).

A Scratch Filter

SIR,—The illustration shows the circuit of a scratch filter, which is the most effective one I have ever made. It cuts at 7,600 cps. within 500 cps., to neglible effect.

The input and output impedances are 15 ohm to suit most good speakers.

The coils can be wound by hand, and a fairly accurate inductance tester is needed to get these correct. The



L1 = ·189 mH. C1 = 1·5 mfd.
L2 = ·126 mH. C2 = 3 mfd.
L3 = ·540 mH. C3, C4 = 1·4 mfd.
L4 = ·216 mH. C5 = 1 mfd.
Resistance of coil should be :—L1 ·5Ω, L2 ·5Ω, L3 1Ω, L4 ·75Ω.

condensers can easily be made up and checked on a bridge.

The result is really remarkable and makes record listening a pleasure, no hiss and not a mere muffled noise.—J. W. B. WIMBLE (Rugby).

Short-wave Listener

SIR,—I am a new reader of your magazine and find it very useful and interesting. I am a keen short-wave listener (chiefly on 10 metres and below). Conditions on the 28 metre band are not consistent at present, but DX can be heard with careful listening.

The best stations heard were: ZC4NX (Cyprus), VS9AP (Aden), VQ3EDD (Tanganyika), XZ2YP and XZ2DN (Burma), ZS1T, ZS1AX, ZS2CI, ZS2AL, ZS2CF (South Africa), and CE1AH (Chile). Rx is 1-v-1, home built.

I have a B.T.S. coil unit (4 range) and wonder if any reader could supply the correct connections and range covered. There are nine terminals and unit is enclosed in a crackle finish steel case.—J. KING (Somerset).

Anti-British Propaganda

SIR,—In your commentary in the September issue of PRACTICAL WIRELESS you stated that Moscow, U.S.A., Eire, and one or two other countries transmit anit-British propaganda from their radio stations. In the case of Radio Eireann this accusation is unjust. Radio Eireann does not or never did transmit anti-British propaganda. You also said that it comes from countries which would have been wiped out but for England and the stand she took against the German people. May I point out that Eire made valuable contributions to this stand, both in man-power and foodstuffs. Take the case of Mr. Churchill's speech concerning Irish neutrality, Radio Eireann gave a detailed account of it, whereas the B.B.C. and the English newspapers gave the British people choice extracts from Mr. De Valera's speech (which followed soon after) that suited their own ends. This is only one of the many occasions illustrating the boycott of Irish news of any importance reaching England.—"AMITA PUBLICO" (Dublin).

Civilian and Service Radio Mechanics

SIR,—Having followed the letters concerning "Civilian and Service Radio Mechanics" in the previous issues, including the last one in August issue which has just reached me, I feel I must agree with the gist of Mr. Knight's letter.

Before being called up, I, too, was in the trade for a considerable time, and on entering the Army was fortunate enough to be able to continue in radio. I have found, however, that the situation is exactly as Mr. Knight states; the skill of the Service-trained mechanic is far below the standard of the civilian mechanic, although the Service mechanic may be far more advanced in his theory of the subject.

I wonder how the Service mechanic would fare in finding an open circuit grid coupling condenser in the oscillator circuit of a Bush receiver B.P. 65, or the cause of intermittent working of the latest pre-war Philips, where the I.F. coils are intermittent although they show on a mechanical and continuity test as perfect.

As Mr. Knight emphasises, the only thing that makes a really good radio mechanic is the intimate contact and long experience with the various types of radios.

The Service mechanic has not the opportunity to obtain these two important factors; most Service equipment is so well-constructed that faults similar to those mentioned are very rarely encountered, most faults being valve changes, occasional condenser replacements, and broken wires due to careless handling.

On the other hand, the Service mechanic never has to deal with push-button tuning, magic-eyes, A.F. amplifier equipment, and all those minor problems that arise, such as valve replacement and, during the war, line cord problems and battery-mains portables.

Taking the whole system of civilian radio service into account the Service radio mechanic can never attain the standard required in civilian life because his work is so confined to such narrow channels and is not so exacting as the type of fault that arises on Army radios.

During my service I have come into contact with many Service mechanics and can honestly say I have never found one who could converse on such things as loud-speaker matching, A.C.-D.C. circuits, negative feed back circuits, and in fact, any of the refinements and oddities of the civilian receiver.

To close, however, I should like to remark on the efficiency at which the Service mechanic has maintained the communications throughout the war, and no one can dispute that they have done a grand job in that respect.—B. H. TURNER (M.E.L.F.).

[*This correspondence is closed.*—ED.]

A CORRECTION

IN the October issue, page 462, we described the construction of a "Two-valve All-dry Portable." In the Circuit diagram and List of Component Parts one H.F. Choke was specified for the inter-valve coupling. This, of course, should have been one L.F. Choke. Any standard component with an inductance of about 20 henries will be suitable.

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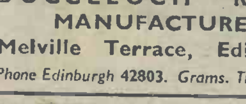

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PRACTICAL WIRELESS, November, 1946

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