

The
SHORT WAVE
Magazine

21.

VOL. XII

AUGUST, 1954

NUMBER 6



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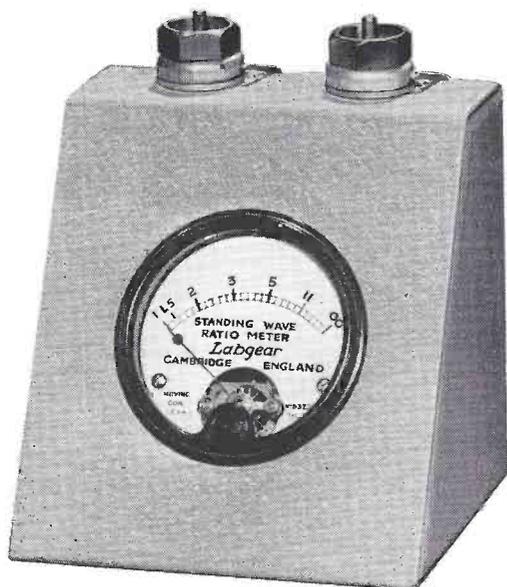
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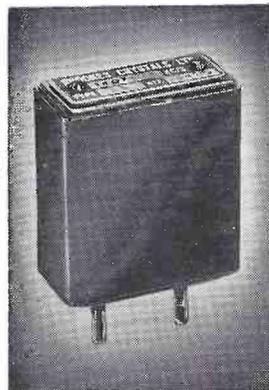
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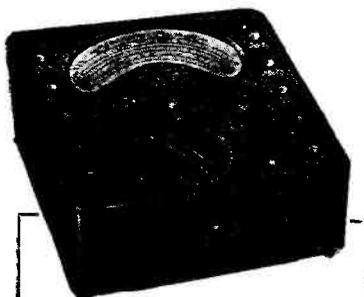
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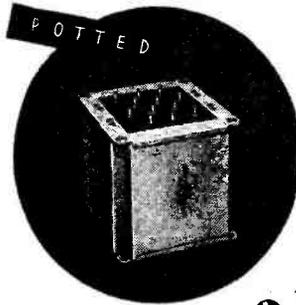
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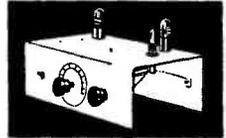
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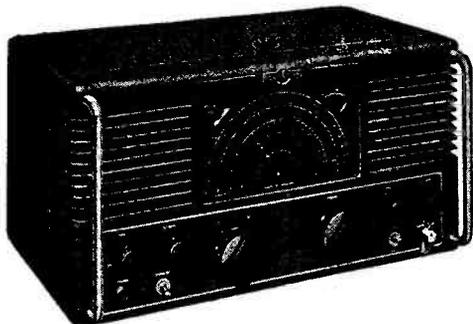
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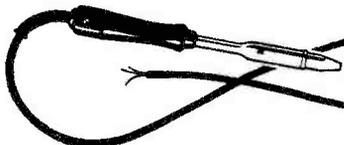


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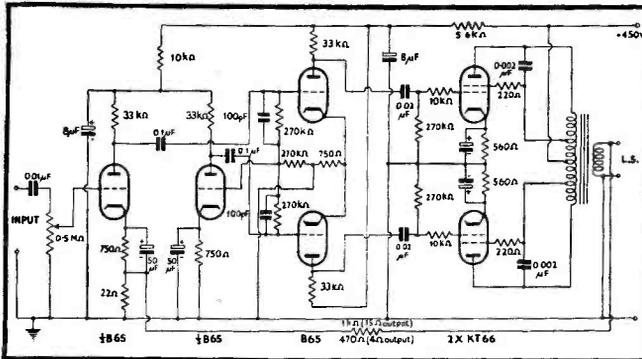
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Published the Friday following the first Wednesday each month at 55 Victoria Street, London, S.W.1.

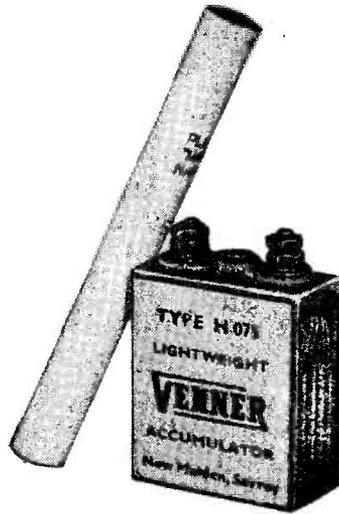
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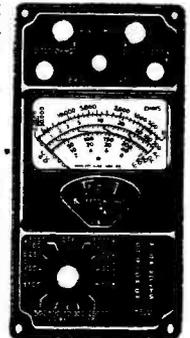
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The SHORT-WAVE Magazine

E D I T O R I A L

QRPP *In this space, in the November 1952 issue, some comments were offered on the practicalities of low-power working, the conclusion then reached being that 2-3 watts into the aerial can do quite a lot in the hands of a capable operator. And of course by now the majority of amateurs (and even some of the professionals !) thoroughly understand that it is in any case not the power one uses, in terms either of DC input or RF output, but the aerial one has up that decides the ultimate efficiency of the station.*

Hence, we have no hesitation in clinching the argument for QRP by drawing attention once again to the remarkable results now being obtained by some of our TTX (transistor) stations. Their DC input is measured in terms of milliwatts, and to them "2-3 watts into the aerial" represents about 50 times the power they can expect to achieve with transistor transmitters. It is the TTX operators who have quickly found that the aerial is the clue to the problem of getting out with the minute RF power which is all that a transistor can produce.

By working over the distances now being achieved on the 160-metre band, the TTX stations are proving that QRPP, or ultra low-power, working is still a profitable pursuit. Hence, the conclusion now is that, for those not interested in transistors but who want a new field to explore, the possibilities of long-distance communication with 1-watt valve transmitters might well investigate, the aim being to achieve the utmost with minimum power, instead of taking what comes when using maximum input.

*Austin Fobler
G6FO.*

Sine Wave all the Way

LOWERED PA EFFICIENCY FOR TVI REDUCTION

L. BLACKIE (G3DIJ)

This is a very interesting and important discussion on the practical advantages to be gained by adopting lower classes of valve operation in RF final amplifiers. For years, the amateur objective has been a high efficiency Class-C PA stage for its own sake, without it always being realised that such a condition is inherently conducive to harmonic generation. Before the advent of TV that did not matter a great deal, and most people never had to bother much about their higher frequency harmonics. But nowadays things are very different. If harmonic production can be substantially reduced by lowering PA efficiency, this is well worth while provided there is no serious loss of RF output at the transmitting frequency, and PA valves are not over-run. In any installation, aerial efficiency is always the deciding factor for the ultimate result. Therefore, in medium-power working, a few watts of RF more or less at the transmitter itself will in any case have no influence on the effectiveness of the signal as radiated. Our contributor discusses PA operation and efficiency and shows figures to substantiate his argument that little is lost, in terms of RF power available, by going from Class-C to Class-AB1 operation of the PA stage. The advantage is that harmonic output is considerably reduced in the latter condition.—Editor.

THERE has been a great deal of information published recently regarding the elimination of TVI and much of it has been in the shape of transmitter circuits. While many of these circuits are excellent and shun the harmonic-producing class of operation known as "C" right up to the final amplifier grid, the end-result appears to be a Class-C final amplifier in nearly every case.

The usual argument is that Class-C operation is the most efficient and, though this is true enough, it is an argument that tends to be exaggerated.

In the case of high-level modulation it is impossible to produce linear modulation unless the final amplifier operates Class-C over part

of the modulation cycle—at least, not unless special circuits are used—and because of this what is to follow applies mainly to CW operation.

Several writers have proposed the use of Class-B and even Class-AB2 operation in the final amplifier, but it is unfortunate that few give definite information on the results that might be expected. It was because of this that experiments were carried out in order to determine the magnitude of the differences between those classes of operation lying in the range AB1—C.

The first aim in any TVI-proof transmitter should be the production of a driving signal that is itself free from harmonic energy. This is best accomplished by producing the operating frequency as a voltage in the first place as this will result in a clean signal; the resonant circuits used in the voltage stages will have high values of Q if care is taken and because of the lack of loading they will play a vital part in the reduction of harmonics.

Once this condition has been achieved it is necessary to ensure that the following stages produce as little distortion as possible; because these following stages will operate as power amplifiers the limit of operation should be Class B if severe distortion is to be avoided.

The Driver Stage

The power required from the driver depends upon the type of final amplifier proposed. If beam-tetrodes are to be used then the drive requirements will be small and almost any small power-type valve will be suitable for the driver; if the PA is to incorporate triodes, then the drive requirements will be much greater and a pair of valves in push-pull will probably be required for the driver. Because a beam-tetrode final amplifier is to be considered here the driver will be quite small and a suitable circuit is shown in Fig. 1.

The circuit is conventional in every way except that the bias voltage, derived from the cathode, is kept low. This voltage does not exceed about 15v. with the stage drawing full current, so that operation is approximately Class-A.

Neutralising is important here because of the mode of operation but it should be found easy to effect and the stage should remain quite stable.

The input/output of the anode circuit is controlled by varying the screen voltage via the potentiometer, VR. There are probably

and anode current are also tabulated and they should give some idea of what is required in terms of drive for good efficiency at the final amplifier. There is a very marked increase of driver consumption above maker's ratings while the output at the final amplifier anode would appear to ignore it. In the case of Class-AB1 operation the driver input is truly negligible, being no more than about 1w.

The Final Anode Tank Circuit

While it is usual to write pages about final amplifier operation it is not often found that the plate tank circuit is given full consideration. This is to be deplored because the overall efficiency of the final amplifier depends not only on the plate efficiency of the valves but also upon the efficiency of the tank circuit used. Apart from this the tank circuit determines how much harmonic coupling there will be to the load.

If the loaded Q of the tank circuit is kept low then its efficiency will usually be high but under these conditions it will be found difficult to load the amplifier properly while harmonic transfer will be at a maximum.

If the loaded Q of the tank circuit is kept high then the efficiency will usually be low and the harmonic transfer to the load at a minimum.

A compromise is made and the loaded Q kept within the range 10 to 15. A mass of calculus is not required to find out whether the circuit Q is correct or not.

It is only necessary to check various current readings in the circuit. If maximum output to the load is obtained before the plate current is at the rated figure then it can be assumed that the Q of the tank circuit is too low and a reduction of L/C ratio will improve matters. If the amplifier is found to be over-drawing current when the maximum power is developed in the load—or if the amplifier is drawing the rated current and the output to the load appears to be low—then it can be assumed that the Q is too high on load and an increase of the L/C ratio will make an improvement.

It must be appreciated that the above is only true when the amplifier is running correctly—apart from the anode current—and when there

is nothing wrong with the method of coupling the load.

If it is found that the maximum output to the load coincides with the rated anode current and the efficiency appears to be good then it can be assumed that the tank circuit Q on load is about right.

This is not to say that if these conditions are met the tank circuit is perfect.

Far from it. If the tank circuit has an off-load Q of 40 and an on-load Q of 10 then it will have an efficiency of 75%: if, on the other hand, the off-load Q is 80 and the on-load Q is 10 then the efficiency will be 87.5%. This means that an amplifier running an input of 100w. with a plate efficiency of 85% will give two different outputs to a load—the former tank circuit will give an output of about 64w. and the latter an output of about 74w. The emphasis here is—both circuits will give an equal anode efficiency because of the similar Q on load, but because of the unloaded Q values there is a distinct difference in the efficiency of the tank circuits. Doubling the unloaded Q value as in this example results in an increase of output to the load of 10w., which is a substantial proportion of the total amplifier input.

The Q of the tank circuit off load can be judged by simply tuning the circuit to resonance without load and examining the amplitude of the anode current that flows: if

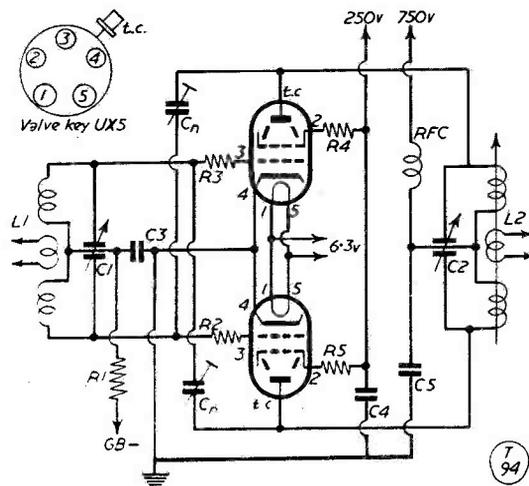


Table of Values

Fig. 2. Circuit for a PA in Class-AB1.

C3, C4 = .002 μ F mica	R1 = 200 ohms
C5 = .01 μ F mica	R2, R3 = 12 ohms
Cn = Neutralising	R4, R5 = 47 ohms
RFC = 2.5 mH RF choke	V1, V2 = 807

(L1/C1, L2/C2—See notes in text).

Fig. 2. Push-pull RF amplifier in Class-AB1, using 807's, which must be neutralised to ensure a clean signal. When adjusted in the manner explained in the article, there should be very little harmonic energy in the output, and even though RF power will be less than with more bias and harder drive, this will not noticeably affect results if the radiating system is efficient.

TABLE OF OPERATING CONDITIONS

Class of Operation	Final Plate Voltage	Final Plate Current	Final Grid Bias	Total Final Grid Current (Opt.)	Driver Stage Plate Current	Driver Stage Input Power	RF Current In Dummy Load	Approx. Final Efficiency	Approx. Final Output
AB1	750 v.	120 mA.	30 v.	0 mA.	4 mA.	1 w.	0.34 A.	69%	62 w.
AB2	750 v.	200 mA.	30 v.	6 mA.	10 mA.	2.5 w.	0.45 A.	73%	109 w.
B	750 v.	200 mA.	35 v.	6 mA.	11 mA.	2.75 w.	0.45 A.	73%	109 w.
C	750 v.	200 mA.	45 v.	6 mA.	14 mA.	3.5 w.	0.46 A.	76%	114 w.
(Makers)	750 v.	200 mA.	75 v.	7.5 mA.	29 mA.	7.25 w.	0.46 A.	76%	114 w.
C	750 v.	200 mA.	90 v.	9 mA.	36 mA.	9 w.	0.46 A.	76%	114 w.

NOTE.—The figures for output and efficiency are not necessarily those obtained in practice. However, the ratios are correct, the RF current being measured through a 540 ohm load.

this current is high then the Q is low; and if this current is low then the Q is high. In the case of the amplifier described the current at resonance and without load should be about 15 mA.

There is only one way in which to obtain high values of off-load Q and maintain the correct on-load value and that is by using only the best materials in the construction of the tank circuit; insulation should be the finest available and it should be used sparingly; the conductor for the coil should be chosen with care—the higher frequencies in particular should demand the use of silver-plated tubing for the coil and silver-plated condenser vanes.

To sum up—there is a lot more to the tank circuit than a condenser and a coil; what efficiency is lost at the anode of an amplifier by running it at some low class of operation can often be cancelled by paying a little attention to the efficiency of the tank circuit!

Conclusion

The advantages of the lower classes of operation in the final amplifier outweigh by far the disadvantage—and the singular is used purposely! The advantages include a lower total transmitter consumption, a simplified exciter unit and lower harmonic output. The only disadvantage lies in the slightly reduced output that is of such meagre proportions that it can be completely ignored in the case of Class-B or AB2. The final amplifier is quite capable of dissipating the odd five watts that will be lost and this will make no difference on the air—any S-meter capable of detecting the difference in signal level will have to use some form of bandspread. Even a reduction to Class-AB1 will result in no more than a 3 dB reduction on the received signal.

If the cathodes of the final amplifier are

considered then the reduced conditions will be accompanied by a reduction of the peak currents that they supply with a consequent prolongation of valve life.

It would appear that the efficiency of a well designed and constructed Class-AB2 amplifier might excel that of an average Class-C one.

In terms of TVI results have been encouraging inasmuch as the home TV aerial is only eight feet away from the transmitter and its aerial, the final amplifier being completely unscreened and without harmonic traps or filters fitted.

With the carrier running on Class-C there is enough TVI to be an annoyance; with Class-B or AB2 there is a barely detectable something that is of no consequence at all; while with Class-AB1 it is impossible to tell if the transmitter is on the air or not.

The purpose of this article has not been to describe the production of a transmitter incapable of causing TVI—that is left to the science fiction writers—but it is hoped that it will give some idea of what to expect with low classes of operation. It takes little time and no expense at all to reduce operating conditions; so if you have a clean driving signal, a Class-C final and TVI, try it out and see what happens. Even if it means a reduction to Class-AB1 then, though full power will be impossible, the efficiency should still be high and the signal will get out.

Note: No values have been given for the inductance or capacity of the tuned circuits as these will depend on the bands required. The values can be obtained from charts or by calculation. Generally, it will be found impossible to use a single condenser to cover all bands and maintain the correct L/C ratio on all.

Crystal Controlled Frequency Marker

GIVING 100 KC BEATS

C. W. FINCH (G3AHO)

Though the new licence conditions do not specify any particular method of frequency control nor a figure for calibration accuracy, it still remains entirely necessary that every amateur should be able to check his frequency with the highest possible degree of certainty. This little oscillator will be found indispensable for VFO calibration and receiver setting.—
Editor.

THE unit to be described was designed as an economical frequency marker for use in the writer's station when it was decided to go VFO after years of being rockbound.

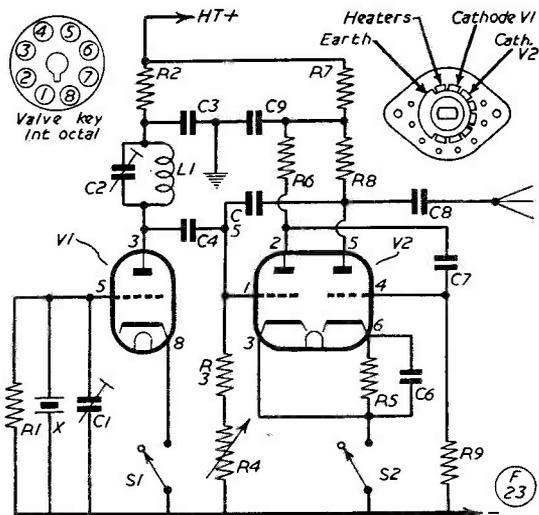
Most of the component parts will be found in the average junk box, with perhaps the exception of the 1 mc crystal; this was purchased from a well-known Magazine advertiser, complete with certificate giving its accuracy as .005%, for twenty shillings.

The unit consists of a conventional triode oscillator controlled by the one megacycle crystal. The output of this oscillator locks the frequency of a multivibrator at 100 kc, and on the station R.1155N it was found that 100 kc pips could be heard up to the highest frequency covered, i.e., 18.5 mc.

In a piece of gear of this nature the circuit and component layout can be altered to suit the individual requirements of the constructor, but it was thought that a few brief notes might be useful.

The box in which the unit was built measured 5" x 3" x 3", and it was found that it housed the components comfortably. A very much smaller assembly could, of course, be devised if miniature components were used.

The tuned circuit in the anode of the 6J5 oscillator can conveniently use a medium-wave BC coil, but about 120 turns on a 1/2" former will tune to 1 mc with a 100 μF trimmer. The switch is arranged so that the rotor is earthed, and progressively shorts to earth first the heaters (stand-by), then the 1 mc oscillator cathode, and in the final position the 100 kc cathode. Here again the design need not be slavishly followed, and any switch or combina-



Circuit of the 1-megacycle CC marker oscillator, with the multiplier-amplifier stage V2 to give 100 kc beats all the way up into the HF bands. With such an arrangement it should be possible to find, for example, a well-defined heterodyne note at 14000, 14100, 14200 kc and so on, thus enabling VFO or receiver to be accurately calibrated.

Table of Values

Circuit of the Check Oscillator.

C1 = 3-30 μF	R4 = 50,000 ohms
C2, C5 = 100 μF	R5 = 1,000 ohms
C3 = 0.1 μF	R6, R8 = 15,000 ohms
C4 = 10 μF	R7 = 15,000 ohms
C6 = 1.0 μF	R9 = 10,000 ohms
C8 = 15 μF	V1 = 6J5
C9 = 0.5 μF	V2 = 6SN7 (or 2 x 6J5)
R1 = 470,000 ohms	X = 1 mc crystal
R2 = 22,000 ohms	L1 = 120 turns, 1-in. former.
R3 = 33,000 ohms	

tion of switches (which can be modified if necessary) can be roped into service.

Having built up the unit and switched on, allow a little time for the cathodes to warm up, and then switch to the 1 mc position. Adjust the tuned circuit in the anode of the 6J5 until the heterodyne beat can be heard on an adjacent receiver. Next switch the 100 kc multivibrator in and adjust the variable resistor (R4) in the grid until the frequency locks in at 100 kc. If it is found that there is a slight error between the oscillator and a standard frequency transmission this can usually be corrected by adjusting the Philips trimmer. This will ensure a very high degree of accuracy indeed.

The unit can be left in the "stand-by" position when the station is in operation, and 1,000 kc or 100 kc pips will be available at a

flick of the switch whenever a frequency check is required.

A 10 kc multivibrator could be added if it was thought necessary, but for those not wish-

ing to spend a lot of time building an elaborate frequency meter, this unit is recommended as a means of giving an accurate frequency check when using VFO control on the transmitter.

Improving the R.1224A

SOME USEFUL MODIFICATIONS

A. J. WARD (G3WD)

NO doubt many amateurs (and SWL's) use this little receiver and get excellent results. The writer has, however, found it lacking in one important respect—it was "too loud" when receiving CW. Even with the RF gain control right off some stations were still at speaker strength and unbearable on a headset. Very nice to have plenty of gain in hand, of course, but let it be controllable!

Examination of the circuit showed that the output valve is RC-coupled to the detector stage with a 1-megohm grid leak, as in Fig. 1, and that there was no bias on the output valve. The audio side of the receiver was originally designed for high-resistance telephones or 600-ohm line. Here was the answer to the problem of where to put a gain control—remove the 600-ohm output jack and fit a miniature 1-megohm potentiometer in place; it will just go in nicely.

The circuit now looks like Fig. 2. In the writer's receiver a further refinement was the fitting of a 3" PM speaker, right at the back of the left-hand side of the cabinet; the original

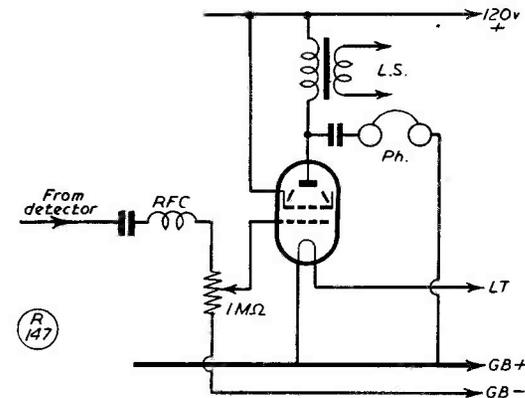


Fig. 2. The modification, as applied by G3WD, with the advantages explained in his notes.

output transformer was changed for one suitable for matching the valve to the speaker. The o/p transformer from an old battery set will do admirably; the smaller the better. The speaker voice-coil was wired *via* the spare contacts on the phone jack, so that plugging in the headset silences the speaker.

These simple modifications make the R.1224A self-contained and very handy in operation. In the final test out, it was found that background noise was less evident and that an effective balance could be obtained between the settings of the RF and audio gain controls; this can be made to improve the signal-to-noise ratio.

AMATEUR EXAMINATION IN OCTOBER

Those who feel able to take the earlier radio amateur examination, held by the G.P.O., are referred to the announcement on p. 284 of our July issue, noting that the closing date for applications to take the *Morse Test* is August 20.

NATIONAL RADIO SHOW

This will be at Earl's Court, London, from August 25 to September 4, and this year will be opened by Sir Miles Thomas. As usual, there will be a large BBC exhibit, and in the Services' section the Royal Navy, the Army and the Royal Air Force will be represented, with exhibits illustrating their work and equipment. One of the "electronic side-shows" is to be a demonstration of radio-controlled models.

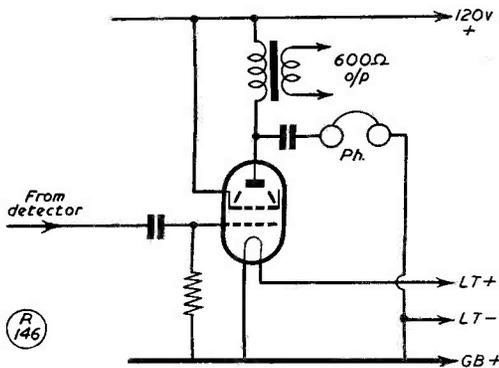


Fig. 1. The original circuit, on the LF side, of the R.1224A.

Peaking CW Signals

USEFUL BFO MODIFICATION

R. C. SCOTT (G3DXI)

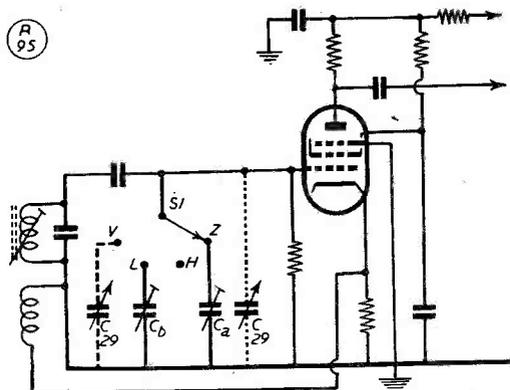
FOR amateur band CW reception a Selective Audio Amplifier (SAA), peaked at approximately 1000 c.p.s., is rapidly becoming an essential.

It has been observed that many receivers are used any-old-how to take CW, the actual signal through the RF and IF stages being as much as 5 kc off resonance. Use of SAA's will probably lead to further mis-alignment of the BFO, possibly one of the least accurately set controls on the receiver.

By modifying the BFO variable tuning to 3 switched pre-set positions this can be overcome, with an added advantage to be mentioned later. Fig. 1 shows the circuit of an AR77 BFO modified. The original BFO tuning condenser (C29, shown dotted) has been removed and replaced, both electrically and physically, with a single-pole, 4-way Yaxley switch. A 4-way switch is quoted so that, if desired, the original variable condenser (C29, shown dashed) can be connected to position V (variable), and mechanically located in the fixing hole for the Noise Limiter control.

The functions and alignment of the remaining three positions are, in correct order, as follows:

Position H ("High"). To the mixer grid feed an unmodulated signal, exactly 1000 c.p.s.



The BFO modification suggested by G3DXI as applied to an AR77; it is equally suitable for communication receivers of other types. In this arrangement, the cathode resistor does not act as a bias source, but determines the output of the oscillator. Ca, Cb are 3-25 μF trimmers, C29 dotted is the original BFO beat adjusting condenser, and C29 dashed, connected to S1, is of sufficient capacity to swing from 455 to 1000 kc.

higher than, IF and tune the core of the BFO coil for zero beat. If difficulty is experienced in determining 1000 c.p.s. higher (or lower) on the signal source, inject a signal at exactly IF (peaked with the Xtal IF filter) and tune the BFO core for maximum audio output from the SAA.

Position Z ("Zero Beat"). With the injected signal at IF exactly, tune trimmer Ca for zero beat.

Position L ("Low"). Proceed as for position H, but with the injected signal 1000 c.p.s. lower than IF, and tune Cb for zero beat.

If the alternative method is used, tune Cb for maximum audio output from SAA. If only one maximum is thus obtained and this occurs with trimmer Cb right open, then the BFO core has been wrongly set 1000 c.p.s. below IF.

The band-pass switch should preferably be in the narrowest position for these adjustments.

The Effect

Now let's try some CW reception. Switch to position Z and tune the receiver until your selected CW signal is at zero beat. Flip to position H and you have a nice 1000 c.p.s. note which sits right on the top of the curve of your SAA.

Very nice, but just then old G9VFO comes on just 2000 c.p.s. HF of the wanted signal, giving a further 1000 c.p.s. beat in the phones. Worry us? No fear. Just switch to position L, and G9VFO becomes 3 kc away and slides right down your SAA curve while the wanted signal is still sitting right on the nose at 1000 c.p.s.

This, then, is the advantage referred to previously—no tuning your variable BFO control down to zero and up the other side to a doubtful 1000 c.p.s. Just turn the switch, which is the great advantage, especially under contest conditions.

Additionally, by first tuning on zero beat, you can rest assured that you are getting the absolute best from your receiver, from the aerial terminal right the way through to the 'phones.

Although the AR77 has been used as an example, this same system can be built into any normal communications receiver. There are no snags, except that in some receivers a point to watch is the position of the RF gain control. These may suffer a change in beat frequency as the signal strength increases; the moral, therefore, is to keep the RF gain as low as is consistent with readable signals.

“So You’ve Passed R.A.E.!”

PART II

APPROACH TO OPERATING

A. D. TAYLOR (G8PG)

This article is essentially Advice to Beginners, and the author deals with the basic principles of good operating. All who have themselves been through the mill of experience in this respect will agree that he has picked out the points that matter. Part I in this short series appeared in our July issue, and dealt with the installation and general arrangement of the beginner's first station.—Editor.

What Makes a Good Operator? This is perhaps one of the most difficult questions in Amateur Radio! Two men start on the air as raw beginners. Within a couple of years one is able to hold his own with the best of the old timers, while the other appears to have made little or no progress. Why? Temperament certainly enters into it—some people take to operating naturally—but many other factors also play an important part. These can be summarized as follows :

- (1) The realisation that Operating is an acquired skill, every bit as intricate and worthy of study as the technical aspects of radio.
- (2) The determination to master Operating in all its aspects—telegraphy, procedure, the instantaneous recognition of another operator's capabilities, the best use of the various bands and of frequencies within a band, the ability to pick the good and reject the bad from other people's operating practices and the patience and attention to detail which are the final hallmark of the expert in any craft.
- (3) A modicum of common sense, the ability to think reasonably quickly, and genuine consideration for others.
- (4) A good knowledge of Morse telegraphy.
- (5) A steadily increasing sense of the pride of craft which comes in time to every good operator whether amateur or professional.

Any amateur who cultivates these qualities will in time become a good operator. If, in addition, he possesses natural operating ability he will become an outstanding operator. *This*

applies irrespective of the mode of transmission employed. Good phone operating is just as important as good CW procedure, and the man who gets the most out of his hobby will attempt to become proficient at both. As this article is written for the beginner the emphasis is on CW working, but the basic principles apply equally to phone operation.

Morse

Any good amateur operator will take pains to master Morse telegraphy, concentrating especially on reception. The ability to read weak CW signals through heavy interference is essential if contact is to be maintained (especially in DX working), and it is almost entirely a matter of practice and concentration. Begin by picking out a weak signal on a crowded band and imagining that it is a rare DX station who has at last come back after hours of calling. Concentrate on this signal and attempt to copy every character being sent. Do this whenever possible, gradually increasing the length of the practice period as confidence is gained. As the ability to read through interference increases with practice, so will the operator's receiving speed. The aim should always be to practice on a station sending as fast as one can receive. As regards actual speeds, the eventual aim should be to reach a speed of at least 19-20 w.p.m. This gives something in hand, which will prove invaluable when reading through interference.

Sending is also important. Here the aim is *good* Morse rather than fast Morse. Speed will come later with practice, but once bad habits of formation or spacing are acquired they are very difficult to lose. Listen to automatic Morse keying or good hand sending and attempt to copy the style, concentrating on formation and letting speed come gradually.

As regards working speeds, remember these rules: (1) Never send faster than you can receive. (2) If the other man sends slowly, go back to him slowly. A station called at 25 w.p.m. is entitled to assume that the other man can read 25 w.p.m., while going back to a 12 w.p.m. station at 20 w.p.m. merely indicates that one is neither an operator nor a gentleman!

Listening

The art of listening is often the dividing line between good and bad operators. This is particularly true of DX working. The outstanding DX operator spends far more time listening than transmitting, his idea being to comb the band for the rare stations and get

after them *before* the wolf pack has picked up the scent !

Once again, much can be learned by practice. Set the receiver to a random frequency in a busy band, then spend ten minutes trying to identify all the signals audible. The number of signals which are heard merely by *listening* on a single frequency will prove an eye opener! Again, spend ten minutes tuning around a DX band which is open and trying to identify every signal of S5 or less. The variety of calls recorded should be convincing proof that this is one of the secrets of DX success.

There are two other points which should always be observed. After a CQ call listen and search carefully for at least a minute. Also, always listen for at least 30 seconds at the end of a QSO. This latter habit may often result in an unexpected contact with a third station who has been standing by.

Operating Signals and Abbreviations

Operating signals are a series of internationally recognised code signals used by commercial and amateur stations. Abbreviations are shortened words or letters which stand for a word, some being used purely by amateurs. Examples of operating signals are "QRM," "K," and "DE," while examples of abbreviations are "UR," "WX" and "PSE."

These signals are designed for *Morse* working, and normally should not be used on phone. They serve the dual purpose of providing a "language" by means of which operators of various nationalities can communicate with each other and also as a great time saver. As time saved in transmission reduces interference, they should always be used. Full lists of both operating signals and abbreviations can be found in the Amateur Radio handbooks, and they should be studied with care. They are best learnt with practice, one simple method being to make sure that each abbreviation received either when listening or working is fully understood and looking it up if in doubt.

The international "Q" signals (QTH, etc.) each have two meanings, being used either as a question or answer. When followed by a question mark (IMI in Morse) they convey the question, and when used without the question mark the answer, e.g., QTH? means "What is the location of your station?" and "QTH London" means "The location of my station is London." A common mistake amongst beginners is to omit the question mark from the abbreviation QRZ. QRZ means "You are being called by" and should be followed by the call sign of the calling station. QRZ? on the

other hand, means "What is the call sign of the station calling me?" "QRZ de G3-K" without the question mark is therefore meaningless, but "QRZ? de G3-K" is the correct procedure when the call sign of the calling station has been missed.

K is the invitation to transmit and should be used at the end of any transmission where a reply is expected. KN sent as one group is used instead of K when only replies from a particular station or group of stations are desired. It should *not* be used after a CQ call except in the case of a directional CQ, e.g., "CQ USA de G3-KN" indicates that only stations in the U.S.A. should reply.

AR is the "end of message" sign, and should be used to separate the last word of the text from the call signs, e.g., "NW HW? AR G8PG de G3-K." (The Americans recommend that AR should also be used to end calls when communication has not actually been established, but this seems to some extent a mis-use of the signal.)

Perhaps the most misunderstood operating signal is the "end of work" sign, "VA." VA means simply and solely "end of work," and should be used *only* at the end of the last transmission of a contact, e.g., "G8PG de G3-VA." Once VA has been sent any other station can normally break in and call either party.

"BK" or "break" is used in place of K when a station is equipped for break-in operation. It indicates that the station can "listen-through" and that his transmission can be interrupted by the receiving operator.

If these signals are correctly used and a reasonable number of Q signals and abbreviations learnt, the procedural side of operating should prevent few difficulties.

Calling

Calls should be kept short and should be made at a speed not exceeding that used by the station being called. The call will usually be made on a frequency within ± 1 kc of that used by the station being called, and the call itself should normally consist of the call sign of the station being called sent not more than 7 times, "de," the call sign of the calling station 3 times and the letter K. In local work and contests shorter calls can often be used and occasionally a longer call may be required. If the desired station does not answer and no other station can be heard calling him, a second call is in order. If other stations are heard calling, stand by: the station being called may

come back to two or more stations and establish a multi-way QSO.

When calling, good Morse is essential, great care being taken to send one's own call sign carefully, as this is the most important part of the transmission as far as the receiving operator is concerned.

Rag-Chewing

It is a true saying that rubber-stamp contacts make acquaintances and ragchews make friends. While a long chat is not in order when taking part in a contest or working a rare DX station with a queue waiting, the vast majority of contacts can be made far more interesting if ragchewing is indulged in. The range of subjects is unlimited. To get the other fellow started, ask questions about conditions, his equipment, the town he lives in or anything else which will open a conversation. His reply is almost certain to contain something to comment on and so the ragchew builds up. Many lasting friendships are made in this way—often between operators thousands of miles apart—and ragchewing itself is one of the most pleasant aspects of Amateur Radio.

While this survey is only a brief glimpse over the whole fascinating field of operating, it is hoped that it will prove of value to the newcomer and will help to add still more to his enjoyment of the freedom of the air.

MULLARD SUB-MINIATURE VALVES FOR COMMUNICATIONS AND INDUSTRY

The Communications and Industrial Valve Department of Mullard Ltd. now have available a complete range of sub-miniature valves, comprising both directly-heated and indirectly-heated types. Among these are some of the most remarkable post-war valve developments. For example, the directly-heated triode, type DC70, is capable of operating efficiently at 500 mc, giving an output of 450 mW as an oscillator. (It can therefore be used in the 460-470 mc "Business Radio" band.) For the lower frequency of 200 mc a sub-miniature battery pentode, DL73, is available, having an output of well over 1 watt as a Class-C amplifier. Indirectly-heated sub-miniatures are also being made with performances at least as good as comparable miniature types, and in general, their heater consumption is lower. Type EF72, for instance, has characteristics similar to the EF95 (6AK5) low-noise pentode, but a heater rating of 6.3v., 0.15A.

Many of the Mullard sub-miniature valves, especially those designed for use in power output stages, are of the 10 mm (0.4in.) diameter round type, the length ranging from about one to two inches. An important group of smaller valves, the flat sub-miniatures, is also being developed. These

are 1.25v. filament types on the B5A base, and are similar in size to hearing aid valves. Some of these are provided with metallised bulbs for screening purposes, the metallising being connected to the negative filament lead. The flat sub-miniatures have bulbs about 8.5 mm (0.3in.) wide and 6 mm (0.25in.) deep, the bulb length being of the order of 1½ins. A typical example is the DF62, an RF amplifying pentode for use in receiver input stages at frequencies up to 200 mc; it is an exact equivalent of the American 1AD4. Flat versions of some of the 10 mm receiving valves have also been developed. They include a straight RF pentode, a variable- μ RF pentode, and a low power audio output valve, all with 25 mA filaments, and an equivalent of the American CK5672. These valves are particularly suitable for use in pack sets of compact unitised plug-in construction.

An even smaller valve, the 5 mm (0.2in.) round sub-miniature on the B5B base, is the EA76 indirectly heated diode. With a length of just over an inch, this valve is comparable in size with a germanium diode, but is, of course, free from the temperature limitations of germanium crystal valves.

Other valves in the range of Mullard sub-miniatures are a high-voltage rectifier, a tetrode thyatron, a voltage stabiliser, two low-consumption electrometer valves, and several low-power UHF amplifier and oscillator types.

COURSES FOR THE R.A.E.

As in previous years, various courses of instruction for the Radio Amateurs' Examination have been, or are being, arranged for the coming winter session in preparation for the Examination in May 1955.

Grafton, Holloway, N.7. By special arrangement with the local authority, a course will open at Grafton School, Eburne Road, Holloway, on Monday, September 27 at 7.15 p.m., and thereafter each Monday evening, 7.15-10.00 p.m. The classes will cover radio theory and practice up to R.A.E. standard, and will include Morse instruction. The total (L.C.C.) fee for the course is 10s. only, the instructor in charge will be A. Perry, G3DKX, enrolment takes place during September 20-24, and in the first instance application should be made to: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middlesex. This course proved to be both popular and successful last year, and Grafton hope to get even more students through this time.

Brentford. The annual course for the R.A.E. will be on Wednesdays, 7.00-9.00 p.m. at the Evening Institute, commencing on September 22, with enrolment during the week September 13-17; the fee is 15s. This course is designed for the absolute beginner with no previous knowledge of radio, and Morse instruction is *not* given. Additional courses available here are Radio Servicing I and Radio Servicing II, intended for those wishing to become qualified in this subject, and the fee is also 15s. Applications for enrolment and further information to: J. R. Hamilton, 11 Hitherbroom Road, Hayes, Middlesex.

(Additional courses will be announced next month).

DX COMMENTARY

L. H. THOMAS, M.B.E. (G6QB)

RESIDENTS in the British Isles are hardly bothering, by and large, to talk about radio conditions any more. The favourite topic of conversation is the summer weather (or shall we say the complete absence thereof, up to the time of writing). We have often wondered whether this can also be linked up in some way with the eleven-year sunspot cycle; and the main point in mind at the moment is that the peak year for short-wave radio (1947) was undoubtedly the best summer that most of us can remember. It seems more than a coincidence that 1954 should now present us with the worst conditions and the worst weather. So rapidly does the average sunspot cycle "grow" that it seems probable that the next peak year will be 1958—eleven years from the last peak, but only four from the trough.

This particular Old Moore suggests that you save up and buy a really snappy swim-suit and a bottle of sunburn lotion in 1958 . . . but then conditions may be so good that the more rabid type of DX-chaser won't be interested in bathing that summer.

News of the Month

The DX bands have been much the same as they have for the last three or four months—pretty uninteresting, if you except the occasional burst of mild DX on Twenty. The others are obviously not dead, but sleeping . . . poor consolation to those who have determined to stick to them in the hope of winking something out.

Twenty always has its ups and downs; there have been many days when we might have thought



G6TJ

CALLS HEARD, WORKED and QSL'd

it quite good had it not been for an appalling lot of short-skip stuff. The latter is usually generous in quantity, but the less said about its quality, the better.

Fourteen has occasionally opened to North and South paths and has also been packed with short-skip; and the same applies to Ten, which has actually released a few South Americans and South Africans in this direction! Just for a change, we will start down there.

Ten Metres

G3IDG (London, S.W.12) has been sticking to this band with 10 watts, one crystal and two half-wave dipoles in the roof-space. With these he has raised three DL's, an HB three times, 11 and YU. Others heard but not worked have been AG2, CT, EA, F, LA and LU. He wants to see a lot more CW activity on the band.

The Activity Sunday, July 25, occurs between the date of writing

this and that of its publication; we hope the band was stirred up on that day—please do not fail to report if you took any part at all in the Activity Period. On other Sundays we have heard LU, CE, PY, ZS, VQ4 and ZE—all on phone.

Fourteen Metres

G3HCU (Chiddingfold) is still faithful to this band, and has found things poor, with even the North-South path almost shut. When he worked ZS1BV, it was his first South African contact for about four weeks. Other DX was CE, CR5, OD, KV4, KZ5, LU, VQ4, ZD4 and ZD9—all on phone. Three American /MM's (now authorised to use this band) were also raised.

G2BJY (West Bromwich) has also had a month on 14 metres without noticing much improvement in things. He says two outstanding signals have been W8QOH/MM and W4DGW/MM.

THE VK-ZL CONTEST

Period : Phone Section, 1000 GMT, October 2 to 1000 GMT, October 3. CW Section, 1000 GMT, October 9 to 1000 GMT, October 10.

Serial Nos. : RST (or RS) report, followed by consecutive numbers of contacts, starting at 001.

Contacts : Between all stations outside VK and ZL, and any VK or ZL stations.

Multipliers : The total number of contacts on all bands (scoring one point each) to be multiplied by the total number of VK and ZL districts worked on all bands.

Logs : Must show Date, Time GMT, Call-Sign, Serial sent, Serial Received, Band. Underline each new VK/ZL district as contacted, and use a separate sheet for each band of operation.

Summary sheet must show Call-Sign, Name and Address in block letters, details of rig, total score (by showing total of districts worked on all bands and total contacts on all bands). Also signed declaration that rules have been observed.

Logs must be sent to reach NZART, Box 489, Wellington, N.Z., before January 21, 1955.

both on CW and commendable for excellent operating. Ragchews for fifteen minutes or more at 25 w.p.m. have been very stimulating for 'BJY. Other nice ones have been EL2X and FY7YC (new ones), and ZS9G on phone. VQ4, ZS and ZB1 just about make up the total. A new one for G5BZ (Croydon) was TF5TP.

G2BW (Walton - on - Thames) bagged FY7YC, UQ2AN and a GI for three new ones, and worked the two /MM's mentioned above as well as W3KIF/MM. He has no doubt that the band is now taking a turn for the better, and has heard W's on CW (around 1600 GMT) on three occasions.

Twenty-Metre DX

G5BZ reports "the usual run of stuff"—HK, CE, VQ2, VE5, W6 and 7, and the like. G6VC (Northfleet) worked a few KH6's in the early mornings, and the usual W's during normal daylight hours. A tower and a "ZL Special" are on the way.

G6QB has been maintaining his sked with W2BCR, around 1400 BST. It is interesting to note that this has now been running since last November and has never yet been missed because of conditions. Signals started at S99+ both ways and have gradually dropped throughout the year. The weakest (as yet) have been on a particularly poor day when S4-5 both ways was the best report that could be given.

Around this same time of day one almost invariably hears fairly good signals from the Far East. One or two high-powered KA's have been outstanding, with JA's, DU's and KR6's nearly always in evidence. On less frequent occasions VU's have been there with good signals.

News from Overseas

VS2UW (ex-G3GUW) says conditions for the U.K. have been hopeless, with only one contact in six weeks. (This compares with a

QSO every other night, last season). All the same, he has raised 100 countries in his first twelve months out there. 'UW tells us that VS2EB, with a 3-el. beam in Johore Bahru, gets out likes nobody's business when the stations up in Kuala Lumpur can't do a thing. The country is 400 miles long, which we are apt to forget.

First VS2-G contact on 21 mc is claimed by VS2UW for his QSO with G3HCU on April 19. Two-metre skeds with other VS2's are made rather difficult by the fact that the first hop is 200 miles. VS2DQ (Kedah) has his 14 and 144 mc beams up and hopes to make himself heard soon—he is ex-ZC1AL.

MP4QAJ/OD5AF writes to explain his somewhat confusing set-up. The two ops. are R/O Bennet (Benny), G3HEH; and R/O Rimmer (Roger). Their job includes flying from the Tripoli (Lebanon) Air Base to Qatar and

SHORT WAVE MAGAZINE DX CERTIFICATES

WNACA (Worked North American Call Areas)

Twenty-two cards to be submitted, for contacts with stations in ten U.S. Districts (W1-9); nine Canadian (VE1-8 with one 8 in Yukon, one in North-West Territories); Alaska (KL7), Newfoundland (VO) and Labrador (VO). Contacts may have been on any bands, phone or CW. Operators in W, VE, VO or KL7 are not eligible for this Award. (70 WNACA Certificates issued to June, 1954).

FBA (Four Band Award)

Cards to be submitted with confirmation of contacts with 20 different countries, each country to have been worked on four different bands. Any bands will qualify e.g. 160-80-40-20, or 80-40-20-10, or 160-40-20-14 — and so on. Entrant's own country may count as one of the 20 countries. (37 FBA Certificates issued to June, 1954).

WFE (Worked Far East)

Eighteen cards to be submitted, for 18 different countries selected from among the following: C (China), C3 (Formosa), C9 (Manchuria), CR9 (Macao), CR10 (Timor), DU (Philippines), F1 (French Indo-China), HL (Korea), HS (Siam), JA/KA (Japan), KR6 (Ryukyu Is.), PK1-2-3 (Java), PK4 (Sumatra), PK5 (Dutch Borneo), PK6 (Moluccas), UA0 (USSR in Zone 19), VS1 (Singapore), VS2 (Malaya), VS4 (British North Borneo), VS5 (Brunei), VS5 (Sarawak), VS6 (Hong Kong) and XZ (Burma). All or any bands count. (17 WFE Certificates issued to June, 1954).

WABC (Worked All British Counties)

Sixty cards required, from sixty different counties of the British Isles, all to have been worked on the 160-metre band since January 1, 1952. Counties to be as shown in any standard atlas, *not* "administrative counties" such as the three Ridings of Yorkshire, East and West Sussex, County of Bristol, and so on. Isle of Wight counts as Hampshire — not separately. Isle of Man counts separately, as do all the Channel Islands. Scilly Isles also count separately. For London, the L.C.C. area scores as one County. (64 WABC Certificates issued to June, 1954).

MDXA (Magazine DX Award)

To qualify for this Award it is necessary to have worked 3 continents, 15 countries on 160 metres; 5 continents, 40 countries on 80 metres; 6 continents, 80 countries on 40 metres; 6 continents, 180 countries on 20 metres; and 6 continents, 90 countries on 10 metres.

This involves a total of 405 QSL cards, which should *not* be sent. A list of all qualifying contacts should be given in the first instance when claiming the Award, after which certain selected cards will be requested for scrutiny.

Claims for all the above-mentioned certificates should be addressed "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

Iraq. They run 150 watts and a modified BC-342 at OD5AF, where they have a good workshop and are "building and modifying furiously." At MP4QAJ they have a 15-watt CC rig and a two-valve straight receiver. Any G's calling either station will be welcomed, and they try to QSL the lot. QTH for either station and either operator is Box 235, Tripoli, Lebanon. Operation at present exclusively on Twenty.

DL2RO (Hamburg), in claiming his FBA Certificate, tells us that he is mainly active on 21 mc, where his score is now 92. Latest acquisition is ZS9G on phone. DL2RO recently claimed a WAE and was told that he was the first of the DL2/4/5 fraternity to do so. Incidentally, many readers will know that DL2RO is G2DC, but how many can still remember a station signing "Y-DCR"? The QTH was India; the time, the early 1920's. (See "Other Man's Station," October, 1953).

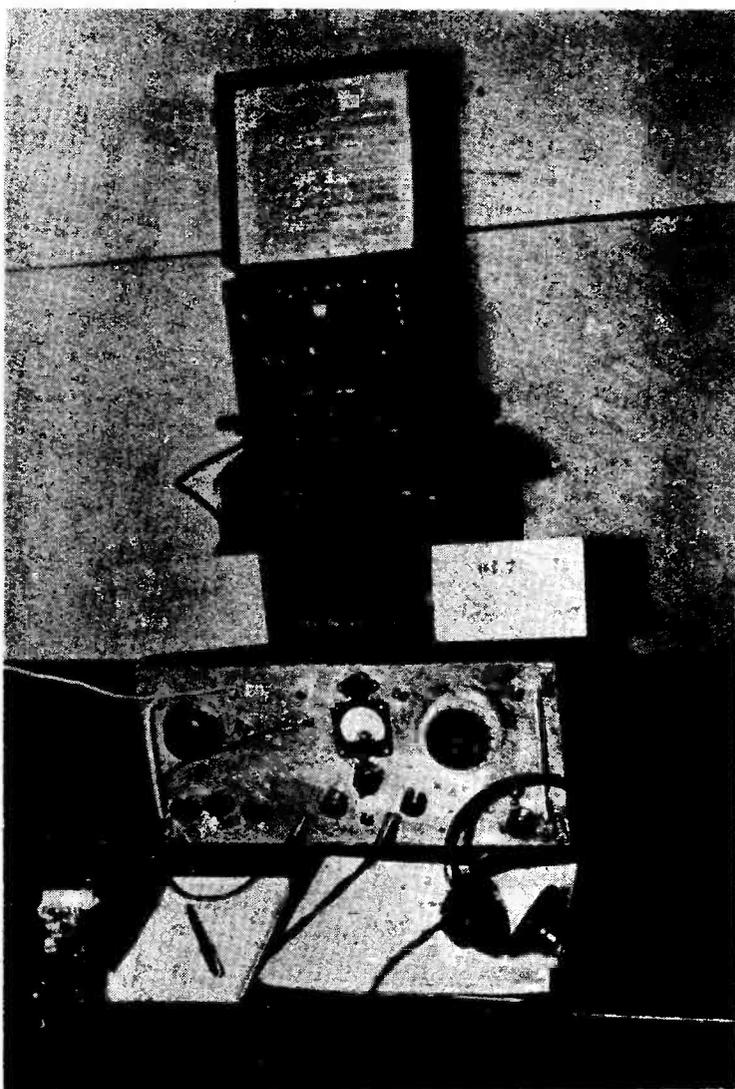
Top Band News

One very interesting item regarding the Top Band comes from 5A2CA (Benghazi). Though QRT for rebuilding, he is listening a lot, and at midnight on June 14 he heard GI3IOS calling CQ. There were lots of signals audible, but mostly at the same level as the static. 5A2CA will be listening nightly from 2100 to 2300 GMT, and says he is wondering when he will hear his first TTX signal from G-land!

G3JZQ (Waltham Cross) joins the Ladder, and says that a reduction in power from 10 watts to 2½ seems to have made practically no difference—which is exactly what one would expect.

G3JBU (Northampton) has now worked on One-Sixty exclusively for twelve months and is finding it very noisy at present. During August he will be in Switzerland, and hopes to arrange some skeds which he can take up on his return. A pleasant surprise recently was the arrival of a card from an OE station, portable in OE3 with a 0-V-1 receiver. He reported G3JBU's 5-watt signals at 579.

G2NJ (Peterborough) hopes that the boys operating expeditions



Station of DL2US — who is G3HH when at home — of R.A.F., Celle, BAOR, 23. He runs a 12-watt VFO-PA CW/phone transmitter with a 4-stage home-built receiver, and the aerial is a 140 ft. end-on wire. DL2US will soon be home again operating G3HH.

to rare places won't overlook the rock-bound station all the time. An occasional scrutiny *off* their frequency would be a Kind Act! 'NJ has recently worked his last Welsh county, Merioneth, thanks to GW3BHT/A—but he would have got it before had he been VFO.

GM3EFS (Alexandria) harks back to the recent MDT and says that during his short period of operation on Whit-Monday he

received excellent signals from G3GGN, right down on the South Coast, but failed to raise him for a contact.

The incredible aerial system at G3BRL (London, W.5), as described last month, is no more. It fell to the ground (not very far for some pieces of it) and now awaits some sort of reinstatement, promotion or whatever-it-is.

G5LH (Horbury) enquires whether there are any Top-Band

enthusiasts in Peebles, Selkirk or East Lothian. If there are, he would naturally like them to do something about it. Still on the subject of new ones, we are glad to report that G13CVH (Armagh) is moving to Londonderry, where he should be installed by the time you read this. He promises to operate fairly regularly, and all contacts will be QSL'd on receipt of a card through the Bureau. Those who want a direct transaction should send their cards to him at Groarty C. Primary School, Londonderry, and if they forward a stamped envelope their cards

will be returned direct. Anyone still short of his card for an Armagh contact should also apply—a few may have been missed in the move.

G3IGW (Halifax) is prepared to co-operate in an expedition during September. He wants it to be a "/A" (mains-connected) affair and would like to cover Co. Tyrone, Fermanagh and Londonderry. But he needs some help with the equipment and aerials, so would some keen amateur or SWL who wants a short holiday around that time get in touch with G3IGW? He adds that he is "22 years ancient"—so how about a young 'un?

Contacts with the Scilly Is. (which will score as a new county) may be possible before long. G3JTH has been licensed down there, but is not at present active on Top Band. (See note from him, elsewhere in this Commentary).

General Patter

Very little news of the Solar Eclipse, which most inconsiderately occurred on a week-day (when, we understand, some people are actually working for their living). We duly observed WWV on 15 mc during most of the period, and he undoubtedly faded right out during the short period of totality. He was an S8-9 signal forty minutes previously, and again thirty minutes after. Notwithstanding this, the G6QB/W2BCR sked worked as usual at 1400 BST, some twenty minutes after totality.

Commercial stations in South America and South Africa were apparently not affected in the slightest. But an interesting note comes from G3HBW (Wembley), who kept watch on the Top Band and found the American Loran stations coming through strongly during the Eclipse, just as they do after dark; he has never previously heard them during daylight hours, and the following day at the same time they were quite inaudible. Obviously the path had time to settle down to "evening conditions," even during the brief period of the Eclipse. (By the way, observers are urgently needed around Lands

THE LABRE CONTEST

Period : CW Section, 0001 GMT, September 4 to 2359 GMT, September 5.
Phone Section, 0001 GMT, September 11 to 2359 GMT, September 12.

Bands : 3.5, 7, 14, 21 and 28 mc bands.

Serial Nos. : RST (or RS) report, followed by consecutive numbers of contacts, starting at 001.

- Contacts :**
- (a) Between stations in same country, no points but count for multiplier.
 - (b) Between stations of different countries, outside the American continent - 1 point.
 - (c) Between stations of different countries, within the American continent - 2 points.
 - (d) Between stations within the American continent and all other stations of the world - 3 points.

- Multipliers :**
- (a) Multiplier of 1 for each American country worked on each band ;
 - (b) Multiplier of 1 for each Brazilian call area (PY 1-9) worked on each band.

Awards : For each country there will be awards for the 1st and 2nd stations on (a) Single Band, and (b) Multiband working. The score for Single Band is the sum of the two multipliers, multiplied by contact points for that band. The Multiband score is similarly made up, points for each band being added together to give the complete score.

Applicants for a Multiband award, if logs cover three or more bands, are also eligible for a Single Band award. Logs, before November 30, to I.A.B.R.E., Box 2353, Rio de Janeiro, Brazil.

**TOP BAND COUNTIES
LADDER
(Starting Jan. 1, 1952)**

Station	Confirmed	Worked
GM3OM	89	90
GM3EFS	85	86
G5LH	85	85
G6VC	84	84
G2NJ	82	82
G5JM	81	81
G13HFT	81	81
G16YW	81	81
G3HIW	73	79
G3CO	71	73
G3IVH	70	73
G2AYG	69	70
G3JEL	67	74
G3BRL	67	69
G3HTI	66	70
G3JEQ	63	75
G3IOX	63	74
G3EUK	62	69
G3FTV	60	68
G3HYJ	60	65
G3DO	57	63
G3IGW	55	68
G3ITY	52	61
G8VG	50	60
G2HKU	48	50
G3JKO	44	56
G3JBU	32	41
G3HZM	30	42
G3JZQ	22	32
G3HMF	17	20
G3JKM	15	36

End and the Scillies—for 1999!)

G3JTH (St. Mary's, Isles of Scilly) has been licensed for about two months, and is crystal-controlled on 40 and 20 with a B.2 Tx/Rx and a 136-ft. aerial. 'JTH would like to provide another county for the Top-Band gang, using a No. 12 set, but is at a loss to know how to cut the power from 25 watts to 10 watts. Meanwhile, his contacts on 20 have included DL, PA, OH, GM and W2—also G3AID/A, a hundred yards away, but now departed!

Over-Optimism

GM2DBX (Methilhill) points out that his 21-mc score in the Five-Band Table was given last month as 92. He would very much like it to be—unfortunately the correct figure is 42! (Apologies for this slip). A topical comment on conditions is that 'DBX is quite busy with tropical fish breeding!

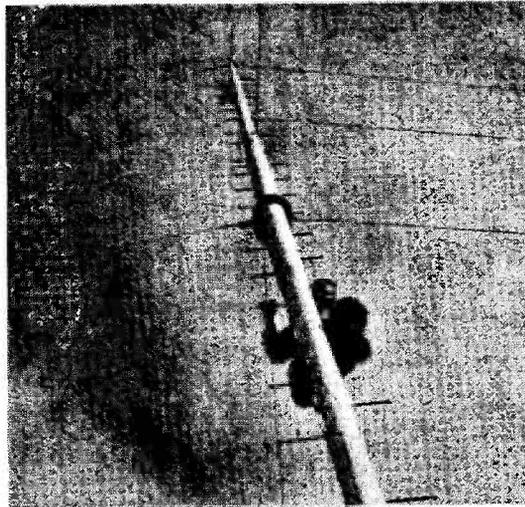
4S7XG is expected home around August 12, and will be taking up his old call G3HVG for a while.

An interesting story of a rebuild comes from G3JAG (Rochdale). Finding himself with an unserviceable superhet, a similar Tx, and a

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
VQ4RF	108
G4ZU	102
G5BZ	101
GW3AHN	100
G4ZU (Phone)	95
DL2RO	92
G2BW	92
DL7AA	90
G2WW	89
G3HCU (Phone)	87
G2BJY	81
G2YS	74
GW3AHN (Phone)	72
G3DO	71
G3TR (Phone)	69
ZS2AT	67
G3CMH	64
G3CMH (Phone)	62
G3FXB	62
5A2CA (Phone)	60
ZB1KQ (Phone)	58
G6QX	47
ZE3JO	55
GM2DBX (Phone)	42
G2DPY	38
G5FA	31
G8VG	18
G2DHV	11
4S7XG	11



Mast and aerial inspection is a routine maintenance task in Antarctic territory, where 100 m.p.h. gales are usual. The masts are 70-feet high, supporting a variety of aerial systems. Here is VK1EG doing his stuff.

gale-wrecked aerial, he started up all over again with a 6V6 CO, an EF50 (0-V-0) receiver and a "piece of damp string" for an aerial. On Forty this worked a couple of DL's. The aerial then improved somewhat and became a ground-plane, and 'JAG joined the Sleepless League, as a result of which a 579 report came in from W3NMR. Since then, with 12 watts, G3JAG has raised a number of W's and TI2PZ, all on Forty with the same 6V6 CO. He is now looking forward to the possibility of a ZL contact, in the autumn.

Other DX heard by G3JAG on Forty has included FO8AJ, AP2BX, ZA1AA and ZS6JN.

On the subject of Forty, G5BZ worked TI2CR for a new one on the band.

Nobody even mentions *Eighty* except for G3IND (London, E.7), who worked W1ZW up there at 2100 GMT on June 23. The W was 589 and gave him 439/559. A sked for the following night produced no results at all.

"Expeditions" and Hoaxes

It seems that these days even the heavily-publicised expeditions can't be trusted unless their validity is carefully checked by independent witnesses. Some people have added four or five

countries to their score with the help of "UU" calls; we remember the band going sour over YA3UU VQ7UU, VQ9JU, 4W1UU, FL8UU and the like, at various times during the past two years.

The news now filters through that the whole lot were bogus and that the signal bearing these exotic call-signs always came from the same place.

We should like to comment, in appropriate language, on this one, but the matter is, so to speak, *sub judice*; a full statement will appear in our next issue. There will be nothing personal in our comments, because, strangely enough, we haven't worked a single one of them ourselves—more by luck than judgment.

One or two previous hoaxes have had their funny sides, it is true (remember "Box Eight-thousand - and - something, Lhasa, Tibet" ?); but this one has assumed quite serious proportions and is being dealt with accordingly.

Deadline for next month is **Friday, August 13**, and for the following month **Friday, September 17**. Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Until next time, 73. Good Hunting, and BCNU.

TRANSISTOR TOPICS

Conducted By G3HMO

SO far as the transmitting amateur is concerned, the Junction Type Transistor has seemed to be of not much practical use. It has occurred to the writer that consequently little has been said in this column of this important type. It was mentioned briefly on p.80 of the April *Short Wave Magazine* and again last month in connection with the tetrode transistors used in G3CCA's new TTX. It seems a propitious moment to put matters right, as this month we are describing a simple practical circuit using a junction-type and also listing in the Table of commercially available transistors herewith several junction types.

Junction Transistors

The Junction transistor is constructed of a single crystal having n properties and p properties in layers, as shown in Fig. 1. Fig. 1(a) is the more common $p-n-p$ type and (b) the complementary $n-p-n$ type. It is easy in principle to make pure (intrinsic) germanium, either p or n , by adding suitable impurities to the molten germanium. The difficulties begin when trying to produce p and n characteristics in different parts of one and the same crystal. To make a useful transistor the central layer should be very thin, an added complication. A possible form is shown in Fig. 2.

Construction. A wafer of n germanium is soldered to a base lead making an ohmic (non-rectifying) contact. Two blobs of indium (an impurity giving p type germanium) are placed on opposite sides of the wafer. By suitable heat treatment this impurity is infused into the germanium in sufficient density to convert it to p type from the locality of the blobs to near the centre of the wafer. Two wires are soldered to the blobs to make the emitter and collector connections. (It will be appreciated that it is hardly feasible to make such a transistor outside the laboratory !).

Wire leads are brought out and the whole sealed hermetically to exclude moisture. Moisture could cause variation of characteristics of the transistor with humidity (and did with some earlier models).

Action. A $p-n$ junction behaves as a cat's-whisker on n germanium and permits a current to flow from p to n but not in the reverse direction. It is more efficient with lower forward and higher reverse impedance; $p-n$ power rectifiers are now available in the STC range weighing less than an ounce with an output of 100 mA

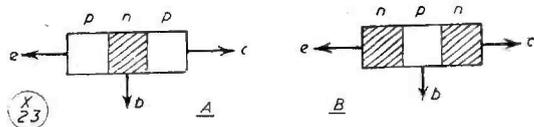


Fig. 1. Shown here is the diagrammatic layout of the Junction Transistor. The $p-n-p$ in (A) is the more common though both can perform equally well. The $n-p-n$ (B) is used, in conjunction with the other, in circuits unique to transistors.

at 100 volts. Fig. 1(a) shows what is in effect a double-diode, just as the point-contact is; it may be connected up in the same way but it has somewhat different characteristics. In the first place it has a current amplification of slightly less than one. However, it more than makes up for this by a very high ratio of output to input impedance. A signal current in the low impedance (perhaps 100 ohms) input can cause an almost equal signal current to flow in a collector load of a very high value (perhaps 500,000 ohms). As almost all the emitter current flows into the collector, the base current remains very low. The standing current is also very low (that is, the collector current in the absence of emitter current). This makes for high efficiencies, and Class-A amplifiers using junction transistors may reach 48% out of a maximum possible 50% efficiency.

The Grounded Emitter Circuit. Just as a big change in emitter-to-collector causes only a small change in base current, so a small change in base current will produce a big change in emitter-to-collector current. In other words, a big gain can be achieved by putting the signal in the base and taking the output from the collector, the emitter being common to input and output. This is the grounded emitter circuit shown in Fig. 1(b) on p.281 of the July *Short Wave Magazine* and is used in the output stage which has been added to the receiver described in that article.

Another characteristic of the Junction Transistor is the comparatively high capacities across the junctions which shunt the external circuits at high frequencies and so limit the useful frequencies to values around 500 kc or so according to type. Although American sources quote some specimens of the Raytheon CK722 as oscillating up to 2 or 3 mc. The tetrode is the only effective way of overcoming this difficulty. (See July "Transistor Topics" for details).

Power Rating. All the available junction transistors are limited to dissipations of the same order as point types. This is simply a matter of size, and special ones have been made with ratings up to 100 watts, though the frequency response is likely to be poor.

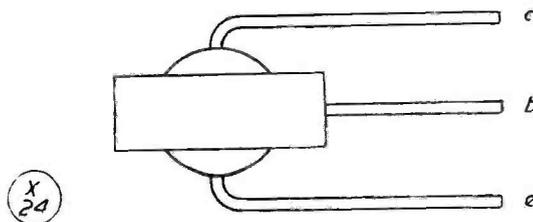


Fig. 2. A Junction Transistor requires very special manufacturing techniques but an outline of one method of construction is shown above. Two blobs of Indium on opposite faces of the Germanium are infused into it by heating. Leads soldered to the Indium and Germanium form the three transistor connections.

TABLE OF TRANSISTOR CHARACTERISTICS

Point Contact Type Transistors

TYPE	MAKE	PURPOSE	ALPHA		ALPHA MEASURED UNDER CONDITIONS BELOW		COLLECTOR CURRENT I_c		MEASURED WITH $I_e=0$ AND V_c AS BELOW		MAXIMUM RATINGS			MAXIMUM OPERATING TEMPERATURE °C	ALPHA CUT-OFF FREQUENCY *	PRICE
			Minimum	Average	V_c	I_e	I_c	Volts	mW	V_c	I_c	V_c	I_c			
2N32	RCA	S	—	2.2	-25	0.5	—	—	—	—	50	-40	-8	40	2.7	—
2N33	RCA	50 mc Osc.	—	—	-8	0.3	—	—	—	—	30	-8.5	-7	40	—	—
3X/101N	STC	A, O, GP	2	5 max.	-20	0.75	2.0	-20	-20	150	-50	-70	—	40	0.5	50s.
LS737	STC	GP	1.5	**	-10	—	—	—	—	200	-70	—	—	—	—	—
GET-1	GEC	A	2	2.5	-10	0-1	1.0	-30	-30	100	-50	-15	—	35°	0.5	60s.
GET-2	GEC	A	2.5	3.8	-10	0-1	0.75	-10	-10	75	-30	-15	—	35	—	35s.
OC50	MULLARD	S, GP	—	2.1	-5	1.5	1.2	-20	-20	120†	-30	-12	—	40	1.0	30s.
OC51	MULLARD	S	—	2.2	-30	1.0	1.0	-20	-20	120†	-50	-15	—	40	1.5	30s.

Col. 3. Application. A is amplifier ; GP, general purpose ; O, is oscillator ; S, is switching.

* Either average or minimum frequency at which alpha is 0.7 of its low frequency value. Most transistors will work at frequencies considerably higher, though performance deteriorates progressively.

** Red spot on body indicates alpha greater than 2.

† Collector and emitter dissipation together.

In general, point-contact types are suitable for RF applications.

Junction Type Transistors

TYPE	MAKE	JUNCTION	BASE CURRENT AMPLIFICATION (Grounded Emitter Circuit)	MEASURED UNDER CONDITIONS BELOW		EMITTER RESISTANCE	BASE RESISTANCE	COLLECTOR RESISTANCE	MAXIMUM RATINGS		MAXIMUM OPERATING TEMPERATURE	PRICE
				V_c	I_c				mW	V_c		
2N34	RCA	p-n-p	40	-6	1.0	Ohms	Ohms	K ohms	mW	Volts	mA	°C
2N35	RCA	n-p-n	40	6	1.0	—	—	600	50	-25	-8	50
CK722	RAYTHEON*	p-n-p	12	-6	1.0	—	250	2000	33	-22	-10	50
OC10	MULLARD	p-n-p	Replaced by improved type OC70 (see below)									
OC11	MULLARD	p-n-p	Replaced by improved type OC71 (see below)									
OC12	MULLARD	p-n-p	30	-2	-0.5	35	750	1500	6	-5	-5	45
OC70	MULLARD	p-n-p	50	-2	-3.0	6	600	500	6	-5	-5	45
OC71	MULLARD	p-n-p	50	-2	-3.0	6	600	500	6	-5	-5	45

* RAYTHEON also make p-n-p transistors with type Nos. CK721, CK723, CK725, CK727, 2N63, 2N64 and 2N65.

In general, junction types are suitable for audio and low-frequency RF applications.

The Complementary n-p-n Junction. This type performs in an identical way to the other except that the supply voltages must be reversed. This type uses the same polarities as a valve circuit would. It may be used in special circuitry, in conjunction with the other type, such as single input push-pull output stages with no transformer.

A Simple LF Amplifier

It was realised that it should be quite feasible and possibly more sensible (in view of the existing power supply) to use a third point-contact transistor for the output stage to the receiver described last month; but it seemed a good opportunity for using a junction transistor and hence gaining a little experience with this type. The final circuit is shown in Fig. 3. Indeed it was also the initial layout except for some variation in the values and is a stereotyped circuit for use with Junction Transistors.

Power Supply. Junction Transistors work at lower collector voltages than the Point types, 2 to 6 volts being mentioned in place of the 10 to 30 volts used in Point Transistor circuitry. *Junction transistors will oscillate on a small fraction of a volt.* Consequently it was thought advisable to drop some of the 22½-volt receiver supply by a fairly high value resistor (R4 in Fig. 3). Comfortable strength can now be obtained on the headphones when drawing only one fifth of a milliamp in the audio stage, whereas before this was put on a good deal of concentration was necessary. Reducing R4 to 10,000 ohms increases the current to 1 mA and enables strong signals to be read on the speaker. Even under these conditions the whole receiver current is less than 3½ mA from a very tired 22½ volt battery. (It is showing about 18 volts on load, having been rejected from a deaf-aid after completing its normal service!).

Circuit Details. The stage is biased by the method shown in Fig. 2(c) of last month's "Transistor Topics," but with this difference: The input is applied between base and ground and the emitter is kept effectively at ground potential.

Input is taken from the headphone connections of the detector stage (see Fig. 5, p.283 July) via a 5:1 step down LF transformer. It was found advisable to increase the decoupling condenser in the detector stage to 2 µF (C10 in Fig. 5 of July "Transistor Topics").

A resistance R3 (back to Fig. 3 here) in the emitter circuit has a stabilising influence on the circuit conditions as it causes negative feedback and so counters any fluctuations caused by change in the supply voltage or transistor temperature. It is by-passed by C2 to avoid loss of audio gain. It will be noted that high-capacity electrolytics are used and that while the stated values may be higher than strictly necessary they are of the right order for such a circuit. The positive ends of the electrolytics go to chassis of course (except for C1 whose positive end goes to the input transformer). Special high-capacity low-voltage working midget electrolytics are now being made for use in transistor circuitry. In general, coupling and decoupling in low impedance transistor circuits involves a corresponding increase in capacity over comparable valve circuits.

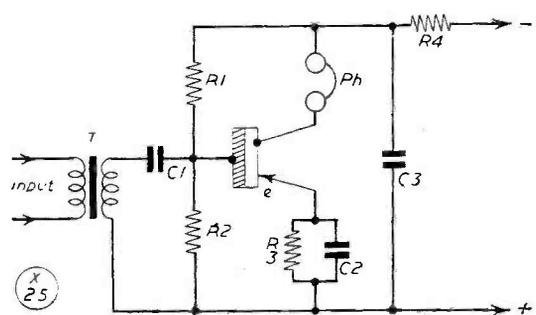


Fig. 3. Transistor audio amplifier, used as the LF stage with the 1-V-O TRX shown on p.283 of the July issue. The input is taken from where the phones are connected in that circuit, and the result is a "1-V-1" type of receiver which gives excellent results on the 160-metre band.

Table of Values

Fig. 3. Circuit of an Audio Amplifier

C1 = 10 µF, elect.	Ph = HR headset, or LR
C2, C3 = 8 µF, elect.	phones with trans-
R1 = 100,000 ohms.	former.
R2 = 50,000 ohms.	
R3 = 5,000 ohms.	Transistor = Mullard OC71 (or
R4 = 10-50,000 ohms.	OC70) Junction Type.
(see text)	

The output from the collector is taken to the load, which may be a speaker transformer or high resistance headphones (2000 to 4000 ohms). Low resistance headphones can be used with the usual matching transformer.

The result of combining the circuit of Fig. 5 on p.283 of the July issue with the circuit of Fig. 3 discussed here is a "1-V-1" type of receiver which handles smoothly and gives most pleasing results.

Table of Commercial Transistors

As a result of careful extraction from manufacturers' literature, a Table has been compiled giving the salient features of all commercial transistors likely to be met with in this country. In addition to those available through normal channels, some American types are also included. The purpose of this Table is to make available in convenient form the characteristics so that they may be seen at a glance. It is thus possible to refer to types mentioned in transistor literature or to choose the most likely transistor for a particular job. It is *not* the function of this Table to supersede in any way the manufacturer's own data, which should always be consulted fully before putting a transistor into service.

It is impossible to fill in all the columns on all the types as the information is not available. Still in its infancy, Transistory has not yet settled down to the same state as the valve with its universally accepted conventions. Different manufacturers have different ideas on what characteristics are important and under what conditions they should be measured. While no characteristics have been extrapolated to fit the Table, some have had to be omitted where they would not fit into the general scheme.

Tolerances have not been included and it should

be noted that they may be very wide in the present state of transistor development. Maximum ratings are probably conservative but the degree of conservatism probably varies from one make to another. There is no such thing as the "amateur and intermittent commercial rating" for transistors.

Precautions. Like thermo-meters, transistors may be ruined irrevocably by quite a small overload applied for a fraction of a second. This means that quite apart from running conditions, care has to be taken that sudden surges are not applied on switching on and off. The trouble is that a sudden surge, such as a condenser discharge, may give a transistor "heat treatment" from which it never recovers. A soldering iron can also produce the same effect, and great care should be taken in soldering. The iron should never be allowed to get close to the transistor, and to avoid heat travelling up the connecting wires, the wire should be held securely with pliers between the joint and the transistor body while soldering.

Since there are only three connections to contend with at present there is little difficulty about basing. Even so there is no universally accepted convention as yet. The connections may be deduced as follows, in most cases: The base may be either the centre wire of the three or the one on its own. In the case of there being only two wires and a metal case then the case is the base connection. The *collector* can be picked out as having some distinguishing mark, such as a crimp in the lead, having a red or blue spot, or being offset from the other two by a bigger space.

It will be noted that for Top Band work the Mullard OC51 is the most promising. Selected specimens of other types may give excellent results but there is no guarantee of this when obtaining them in small quantities. No doubt new types of transistor will soon be appearing as the demand for them arises. It is believed that tetrode transistors are in the pre-production stage at the present time. We must hope that the manufacturers will not allow the transistor to be burdened with a multiplicity of types with virtually the same characteristics and applications, as has happened with the valve.

Transistor Communication

New achievements are being registered all the time as more stations come on with transistor equipment. The highlights of this month's activity were the QSO's between G3CCA and G3IZS, both on TTX and both of Leicester, with GM3EFS in Dunbartonshire, which took place during the Test of July 13/14.

TTX Test, July 13/14, 2300-0130 BST

G3CCA (Leicester) worked on TTX/TRX G31VH (589 at 109 miles); G6QB (569 and R5 phone at 142 miles); and GM3EFS (44/69 at 278 miles). He also worked or was heard by G31VH, G3JEL, G5JM and G6FO on TTX phone, at distances of 109-45 miles. G3CCA used a TRX for reception throughout.

G3IZS (Leicester) worked on TTX G31VH (58/99 at 109 miles); G6QB (569 at 142 miles); and GM3EFS (569 at 278 miles). He was also heard or

worked on TTX CW by G3JEL, G5JM and G6FO, over distances of 85-45 miles.

G3HMO (Buckingham) was identified on TTX by G3JEL (London, N.7) and G5JM (Buckhurst Hill, Essex), both at about 45 miles. Throughout the test, G3HMO was using the "1-V-1" TRX for reception, copying all stations R5, including the TTX CW and GM stations. However, G3CCA's phone was only audible and not readable on the TRX, although it was fully readable on the normal valve receiver.

G5HB (Watchfield, Wilts.) was received on TTX by G3WD (Petersfield) at 559. G5HB was on somewhat earlier than the others and at his present strength should get some good results in due course. G5HB is in fact using the equipment built by G4AP and reported previously.

Apart from the CW contacts with GM3EFS (Alexandria, Dunbartonshire) obtained by the two Leicester stations, the other outstanding result was the reception, at R4/5, of the G3CCA transistor phone at G6QB (Bexhill, Sussex) a distance of 142 miles.

Conditions on the 160-metre band during the period of the Tests were good, with rather fierce interference at times. Nevertheless, very little was missed in the course of the QSO's. It is now evident that TTX stations of the calibre of G3CCA and G3IZS (and G3IYX, who regrettably could not be on for this particular Test) can obtain Top Band contacts in the normal way, *i.e.* without the assistance of linking stations, though it is this procedure that has demonstrated the possibilities for ultra-QRPP transistor working. To make sure of success under free-for-all conditions, however, it seems clear that transistor stations will have to be VFO-controlled and that they should always call "TTX" to secure full co-operation.

The only other activity to report is that G3JRH (London) is still plugging away on Eighty. He has worked G6VC (Gravesend) at 31 miles using 35 mW input. All these results and any new ones will be incorporated in the "Transistor Contact Record" next month.

With regard to a frequency for TTX tests and transistor working generally, experience suggests that we could not do better than 1825 kc plus or minus 5 kc. It is suggested therefore that TTX's should if possible use this part of the band and it is hoped that QRO operators on this frequency will keep an ear open for "CQ TTX" calls and treat them kindly.

Other Notes

As a result of the recent visit by G3IZS to Holland, G3CCA is hoping to arrange a series of cross-band tests (1.8 and 3.5 mc) in the early autumn. This should prove of great interest to all concerned. G3CCA also reports that his TRX used in the tests this month had a new type mixer for the superhet circuit. This mixer transistor uses two emitters and one collector. The mixer efficiency is greatly increased by this technique.

Demand for phosphor bronze wire for home-made transistors "has exceeded all expectations"! The s.a.e.'s continue to arrive. However, there is still plenty

on the reel (some hundreds of feet) so if you want any send your s.a.e along, with a statement that you need the wire for home-construction of transistors, to "Transistor Topics," c/o The Editor, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. For the September issue, all news of activity, equipment, progress and results with transistors should be posted to arrive not later than August 12.

HOME-CONSTRUCTED TRANSISTORS

Those who have recently become interested in Transistory may like to know that detailed information on the home-construction and testing of Transistors appeared in the April 1954 issue of **SHORT WAVE MAGAZINE**

PORTABLE TEST MASTS IN ALUMINIUM

The system of VHF and UHF links now being used on an increasing scale for television and telephone working requires a series of receiving and re-transmitting stations within "visual" range of each other, and hence at relatively frequent intervals along the line of transmission.

Establishment of a new line has to be preceded by tests to discover the best site for each relay station and the height of mast that will be needed, and for this work pairs of temporary test masts, carrying transmitting and receiving equipment, are employed. Structurally, these test masts must be easily transportable to the sites over all types of country and capable of being quickly erected and dismantled by a small crew. A further essential is that the height of the directional transmitting and receiving aerials and reflectors on the masts should be readily adjustable.

A pair of 200-ft.-high masts to meet these requirements has recently been built for Standard Telecommunication Laboratories Ltd. by Painter Bros. Ltd., Hereford, to the design of British Insulated Callender's Construction Company Ltd. It will be seen from the accompanying photograph that each mast is of lattice construction, triangular in cross-section, and is built up from a number of short, easily-handled lengths. It is guyed at several points.

The material chosen for the structure was the aluminium alloy Noral 51SWP, supplied by Northern Aluminium Company Ltd. This alloy is of the aluminium-silicon-magnesium type now widely used for structural work, having a typical tensile proof stress of 18 tons/sq. in. and sufficient durability to enable it generally to be used without painting. In this case, the lightness of aluminium alloy was obviously attractive. The possibility of welded steel construction was investigated but ruled out on grounds of weight alone; it is generally safe to say that aluminium, with a density one-third that of steel, will in practice yield a structure of about half the weight of a steel one. Transport to the site is simplified, and erection and dismantling greatly speeded up. Each length of mast, 8 ft. 4 in. long, weighs only 110 lb. and is easily handled by two men aloft with the aid of a light-alloy erection pole.

Bolted construction was chosen for the mast, so as to enable the individual lengths to be further broken down to any degree necessary for shipment



This is a B.I. Callender's Cable photograph of an aluminium mast built by the Northern Aluminium Co., Ltd. of Banbury, Oxon., for experimental HF/VHF work and the surveying of VHF paths. A mast of this type can be taken up to 200 feet.

over long distances—for instance, by sea. In general the bolts are of Noral 51SWP alloy like the members, but high-tensile steel is used for the bolts that connect each length to the next. Mild steel is used for various details, such as the butt joints and at guying points. All steel parts are galvanized to prevent atmospheric corrosion and to avoid any possibility of galvanic interaction with the aluminium.

One 200-ft. mast, complete with steel head and base plates, wire ropes and fittings, but excluding anchorage pickets, weighs just over one-and-a-half tons. With all materials on site and the pickets driven in, the whole structure can be erected by six men in an eight-hour day; where the full height is not required, erection time is reduced.

Improved Two-Metre Converter

PUSH-PULL RF, CC
OSCILLATOR, LOW NOISE
MIXER, CATHODE
FOLLOWER

A. G. WOOD (G5RZ)

During the last few years, the author has contributed several useful practical articles based on his personal VHF experience. Readers can confidently adopt the receiver design he suggests here; it is the result of a long period of experiment and is within the ability of any careful VHF constructor. If followed out in the spirit of our contributor's ideas and suggestions, this converter will be found to give excellent results.—Editor.

IN the August, 1952, issue of *Short Wave Magazine* there appeared an article by the writer which dealt, amongst other things, with the construction of the G2IQ 6J6 VHF converter.

It was not to be expected that the first successful attempt at constructing a two-metre converter would represent the last word in efficiency and, in fact, subsequent experience and comparison with those possessed by other and more accomplished two-metre men have borne out this fact. Consequently, during the intervening period, a good deal of research and constructional work has taken place with the object of producing something which would show an improvement on the original model. Several designs of a somewhat revolutionary character were attempted (none of which worked!) and a number of more orthodox arrangements were completed and brought into operation. But none of these came up to the same standard as the original and were, subsequently dismantled. However, all this effort was not a waste of time as a great deal of valuable constructional experience and technical know-how was acquired in the process. It should be noted that great care was taken to preserve the original working model and all temptations to "modify" it were ruthlessly suppressed. By so doing the station remained operational the whole time

and all constructional work could be undertaken in a leisurely fashion and without the constant fear that a good opening might be missed.

Seeking Improvement

The writer is of the firm opinion that most VHF workers have a flair for some particular type of design—so that each of the main basic circuits have their *coterie* of keen supporters. The writer is no exception to this, with the result that with a number of relatively unsatisfactory experiments to his credit, he quite naturally turned to the idea of considering by what means a new and improved design of push-pull triode layout could be achieved. The chief short-comings of the original equipment were (1) A signal-to-noise ratio which seemed capable of improvement; (2) A nominal IF of 10 mc which suffered from some degree of break-through, and (3) A self-excited oscillator which although stable within reasonable limits suffered from a day-to-day variation sufficient to make calibration a dicey business. In addition the note could not honestly be described as T9. With these thoughts in mind then, the first point to decide upon was the choice of a more suitable IF and as a crystal-controlled local oscillator seemed to be a very definite improvement, this was no easy matter.

The obvious choice would be 4-6 mc; 14-16 mc or 24-26 mc, so that dial readings could be directly related to the actual signal frequency. On the count of IF break-through alone the two former were automatically ruled out, apart from other considerations. This left 24-26 mc and here again snags were quickly encountered. Using a crystal oscillating on its third overtone we have a choice of four fundamental frequencies to produce the necessary harmonic on 120 mc — 5.00; 6.66; 8.00 and 10.00 mc. 5.00 is out because 3 x 15 equals A.P. vision and 8 x 15 was too great a multiplication. 6.66 mc might have done but again it seemed unlikely that sufficient injection would be available. 8.00 mc is obviously out because 3 x 8 equals 24 which is the actual IF. 10.00 mc seemed rather an expensive way of trying to do it, so eventually (as is usually the case) a compromise was made and it was decided to select an IF *in the region* of 24-26 mc and to look through the crystal box for something suitable, calibration being effected by logging the clock-dial readings of the communication receiver used at this station.

The question of "birdies" is a very important one and as it has already been dealt with most efficiently by another contributor to the *Magazine* it will suffice to say that 7940 kc working on its third overtone and producing an IF of 24.9—26.9 mc has proved very satisfactory, only one weak beat appearing in the tuning range of 144.0 to 146.0 mc. At the selected IF, break-through on the main receiver is much improved, but two other factors emerged. As is often the case the overall gain of the receiver is not so good at this end of the tuning range and in addition there is a relatively poor image-ratio. It was found on the trial lash-up that amateur stations giving reasonably strong signals on a frequency greater than 144.9 mc could be tuned in at readable strength on twice the 2nd IF, or approximately 900 kc lower, and therefore they appeared twice in the band.

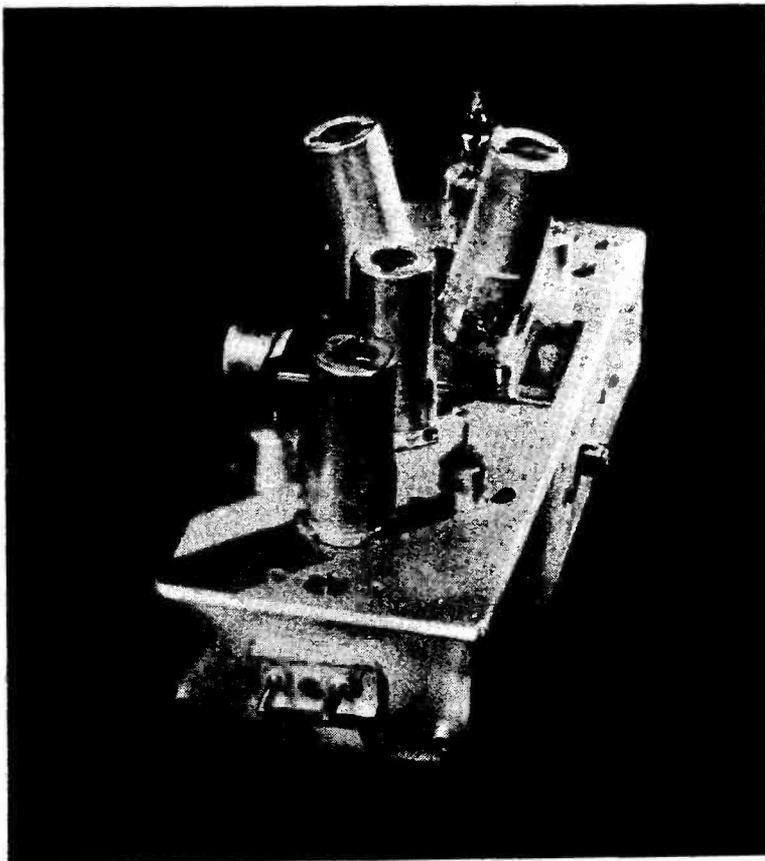
These factors called for some modification in the original design and, it was felt, could be rectified by the inclusion of an RF pre-amplifier stage to be run at full gain, any surplus to be reduced by control of the RF gain control of the main receiver. Finally, to give the *finis* to any residual break-through, and to provide a good match into the main receiver, a cathode follower was incorporated in the output.

Having decided finally upon the main circuitry the whole thing was set out to scale on paper and the chief components juggled into position. The result of this was the production of a chassis measuring 9" x 3 $\frac{1}{4}$ " x 1 $\frac{1}{2}$ " into, or upon, which, with some care, everything could be fitted.

Design and Layout

In the photograph of the finished converter, the Churchillian structure is the pre-amp with the cathode-follower stage. The other photograph shows the view underneath.

From the circuit it will be seen that there is nothing revolutionary in the design. V1 is



Top view of the G5RZ two-metre converter, from the aerial end. A neat and symmetrical layout, with the preamp-cathode follower stage in the turret mounting, and the oscillator-multiplier immediately behind.

the 6J6 push-pull RF stage; V2 the push-push mixer; V3 the pre-amplifier; V4 the cathode follower and V5 the oscillator-multiplier stage. The total unit consumes 38 mA at 150 volts at which pressure it is absolutely docile and very quiet in operation. There are, however, a number of points to watch and snags to avoid if results are to be up to expectation and these will now be dealt with.

Over-riding consideration must at all times be given to sensible lay-out of the components to provide the shortest possible wiring—this is common to all VHF designs. In addition it is very desirable that symmetry should be observed as far as the mixer anode.

RF Stage. The aerial input is 300-ohm balanced feeder and this is coupled in at the front end to a 4-turn coil of insulated wire interwound into the centre of the grid coil. This coil is tuned with an 8 $\mu\mu\text{F}$ concentric

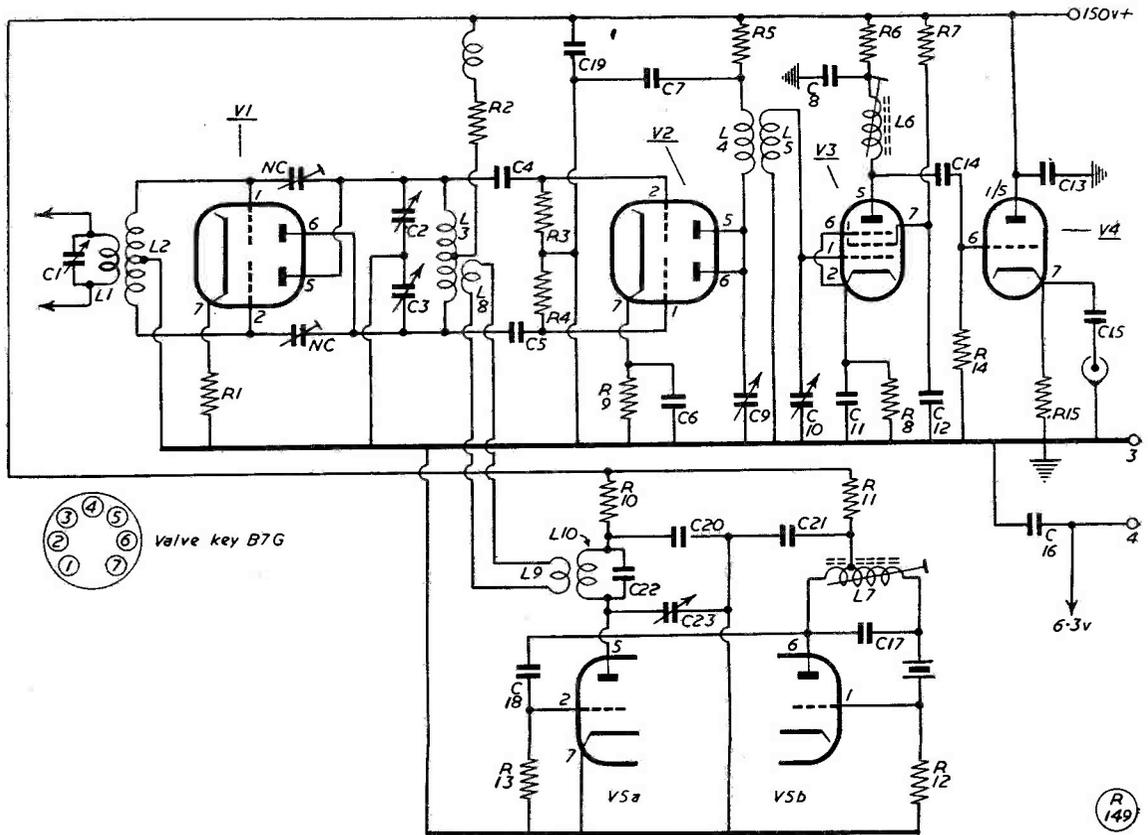
trimmer. The grid coil consists of 8 turns 20 SWG tinned wire, $\frac{3}{8}$ " diameter x 1" long. The 6J6 valve chosen for this stage was decided upon somewhat reluctantly in view of the wide *Gm* range it is reputed to have, not only as between valves but also between each half, and from this point of view the 12AT7 would undoubtedly have been a better choice. The disposition of the 12AT7 valve pins, however, is such that no means of neutralising and at the same time preserving symmetry of design could be envisaged. Several 6J6 valves were therefore tried in turn in this stage and the most satisfactory one retained. A nylon-loaded bakelite holder was selected for this as well as the mixer stage, in preference to ceramic. Neutralisation is achieved without great difficulty in this manner: The screen is cut so that it makes a very exact fit with the valve holder leaving only the two anode pins projecting into the mixer compartment. Two

Table of Values

Circuit complete of the GSRZ two metre converter.

- | | |
|---|-----------------------|
| C18 = 5 μ F ceramic | V1, V2, V5 = 6J6 |
| C1, C2, C3, C23 = 8 μ F concentric trimmers | V3 = EF91 (6AM6) |
| C17, C22 = 9 μ F ceramic | V4 = 6C4 |
| C4, C5 = 20 μ F ceramic | R1 = 56 ohms |
| C9, C10 = 50 μ F trimmers | R9 = 140 ohms |
| C14 = 250 μ F mica | R2 = 200 ohms |
| C7, C12, C20 = 400 μ F mica | R6, R15 = 1,600 ohms |
| C6, C19, C21 = 500 μ F mica | R10 = 2,500 ohms |
| C15 = .001 μ F mica | R11 = 3,900 ohms |
| C11 = .005 μ F mica | R17 = 20,000 ohms |
| C8, C13, C16 = .01 μ F mica | R7 = 47,000 ohms |
| NC—See text | R5 = 56,000 ohms |
| | R13 = 120,000 ohms |
| | R3, R4 = 130,000 ohms |
- All resistors $\frac{1}{4}$ -watt rating.

- L1 4t 40 SWG PVC interwound L2
 L2 8t 20 SWG tinned $\frac{1}{8}$ in. x lin.
 L3 6t 20 SWG tinned $\frac{1}{8}$ in. x lin.
 L4 8t 30 SWG enamelled, close wound on $\frac{1}{8}$ in. slug former with
 L5 $\frac{1}{8}$ in. gap between earthy ends
 L6 8t 16 SWG enamelled, close wound on $\frac{1}{8}$ in. slug former with
 tap 3t from grid end
 L8 } 2t turn links 20 SWG PVC
 L9 }
 L10 4t 16 SWG tinned $\frac{1}{8}$ in. x $\frac{1}{8}$ in.



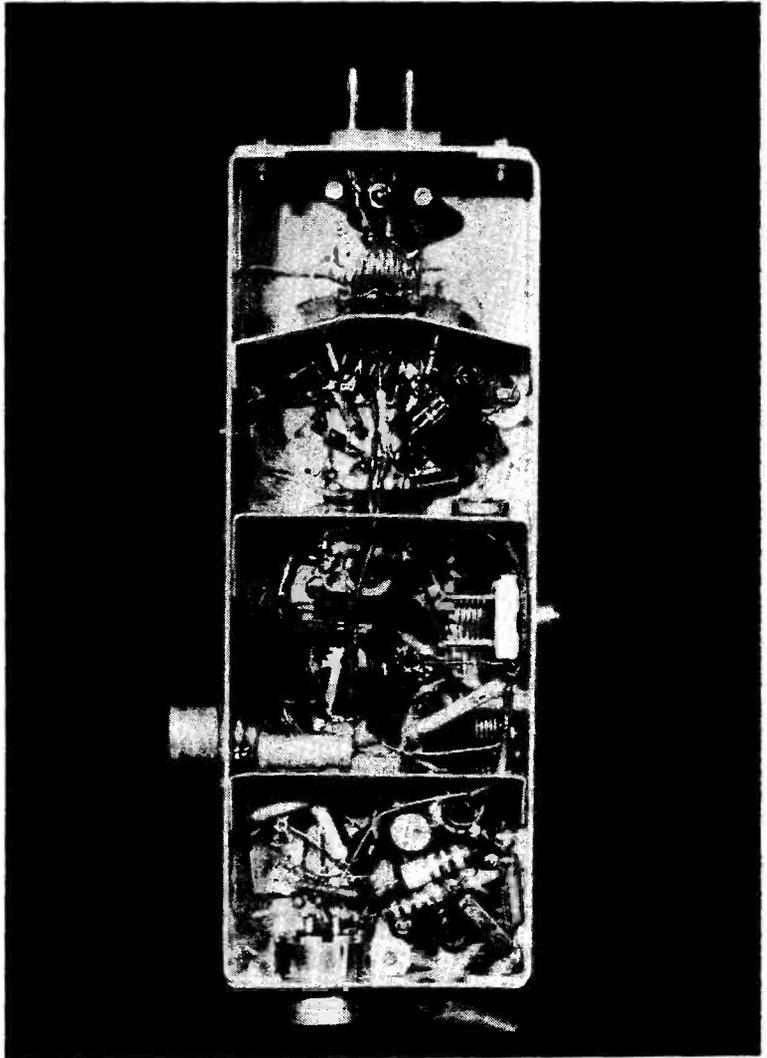
Circuit complete of the converter designed and described by G5RZ. It is quiet and sensitive, and being crystal controlled on the oscillator side, gives a T9 beat and is accurate for calibration over the IF tuning range. (Note: The winding above R2 is a VHF RF choke).

$\frac{1}{4}$ " holes are drilled in this bulkhead and blanked off with small squares of paxolin which in turn are drilled to receive tiny copper tubes $\frac{7}{8}$ " long and about $\frac{3}{32}$ " diameter made by rolling copper condenser foil (taken from a u/s .01 mica condenser) round a suitable sized drill and running a thin touch of solder along the edge. Crossed leads are taken from these tubes which project into the mixer compartment to the two anode pins. It is then only necessary to push short lengths of insulated wire into each tube and solder these to the outside ends of the grid coil, adjusting for neutralisation in the usual manner by moving the wires in or out a trifle with the aid of a trimming tool. Much trouble was encountered with self-oscillation until the smaller stopper resistance R2 was inserted between the centre of the anode coil and the RFC connected to the HT line. After that everything was as simple as ABC.

The anode coil consists of six turns of approximately the same dimensions as the grid coil and is tuned by means of two $8 \mu\text{F}$ concentric trimmers connected between earth and the ends of the coil (C2, C3). By this means electrical symmetry can be maintained. Tuning for optimum signal strength is quite sharp but once these are correctly adjusted they need no further attention and the gain holds up quite well throughout the entire band width.

Mixer Stage. This is screened in a similar manner to the previous stage. A very important point to watch is the anode voltage to this stage. In the unit in question this is dropped to *only 30 volts* by means of the 56K resistor R5. Although not very critical, anything over 40 volts causes a definite loss of conversion efficiency and a marked increase in noise.

Preamplifier. This stage follows normal



Layout and construction underneath the G5RZ converter, with the RF stage at the top. The various stages are in screened compartments, and the chassis overall is 9ins. long by 3 $\frac{1}{2}$ ins. wide by 1 $\frac{1}{2}$ ins. deep.

practice and it was not found necessary to screen either of the two tuned circuits so long as the usual precaution was taken to separate these circuits and to place them to present minimum coupling.

Cathode Follower. Here again this was quite straight-forward but too high a value for the grid resistor produced a curious form of oscillation. 47K seemed quite satisfactory. The theoretical value for the cathode load resistor should be twice that of the input impedance of the main receiver—in this case,

therefore, 600 ohms, but this value does not appear to be in the least critical and, in practice, a value of 1.6K seemed quite satisfactory.

Oscillator-Multiplier. The particular circuit chosen for producing the third overtone mode of oscillation is quite conventional and most crystals tried went off without any difficulty. The fifth harmonic of the overtone frequency is picked out by resonating the second anode coil by means of a further 8 μF concentric trimmer C23. This also serves as a means of varying the degree of injection into the mixer. It will be noted that all these trimmers, with the exception of the one across the input end of the converter, are connected across the "hot" end to earth, which makes for ease in construction and subsequent adjustment.

Injection. This is obtained by coupling a two-turn link from the earthy end of the multiplier anode coil *via* a length of twisted pair to a similar two-turn link into the centre of the RF anode coil. The twisted pair is routed as clear of obstructions as possible, suitable holes being drilled in the two intervening bulkheads through which the wire is passed.

Lining Up. Follows normal practice and few

comments are needed here. With heaters and HT applied check that the crystal is operating correctly on its third overtone by tuning to the appropriate frequency on the main receiver. Make sure that it is, in fact, working in the third overtone mode, then tune in to the 2-metre band and proceed as usual, making use of a signal generator or a local oscillator for peaking the various circuits to the centre of the band. Adjust injection on a weak signal for best results. With the layout shown it is unlikely that injection will be excessive or greatly so. The converter is very quiet in operation provided neutralisation has been correctly done but an increase in "sharsh" should be observed as the aerial is switched into circuit. Ignition noises will also be heard if these are normally experienced.

In conclusion, it is certainly not claimed that this converter is the last word, merely that the thought given to its layout and the care given to its construction have both yielded dividends and produced the results which had been aimed at. It is to be hoped that those readers who feel somewhat dissatisfied with their existing arrangements will take heart and find one or two useful and constructive ideas in what has been written above.

MULLARD HIGH AND LOW PASS FILTERS

The Equipment Division of Mullard, Ltd., has recently made available high- and low-pass filters based on an original Post Office design. The use of Ferroxcube pot cores for the inductances has made possible a considerable reduction in size coupled with excellent attenuation characteristics. Each filter is accommodated on a standard 19-inch panel $3\frac{1}{2}$ in. high, and a single selector switch enables the cut-off frequency to be selected. By connecting the high and low pass units in tandem and varying the cut-off frequencies, the filters form a useful instrument for sampling and frequency analysis. The cut-off frequencies of the high and low pass sections are slightly different to permit the taking of non-overlapping samples.

The input and output impedance of the filters is 600 ohms, but the actual filter sections are designed for an impedance of 25,000 ohms. The necessary high values of inductance are readily obtainable using Ferroxcube cores, and the capacitances required are reduced to the extent that small silver mica condensers of high stability and good power factor may be used.

The high-pass cut-off frequencies are 440, 660, 990, 1480, 2222, 3333, 5000, 7500, 11,250 and 16,800 c/s, and the low-pass cut-offs are 400, 600, 900, 1350, 2025, 3040, 4500, 6830, 10,250, and 15,400 c/s. Stop-band attenuation is 50dB at $0.8x$ fc for the high-pass and $1.25x$ fc for the low-pass sections, and beyond these limits attenuation increases rapidly. Passband

attenuation is $3\text{dB} \pm 1\text{dB}$ (high pass) and $2\text{dB} \pm 1\text{dB}$ (low pass).

The wide range of pass and stop bands obtainable at the turn of a switch makes these Mullard filters particularly convenient for use in the electronics or telecommunications laboratory. A single panel can now replace a complete rack of earlier equipment of comparable performance. Applications of the Mullard High and Low Pass Filters may be expected in the fields of communication network analysis, high quality sound recording and reproduction, and vibration testing.

NEW INDIAN ORGANISATION

We are informed that the old A.R.C.I. has been wound up and that a new body, known as the Amateur Radio Society of India, has been formed. All other amateur bodies in India are being dissolved and the QSL bureau is being consolidated under the direction of that old *qua-hai* J. Nicholson, VU2JP. Box 1, Munnar, Travancore, South India, which is also the address for the QSL Bureau. All other correspondence for the A.R.S.I. should be sent to: Box 584, New Delhi, India.

HAVE YOU ANY?

Remember that we are always interested in clear, sharp photographs of Amateur Radio interest for appearance in *Short Wave Magazine*. They should be accompanied by brief explanatory notes, and all those used are paid for immediately on publication.

BY a curious coincidence, the circumstances in which your A.J.D. finds himself as this month's story is being started are exactly the same as they were four weeks ago; that is to say, it is 0600 on a fine summer morning after a couple of days of settled weather, with the glass steady and fairly high—just the sort of weather, in fact, that produces the conditions we want for VHF.

In other words, we may be on the verge of better things; certainly, when it became time to commit this piece to irrevocable print, there was a marked improvement in conditions, and from July 19 onwards the GDX was there again.

But the period now under review is one of almost unrelieved gloom so far as VHF conditions are concerned—a few Europeans getting through to the South of England and some occasional GDX just about sums up the situation as most people have found it. But there have been some interesting portable excursions, and we are also beginning to hear about /M working on two metres.

Boiling down the /M possibilities on VHF, it looks like a 10-15w. phone transmitter, a CC converter with a simplified IF/AF amplifier, a tuning control and change-over switching box on or near the steering column, a fixed quarter-wave ground-plane spike as aerial for operation on the move, and a collapsible beam system for quick assembly when working under stationary conditions. Unless the beam is to be geared to a gyro-computer, it does *not* seem likely that we shall be able to use any sort of directional aerial system while actually moving—unless the driver has three hands, or a very intelligent assistant!

The practical possibilities of /M working on two metres were well illustrated recently, when G2ATK/M was visiting G2HCG. After contact had been made over the air, and as G2ATK/M approached Northampton, G2HCG was able to give routing instructions which brought G2ATK right up to his front gate. And no

VHF BANDS

A. J. DEVON

Conditions Improving Again—

More Portable Activity—

EI2W/GW2ADZ QSO
on 430 mc—

Station Reports and News—

doubt there have been many other instances of the same kind.

In general, car radios as normally fitted will not be very suitable as IF/AF amplifiers because they do not tune across a short wave band. This means a complete receiver assembly, though there may be some "surplus" types which could be adapted for the purpose, such as the R.109.

Portable Exploits

During the week June 28-July 6, G2HCJ (Warrington) did a tour, as GM2HCJ/P, of some of the more remote and unusual (in the VHF sense) counties of Scotland—see "Activity Report." Though conditions were at rock-bottom, this produced some interesting results, particularly for G3BW (Whitehaven, Cumb.) who garnered four new counties out of the six in which he was able to work GM2HCJ/P. Otherwise, the latter's contacts were mainly with the GM's, who likewise benefited from G2HCJ's enterprising effort. As G3BW remarks, it is those

taking the trouble to go out on wheels who make things so interesting for the fixed-QTH operator; and G2HCJ suggests a private contest between G5MA and himself as to who can QSO from the largest number of counties! As a matter of fact, this is quite an idea for the /A-/M enthusiasts, who are increasing in numbers and activity, and will soon justify an achievement rating of their own.

G2HCJ reports that he expects to be doing another GM tour about mid-August, when he will be found on 144.5 or 144.59 mc; and it may interest EI2W, G5AU, G5BM and G6NB to know that on the last occasion they ranked as DX that was being heard by GM2HCJ/P in these exotic places, but could not be raised—so let us hope they and many other G's make it next time. Incidentally, G2HCJ explains that he has to "fold up his dipoles and creep silently back to the hotel" at about 10.30 p.m., because these activities are undertaken in the course of business trips, and he must be up in time in the morning.

As no less than 77 two-metre operators will already know, Bob of G5MA was down in Monmouthshire during July 3/4, at a site he has now used on four separate occasions. Some of his more interesting QSO's—because of the path right across the Welsh mountain area—were with GW2ADZ (68m.), GW2XV/P (on Snowdon, 98m.) and G3IOO (73m.), with Arthur G5BD in Mablethorpe as best GDX at 175 miles.

At the same time, G2XV made his trip to Snowdon, and no doubt found himself in the same hot up there from which GW6AA had some memorable experiences on the old 5-metre band way back in 1938.

Quick QSO'ing

An achievement of a different sort was that of G3DA (Liverpool), who in 90 minutes from 1950 on the evening of July 19 worked five countries, in the shape of G6XM, GD3UB, G15AJ, GM3JDD/P and GW2ADZ—and had EI2W not been away on holi-

day, it would almost certainly have been six!

Many VHF operators will be interested to note the appearance of GD3UB (Nr. Ramsey, I.o.M.), who is now on 144.108 mc every evening from 2300, with a CC converter, a 10-watt transmitter, and a 12-element stack as described by G5RZ in the November 1952 issue of *Short Wave Magazine*; he has made some good contacts, as his calls worked list shows.

We are also glad to welcome the return of G4LX (Newcastle), who is now with G2BDQ and G3CYY, every Saturday evening 1900-2230 clock time and anxious to give Northumberland to those who may need that county. G4LX also reports that the Newcastle trio regularly work portable from different sites in Northumberland, that expeditions are planned to the Scottish Border counties, and that G4LX expects to be GM4LX/P in Banff, Morayshire and Nairn towards the end of September. It will also be remembered that G2BDQ and G3CYY have been working portable in the South of England and the West Country during recent months.

Yet another of the old-timer VHF men to reappear in these notes is G4AJ, now of West London, who four years ago used to operate from Basingstoke, and earlier still also made his mark on the 5-metre band. G4AJ started up again in January, and comes into Annual Counties; recently, he has been able to work F and GW under difficult conditions.

EI/GW "First" on 70 Cm

It will be remembered that last month we mentioned the EI2W test schedule on the 70-centimetre band. It yielded immediate results, for on the very first day, July 10, at 2220 BST, two-way contact was effected with GW2ADZ (Oswestry), whose signal was at "tremendous strength" in Dublin. EI2W was using a 20-ele beam for 430 mc, to a design by GM6WL, as he has had trouble in matching the 40-ele job; GW2ADZ actually first received EI2W on the afternoon test transmission, and during their evening

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are requested for this section, set out in the form shown below, with call signs in alphabetical and numerical order).

G2DVD, Slinfold, Sussex.

WORKED : F9EA/P, 91Y, G2AHL, 2AHP, 2BMZ, 2DD, 2DSP, 2DTP, 2HCG, 2HCG/M, 2KF, 2MV, 2UN, 3BRX/P, 3EGV, 3ENS, 3EPW, 3FAN, 3FAN/A, 3FD, 3FSG/P, 3FQS, 3GDR, 3GQP/P, 3GSM, 3GVF, 3GXG, 3HCU, 3HST, 3HVO, 3HZJ, 3IAM, 3IOO, 3JHM, 3XC/P, 4GR, 4HT, 5BC, 5BD, 5DS, 5MA, 5TZ, 5US, 6AG, 6JP, 6TA/P, 8KZ, 8UQ/P, GW3EJM.

G3BJQ, Nr. Rugby, Warks.

WORKED : G2AK, 2AHP, 2AOK, 2ATK/M, 2BVW, 2DCI, 2FNW, 2FKX, 2FUZ, 3BKQ, 3CGQ, 3CKO, 3CRH, 3DO, 3DVK, 3DVP, 3EJO, 3ENS, 3FGT, 3FUW, 3FUW/A, 3FW, 3GHO, 3GHU, 3GKZ, 3HXS, 3IVF, 4JJ/P, 5BM, 5BM/P, 5ML, 5RZ, 5YV, 6CI, 6NB, 6VX/P, 6XM, 6XX, 6YA, 8PX/P, 8SC, 8VN, GWSMA/P.

HEARD : F8TD, G2BM, 2OI, 2COP, 2DRA, 2HCG, 3AKU, 3BA, 3BW, 3CCH, 3DQO, 3EPW, 3FAN, 3FAN/A, 3GNJ, 3HAZ, 3HBW, 3IEY, 3IOO, 4SA, 5JU, 5SK, 5VN/A, 6RH, GD3UB, GW2ADZ. (June 18 to July 16).

G2DHV, London, S.E.13.

WORKED : G2MV, 3FD, 3BRX/P, 4AJ.
HEARD : F8GH, G2AHP, 2AIW, 2YB, 3CGQ, 3EYV, 3GDR, 3GXG, 3IFA, 3ISA/P, 3JWA, 3JMA/P, 4HT, 5DS, 5DT, 6NF, 6TA/P.

GD3UB, Ramsey, Isle of Man.

WORKED : G2AK, 2OI, 3BA, 3DA, 3GHO, 3IOO, 3IUD, 3IWJ, 4SA, 5AU, 5BM, 5VN, 6NB, 6WF, GM2HCJ/P, GW2XV/P. (June 22 to July 10).

GW3GWA, Wrexham, Denbs.

WORKED : G2ALN, 2CBB, 2FJR, 2HCJ/P, 2XV, 3DA, 3DLU, 3EPW, 3FMI, 3IOO, 3IWJ, 3WS, 5JU, 5MA, 5YV, GW2XV/P.

HEARD : G2DCI, 2HF, 3BW, 3GPO, 3GZO, 3IER, 4SA, 6AG, 6NB, 6WF, 8OU. (May 14 to July 17).

G3WS, Chelmsford, Essex.

WORKED : G2BBN, 3CGQ, 3EPW, 3FAN, 3GGJ, 3GVC, 3IIT, 3IOO, 3IUD, 3IWJ, 5BD, 5DS, 5UF, 5YV, 6XM, GW3GWA, 5MA/P. (June 21 to July 12).

G4SA, Drayton, Berks.

WORKED : G2AHL, 2AOK, 2ATK/M, 2BMZ, 2HCG, 2HCG/P, 2HIF, 2HIF/P, 2XV, 2YB, 3BA, 3BNC, 3BW, 3CSC, 3CVK, 3DQO, 3EGV, 3FAN, 3FAN/P, 3FQS, 3FSG/P, 3FUM, 3FYY, 3GDR, 3GHO, 3GPO, 3GVF/P, 3HZF, 3IER, 3IOO, 3IRA, 3IRA/P, 3IUD, 3IVE, 3NL/P, 5AU, 5BM,

5BM/P, 5DS, 5JU, 5ML, 5SK, 5TZ/A, 5US, 5YK, 5YV, 6NB, 6TA/P, 6VX/P, 6WF, 6XM, 6XX, 8PX, 8PX/P, 8SC, 8UQ/P, 8VN, G C 3 E B K, G D 3 U B, GW2ADZ, 2XV/P, 5MA/P.

G3BRX, Wanstead, London, E.11.

WORKED : G2KF, 2CZS, 2FSY, 3AJS, 3BUN, 3CNF, 3FEX, 3GNI, 3GSM, 3IKW, 3JMA, 4AU, 5TZ/A, 6YP, 8SK, PEIPL.

HEARD : G2MV, 3AGR, 3DFF, 3DJX, 3FSD/P, 3GWE, 3GYW, 3IJB, 4KO. (April 20 to July 13).

GM3DIQ, Stevenston, Ayr.

WORKED : EI2W, G3CCH, 5YV, G15AJ, GM2BUD, 2DRD, 2HCJ/P, 3BDA, 3DDE, 3DYC, 3EGW, 3FYB, 3IBV, 3INK, 3NG, 4HX, 5VG, 6KH, 6WL, 6ZV, 8AH.

HEARD : G3IUD, 5BD, 6NB, 6RH, G13FZO, 3GQB. (June 12 to July 15, 98 hours operating).

G2FJR, Sutton Bridge, Lincs.

WORKED : F8GH, G2AHP, 2AXQ, 2CYN, 2DJM, 2KF, 2OI, 2YB, 3AGS, 3ARX, 3BK, 3CC, 3CFK, 3DLU, 3DOV, 3DQO, 3ENS, 3GCV, 3GGJ, 3GPO, 3IT, 3JFR, 3JMA/P, 3JQN/P, 3WW, 4KO, 4JJ/P, 4MW, 5BM, 5NV, 5UF, 5YV, 6LI, 6MI, 6XM, 6XX, 8UQ/P, GW2XV/P, 3GWA, 5MA/P.

HEARD : G3CRH, 3IUD, 5IG, 6RH, 8NM, GW2ADZ. (June 18 to July 14).

GM2HCJ/P, Kirkcudbright-shire.

WORKED : G3BW, GD3UB, G13AXD, 3CWY, 3GQB, 5AJ, GW2XV/P.

GM2HCJ/P, Lanarkshire.

WORKED : G3BW, 5TH, G13FZO, GM3DDE, 3DIQ, 3DYC, 3EGW, 3FYB, 3IBV, 3INK, 3NG, 6WL, 6ZB.

GM2HCJ/P, Peeblesshire.

WORKED : G3BW, GM3DIQ, 3EGW, 3FYB, 3IBV, 5VG, 6WL, 6ZB.

GM2HCJ/P, Roxburghshire.

WORKED : G3BW, GM3DDE, 3DIQ, 3EGW.

GM2HCJ/P, Selkirkshire.

WORKED : G3BW, GM3DIQ, 3EGW.

GM2HCJ/P, Wigtownshire.

WORKED : G3BW, G13AXD, 3CWY, 3FZO, 3GQB, 5AJ, GM3DIQ. (All above during June 28 to July 6).

GM3EGW, Dunfermline.

WORKED : EI2W, G2BDQ, 2DRA, 2FO, 3ARX, 3BW, 3CCH, 3WW, 5BD, 5UD, 6UJ, 6XM, 6XX, G13GQB,

5AJ, GM2DRD, 2HCJ/P, 3AYR, 3BDA, 3DDE, 3DYC, 3DIQ, 3EJN, 3FOW, 3FYB, 3IBV, 3INK, 3NG, 4HX, 5VG, 5YV, 6KH, 6SR, 6WL, 8AH.

HEARD : G2FJR, 3IUD, 4LX, 6LI, GM2BUD, 2CHN, 6ZV. (June 1 to July 13).

G2BRR, London, E.18.

WORKED : G2ATK/P, 2BPC, 3CNF, 3FSG/P, 3ISA, 3JMA, 3JQN/A, 4AU, 5JM, 6AG, 6LX, 6NF, 6SG, 6TA/P, 8KW, 8SK.

HEARD : G2BMS, 2CD, 2CZS, 2DUV, 2OI, 3AEX, 3AJS, 3BTC, 3HZJ, 4AJ, 5TZ/A, 6TA. (May 14 to July 12).

G8VN, Rugby, Warks.

WORKED : G2AIW, 2AK, 2ATK, 2BVW, 2COP, 2DCI, 2FXK, 3BA, 3BJQ, 3CKO, 3CGQ, 3CRH, 3CYY/P, 3DVK, 3FGT, 3FUW, 3G3FV, 3GHO, 3IVF, 4JJ/P, 4SA, 5BM/P, 5JU, 5ML, 5SK, 6CI, 6RH, 6XM, GWSMA/P. (June 17 to July 16).

G8NM, Lincoln.

WORKED : G2AIW, 2BBN, 2FNW, 3AKU, 3CCH, 3CGQ, 3ENS, 3FNL, 3WJ, 4JJ/P, 4SA, 5MA, 5TZ, 5YV, 6NB. HEARD : G2YB, 3GHO, 3GVF, 5BD, 5ML, 6RH, 6XX, 8OU.

G8DA, Exeter, Devon.

WORKED : G2HIF/P, 3AGA, 3CCQ, 3DLU, 3GOF/P (Exmoor), 3GOP/P (Dartmoor), 5MA, 6NB, 6RH, GWSMA/P, 8SU.

HEARD : G2AHP, 2BMZ, 2RY, 2UN, 2XV, 2YB, 3AU, 3EUQ, 3FAN, 3GHO, 3GOF, 3HXS, 3HZJ, 3IRA, 4SA, 5HJ, 5JO, 5UF, 6AG, 6GR, 8OU, GW8UH. (June 1 to July 16).

GWSMA/P, Nr. Blaenavon, Monmouthshire.

WORKED : G2AIW, 2AOK, 2ATK, 2BMZ, 2DCI, 2FJR, 2HDZ, 2HIF/P, 2HOP, 2IT, 2MV, 2YB, 3ABH, 3BEX/P, 3BJQ, 3BK, 3CKO, 3CRH, 3CVK, 3DO, 3EGV, 3FH, 3EJO, 3FD, 3FGT, 3FIF, 3FMO, 3FRV, 3FUM, 3GDR, 3GGJ, 3GHO, 3GOF/P, 3GVC, 3GVF, 3GVF/P, 3HBW, 3HXS, 3IER, 3IOO, 3IRA, 3IRA/P, 3JHM, 3JMA/P, 3NL, 3NL/P, 3WS, 3WW, 4AJ, 4CI, 4HT, 4NC, 4SA, 5BD, 5BM, 5DS, 5HB, 5JU, 5ML, 5TZ, 5UF, 5US, 6AG, 6NB, 6OU, 6RH, 6VX/P, 6WF, 6YU, 8OU, 8PX/P, 8UQ/P, 8VN, 8VP, 8VZ, GW2ADZ, 2XV/P. (July 3 and 4).

G3EPW, Tootington, Nr. Bury, Lancs.

WORKED : EI2W, G2ALN, 2AIW, 2CVD, 2CVN, 2DCI, 2DVD, 2FCL/P, 2FZN, 2HCJ/P, 2HGR, 2OI, 3A0O, 3ATZ, 3AUC, 3AYT/M, 3BA, 3B0C, 3BW, 3CCF,

3CCH, 3CGQ, 3CRH, 3CSC, 3DA, 3DLU, 3DOV, 3DQQ, 3FD, 3FGT, 3FMI, 3FYY, 3GB, 3GXR, 3GXT, 3GYV, 3HTY, 3HWF, 3HXS, 3HYH, 3HZK, 3IGK, 3IOO, 3IPH/A, 3IRA, 3IUD, 3IVE, 3IWJ, 3JQN/P, 3PY, 3PT, 3WS, 3WW, 4JJ/P, 4OT, 5AU, 5BM, 5BM/P, 5DS, 5RZ, 5TZ, 5VN/A, 6FK, 6MI, 6NB, 6WF, 6XX, 8OU, 8SB, GW2ADZ, 2XV/P, 3GWA, 3GWA/P. (June 20 to July 16).

G3JGJ, Plympton, Devon.

WORKED: F 8 T D, G3AUC/P, 3CYY/P, 3DLU, 3GOPY, GC2CNC, 2FZC.
HEARD: F3ER, 8ME, 8MG, 8XT, 9JY, G2BAT, 2BQ/P, 2BMZ, 3ABH, 3AGA, 3AUS, 3CQC, 3FIH, 3GHC, 3HWF, 3HZH, 4GR, 4SA, 5MA, 5TZ, 6NB, 6RH, 8OU, GW5MA, 8SU. (June 2 to July 16).

G3DLU, Compton Bassett, Wilts.

WORKED: G2ATK, 2COP, 2FJR, 3ABH, 3APY, 3ASC, 3BW, 3CQC, 3EPW, 3FAN, 3FIH, 3FMI, 3FMO, 3FUM, 3GHO, 3HVB, 3HXS, 3HZH, 3IRA, 3JGJ, 3NL, 3WW, 5FF, 5JO, 5MA, 5TZ, 6AG, 6OZ, 6XX, 6ZH, 8DA, GW3GWA, 8SU.

HEARD: G2AIW, 2BMZ, 2DVD, 2HDZ, 2HIF, 2XV, 3BA, 3BH, 3BJO, 3BKQ, 3CCH, 3CRH, 3DJX, 3DO, 3FRY, 3FYY, 3GVC, 3HAZ, 3HSD, 3HVD, 3HWF, 3IER, 3IOO, 3IUD, 4AP, 4GR, 4SA, 5BM, 5HB, 5YV, 6NB, 6RH, 6XM, 8KW, 8VX, GW2ACW, 2ADZ, 3EJM, 5BI, 8UH. (June 17 to July 9).

G3FYY, London, N.W.2.

WORKED: G2ABD, 2AHP, 2BMZ, 2BPC, 2CZS, 2HDZ,

2MV, 2RD, 2YB, 3AEX, 3BEX/P, 3BRX/P, 3CRH, 3DF, 3EPW, 3FGB, 3FQS, 3FSG, 3FSG/M, 3FSG/P, 3GNJ, 3IAM, 3ISA, 3IXE, 3JMA, 3JMA/P, 4GR, 4GT, 4HQ, 4JJ/P, 4SA, 5DS, 5RZ, 5SZ, 5TZ, 5UF, 5UM, 5YV, 6LX, 6TA/P, 6XH, 8OU. (June 17 to July 14).

G3GHO, Roade, Northants.

WORKED: F8AA, 8GH, 9EA, G2AHP, 2BBN, 2CYN, 2HCG, 2YB, 3BA, 3BJQ, 3BNC, 3CCH, 3CRH, 3DLU, 3EGG, 3EGV, 3FQS, 3FW, 3GHU, 3GVE, 3GWB, 3HBW, 3HOV, 3HZE, 3IEY, 3IUD, 3JFR, 3JHM, 4JJ/P, 4SA, 5MA, 5NF, 5UF, 5VN/A, 5YV, 6PJ, 6TA/P, 6XH, 8PX, 8VN, GD3UB, GW2ADZ, 2XV/P, 5MA/P, ON4BZ, PEIPL. (June 17 to July 15).

directory of active GM stations; the centres of activity are Edinburgh and Glasgow, and several new stations are expected on shortly. Nice G contacts for GM3EGW have been G3ARX (Mablethorpe) and G6UJ (Driffield).

On the subject of GM activity, GM3DIQ (Stevenston, Ayr) also writes; referring to his calls h/w list, he says it covers 14C, of which 7 counties are in Scotland, represented by stations regularly active every night with no restrictions due to TVI (or TV!). Most of them come on about 2000 BST, and some even earlier. Clarke remarks that on July 11 he "heard three new counties"—G3IUD, G6NB and G6RH—but they were too busy to notice his signal.

G2BRR (London, E.11) puts in reports covering his own activities and those of G3BRX, of the Wanstead club; that one who took out G3BRX/P on July 4 enjoyed themselves, and from the club-room they have worked PEIPL on two metres—probably the first club VHF station to raise the Continent.

G5MR (Hythe, Kent) reports July 11 as the best evening of the period, when he worked G3ENS (Loughborough) and G5YV (Leeds) between 1800 and 1900 BST—such contacts are rarities for him, as it is only under the best conditions that workable signals come in from the North; Vernon remarks that an odd fact was that the barometer stood at only 1007 mb in London at the time. (Yes, met. man G3EGB is looking into it).

Ted of G4SA (Drayton, Berks.) sends a calls worked list and remarks that he is looking for GI and GM; also, that so far this has been the worst year for conditions on two metres that he can remember—a thought which many correspondents are echoing. Never mind, a great opening will burst on us one of these days, and then everybody will be writing about how bad the QRM is getting on two metres, and why can't people keep to the Zone Plan. You watch! Nine-tenths of the stations now active on Two are just

QSO the path was found to be better on 70 centimetres than on two metres.

Thus we notch up yet another outstanding VHF achievement, with congratulations to both operators concerned. At just about the time you read this, E12W will be resuming tests on 430 mc on his return from holiday; frequency either 432.3 or 434.73 mc, with the beam swung from East round to South-East during transmission and reception; otherwise, the schedule is as given on p.290 of our last, and the routine will be rigidly maintained until the end of August—naturally, E12W would also like to hear from interested parties about schedules at other times.

The Station Reports

G3BW (Whitehaven, Cumb.), who goes into the lead in All-Time Counties as a result of his Scottish round-up, mentions his pleasure at hearing G3EHY (Banwell, Som.) again after so long, and wonders if Louis has now returned permanently to the two-metre fold. G2DVD down in Sussex will be interested to know that G3BW spent some time calling him on July 18, other good signals from the South at that time being G2AK, G3WW, G4SA, G5TZ, G6NB and G6RH.

G3CCH (Scunthorpe) found conditions very variable during the month, with an improvement about July 18, with G13GQB and G15AJ worked, other recent contacts for new counties being

GM3BDA and GM3JDD/P—and G3CCH remarks that if only G4SA and G5TZ would come back to his repeated calls to them he might have two more for the Annual table! G3CCH says that he has tried G5TZ "hundreds of times in the last two years"—but he will keep on calling till he gets a reply! Other counties wanted by G3CCH are Oxon. and Suffolk, neither of which have ever yielded him a signal.

G2DVD (Slinfold, Sx.) now has a stack of four 3-ele Yagis, all-same G2BMZ, and is very pleased with the results; stations are coming up out of the noise which previously G2DVD never believed to exist! (How often this happens when the gear is improved, particularly the receiver or aerial; it is always our answer to those who sometimes, in a mood of exasperation, say they don't believe all they read in "VHF Bands"!). Anyway, for G2DVD it has meant a healthy advance in both Tables, and evidently he is getting out better, too.

Another to report hearing, and calling, G3EHY is G3FYY (London, N.W.2), who is now considering going VHF-VFO for the London band, Zone J, with the idea of getting off a frequency which seems to have certain disadvantages; G3FYY is much impressed by what he has heard of G6XH's VFO.

The calls h/w list put in by GM3EGW (Dunfermline) is not only interesting for its GDY content, but also reads like a

not hearing one another; it only wants a steady reflecting layer to hang over Northern Europe and the U.K. for about five days for the truth of this to be revealed.

G8DA (Exeter) says his QTH there may be likened to a lump in a sugar-basin, with nothing ever heard from the Midlands or the North. Nevertheless, G6NB and G8OU percolate and are used as condition-indicators; G8DA is on most evenings after TV shut-down. GW3GWA (Wrexham) is another who has been going portable, and on August 15 hopes to be giving Denbighshire to all comers from a site 1,200 feet a.s.l. and clear from North to South; in the portable Tx, he runs 15w. to an 832, CW and phone, and has a 4-ele beam which can be put up to 14 ft. on site. Plans are in hand for an all-dry portable Tx/Rx for two metres, so that trips out can be made more frequently and conveniently.

G3EPW (Bury, Lancs.), who is good GDX for many people, brings himself up-to-date in the scoring and remarks that he now has a 4/4/4 up at 26 feet, which seems to have extended his range under the poor conditions prevailing; he has worked as far as G2DVD and G2BMZ, and goes up six in Annual Counties. G3JMA (Harlow, Essex) also makes progress and has worked F8GH and F9JY; on the afternoon of June 26, ON4BZ was coming in well and worked G3JMA, G5MA and G6NB—apparently the only G's on the air at the time!

G3WW (Wimblington, Cambs.) found the band opening up to the North on July 19, when GM3JDD/P and GM3EGW were getting into the Lancs.-Yorks. areas. At 2250, a "CQ North" from G3WW produced contacts with none other than G3IOE and G4LX, both of Newcastle, and most unusual QSO's from the Cambridge district. GM3EGW was 339 at G3WW later, but no QSO. G3BW was then heard, also G2IQ and G2OI, with G3AGS later worked. By about 1.0 a.m. GDX stations had been heard or worked from nearly all directions, including GW5BI (Cardiff).

G2XV (Cambridge) goes up in Annual Counties and the 70-cm Table, and G8VN (Rugby) writes to say that activity and conditions have been fairly good in the Midlands; interesting contacts for G8VN were with G3CYY/P, who was hove-to for a short time in Rutland on his way home from the West Country, and with G3DVK in Rotherham who, like G8VN, uses an indoor beam; they were 579-599 on July 11, when conditions were so good. Another new station for G8VN was G2AIW, of Twickenham, on July 10.

From Lincoln, G8NM writes to say that he is still active on two metres, but remains very much on his own in that district; he notices how the activity level rises when the EDX starts coming through, concluding that many VHF operators must spend a lot of time just listening round—something in that! G3DLU (Compton Bassett) has worked G3JGJ (Plympton, S. Devon) for the latter's "most northerly QSO" and reports G3FUM (Kingsclere) as being on again after many months in hospital. G5DS (Surbiton, Sy.) notches up three more in Annual Counties, with G3FMI for Cheshire as one, and has now worked a total of 553 stations on two metres.

G3GHO (Roade, Northants.) was glad to raise GD3UB for a somewhat unexpected QSO, and remarks that, with him, July 11 was a good night, with a lot of GDX coming through; though he missed GW5MA/P for Carmarthen (and Bernard's XYL says he hasn't been the same man since) he did get GW2XV/P for Caernarvon, and was surprised to find Gerry's signal so weak (only 559) from such a location. G3BJQ (Nr. Rugby) brings his scores up-to-date, and also reports July 10-11 as the best period of the month; he is back on the band after a long absence and has made some interesting contacts, with F8TD and GD3UB heard.

G3WS (Chelmsford) confirms the excellent conditions of July 10-12; on the night of the 11th he worked several northerly stations, including G3EPW (Bury), G3IUD (Wilmslow, Ches.) and

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH Only

Worked	Station
68	G3BW
67	G5YV
64	G6NB
61	E12W (209), G3BLP (630)
59	G3EHY
57	G2OI (349), G8OU
56	G8SB
55	G2HIF, G4SA, GW5MQ
54	G3GHO, G3WW
53	G2AJ (519), G2HDZ (416) G3CCH, G4CI
52	G2NH, G5BD, G6XX
51	G5BM, G5DS (553)
50	G3ABA, G3FAN, G3IOQ
49	G5MA
48	G2FJR (273)
47	G5WP
46	G4HT (476), G5BY, G5ML (280), G6YU (205)
45	G2XC, G6XM (356)
44	G3BK, G3HAZ (262)
43	G2AHP (456), G3BA, G3COJ, G4RO, G5DF
42	G3GSE (424), G8DA
41	G2FQP, G3DMU, G6CI (184)
40	G3BNC, G3CGQ, G5JU, G8KL
39	G2IQ, G3GBO (434), G3HBW, G3VM, G8IL (325)
38	G2DVD, G2FCL (234), G3APY, G3WS (183)
37	G2DDD, G2FNV, G2FZU (180), G6TA (300)
36	G2HOP, G3CXD, G6CB (312), G8IP
35	G3DLU, G3FZL, G3HCU (224), G3HWJ
34	G3BJQ, G3BKQ, G3DO (220), G8I3
33	G3IUD (120), G5MR (215)
32	G2FVD, G8VR, G8QY
31	G3FYY (156), G3HXO, G5RP
30	G3FRY, G3GOP (208), G3GVF (129), G3IER, G3IRA, G5NF, G8VN (121), GM3EGW, GW8UH
29	G3AGS, G3AKU, G3FJ (194)
28	G2CZS (135), G3FIH, G8DL, GM3BDA
27	G3DAH, G3ISA (160), G6GR
26	G2DCI, G3AEP, G3CFR (125), G3SM (211), G4LX, G4MR (189), GM3DIQ
25	G3JMA, G5SK
24	G3FD, G3FXG, G3FXR
23	G3CWW (260), G5PY, G6PJ, GW3GWA
22	G3AGR (135), G3ASG (150), G3BPM, G3HIL
21	G2AOL (110), G3IWI, G6XY
20	G3EYV, G3HSD, G3YH
19	G3FEX (118), G3GCX, G5LQ (176)
17	G8NM, GC2CNC
16	G3FRE
15	G2BRR, G3IWA
14	G2DHV, G3CYY

Note: Figures in brackets after call are number of different stations worked on Two Metres. Starting figure for this classification, 100 stations worked. QSL cards are not required to verify for entry into this Table. On working 14C or more, a list showing stations and counties should be sent, and thereafter added to as more counties are worked.

G3IWJ (Liverpool). Harold of G5YV found conditions pretty poor generally, but having worked GM3JDD/P for Roxburghshire, gets to 67/54 in the Counties Tables; from July 19, things began to brighten up, and on that evening he was getting strong signals from G1 and GM stations. An interesting development at G5YV is the opening of a regular schedule with PE1PL, at 1245 BST daily except Sunday; we shall look forward to hearing how this progresses.

G3JGJ (Plympton, S. Devon) and GC2CNC (Jersey) have made it, and GC2FZC (Guernsey) has also become a regular contact for G3JGJ, who has now heard G3GHC (Kidderminster) as his best reception to the North; the northerly French stations are fairly easy for G3JGJ.

That GDX Distance

There has been a slight querying of the distance we attributed in our last to the G2FJR-GM3ANG contact, which we gave as 496 miles; and G2FJR himself was a bit puzzled to see it subsequently quoted (not in "VHF Bands") as 550 miles. There always seems to be a bit of hair-splitting about these new-record distances, and all we can say is that we invariably take the greatest possible care to get them right, by measurement on large-scale maps and, where necessary, by calculation. In this case, the possible margin of error *plus* or *minus* is not more than three miles; in other words, it might be 493 or 499 (500 is near enough for practical purposes), but it is certainly not 550 miles from Sutton Bridge to Sumburgh; it should be remembered that Sumburgh, where GM3ANG is actually located, is 20 miles south of Lerwick, which is the QTH of GM3HGA. Though it looks a pin-point on a small-scale map, what is known as Mainland in the Shetlands is more than 50 miles long from north to south.

Anyway, try as your A.J.D. will, he cannot make it much over the 496 miles given on p.285 of the July "VHF Bands" !

While on the subject of DX, it might be mentioned that we have



"..... Worked any EDX lately?"

a report, not authenticated, that there may be a high-powered SP station on now, with the right equipment for working EDX if conditions open up. He is said to be looking for SM, PA and DL contacts—if he can get into PA, he should be audible in the South of England.

Calls Heard and The Tables

Once again, the number of movements claimed (more than 30) proves that there *has* been activity and that conditions *have* been good enough for GDX working at times during the month. There is daylight showing again between G3BW and G5YV in All-Time Counties, but Harold keeps well in front in the Annual table.

Which brings us to the important fact that Annual Counties closes for the year at midnight on Tuesday, August 31. As usual, the final placings for this Table will appear in our October issue, giving a comparison of the results with previous years. Will all interested please be good enough to let us have their latest claims for Annual Counties as soon as possible after August 31—*thank*

you! (And, of course, the Table re-opens again immediately for the year to August 31, 1955).

Incidentally, we again have the query about how the /P stations score when they work from different counties, though this time it is for VHFCC; the answer is that an operator appearing under the same call-sign in three different

**SEVENTY CENTIMETRES
ALL-TIME COUNTIES WORKED
Starting Figure, 4**

Worked	Station
23	G3BKQ
15	G2XV, G4RO
13	G3IOO
11	G5YV
9	G2HDZ
7	G2HDY
6	G3JMA
5	G3FUL, G3IRW
4	G2DDD, G3JGY

On working four Counties or more on the 70-centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

counties is three different stations, and he scores accordingly both in the Tables and for VHFCC. For U.K. scoring purposes, the counties of Eire are reckoned in the same way; for instance, EI2W gives a county as well as his country. The counties which are *not* reckoned for scoring purposes

TWO METRES

COUNTIES WORKED SINCE

SEPTEMBER 1, 1953

Starting Figure, 14

Worked	Station
54	G5YV
50	G4SA
48	G3GHO
45	G6XX
44	G3IOO
43	G3WW
41	G2FJR, G3CCH, G3EPW, G5MA
40	G2XV
38	G5DS
37	G2DVD
36	G3WS
33	G3DO
32	G2AHP, G5BM
30	G3FYY, G5ML
29	G3GVF, G3IRA
28	G2DDD, G3IUD
27	G2CZS, G3CUZ
26	G2FCL, G3BW, GM3EGW
25	G3FIH, G6TA
24	G5MR
23	G2HDZ, G3JMA
22	G3IER, G8VN
21	G3BJQ, G3JFR, G4RO
19	G3FUW, GM3DIQ
17	G3JHM, GW3GWA
15	G2AOL, G4AJ
14	G3FTJ

Note: This Annual Counties Worked Table opened on September 1st, 1953 and will run for the twelve months to August 31, 1954. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additions claimed need show only stations worked for each county as they accrue. QSL cards are not required for entry in this table.

are the administrative areas or districts, such as the County of Bristol (which is in Gloucestershire so far as we are concerned), or the Isle of Wight, which counts as Hampshire. The self-governing dependencies of Guernsey and Jersey, however, score as separate counties, and not simply as one under the GC heading; but, having regard to geography, Jersey and Guernsey do not count their own GC "Firsts" separately, since GC is an all-embracing prefix. (*Simple, isn't it!*—Ed.)

Some of these decisions may be slightly illogical, but they were made a long time ago on a sound basis of argument, and it is too late to make piece-meal changes now; in any case, whatever the argument (and we don't want to hear the one about Monmouthshire being a Welsh county!) and whatever the decision, it is the same for everybody and therefore fair to all.

There is a very good—and, we believe, interesting—spread of calls heard-and-worked this time, and there is no doubt that the "Activity Report" is carefully checked through by almost everybody who reads this piece. In fact, a lot of valuable information can be deduced from a study of the Activity Report, and we have no intention of dropping or curtailing it, though it does involve an immense amount of labour in its preparation. This month, your A.J.D. was lucky—nearly half the lists were written out in such a way that they could be pasted straight down. One doesn't want to waste space harping on this theme, but it is fair to ask once again for calls h/w lists to be written out on a sheet separate from the letter, arranged as you always see them in print. There are a certain number of valued correspondents who never fail to meet this requirement exactly—it would be of enormous assistance to your A.J.D., at the most critical period of the month, if everyone (or even nearly everyone) could do the same!

Finally, a note from G3WS (Chelmsford), who is anxious to get in touch with anyone able to transmit in the 1250 mc band—

the next one up after 430 mc, which is 85 megacycles wide and completely devoid of any amateur population. The G3WS receiver is a *pukka* superhet job, and apart from the fact that he has never had an external "air-wise" signal on which to test it, seems to be working well.

In Conclusion

Once again we wind up with sincere thanks to a large group of correspondents, hoping each will

TWO-METRE FIRSTS

G/DL	G3DIV/A-DL4XS/3KE	5/6/50
G/EI	G8SB-EI8G	23/4/51
G/F	G6DH-F8OL	10/11/48
G/GC	G8IL-GC2CNC	24/5/51
G/GD	G3GMX-GD3DA/P	29/7/51
G/GM	G3BW-GM3OL	13/2/49
G/GW	G5MQ-GW5UO	22/10/48
G/HB	G6OU-HB1IV	12/9/53
G/LA	G6NB-LA8RB	29/6/53
G/ON	G6DH-ON4FG	25/9/48
G/OZ	G3WW-OZ2FR	1/6/51
G/PA	G6DH-PA0PN	14/9/48
G/SM	G5YV-SM7BE	1/6/51
GC/DL	GC3EBK-DL3VJ/P	22/3/53
GC/EI	GC2CNC-EI2W	8/10/51
GC/F	GC2CNC-F9OK	17/11/53
GC/GW	GC2FZC-GW8SU	16/6/54
GC/ON	GC3EBK-ON4BZ	4/3/53
GC/OZ	GC3EBK-OZ2FR	2/3/53
GD/EI	GD3DA/P-EI2W	30/7/51
GD/GM	GD3DA/P-GM3DAP	29/7/51
GD/GW	GD3DA/P-GW5MQ	28/7/51
GI/EI	GI3GQB-EI2W	13/6/51
GI/GD	GI2FHN-GD3DA/P	29/7/51
GI/GM	GI2FHN-GM3OL	1/7/49
GI/GW	GI2FHN-GW3ELM	8/7/49
GM/EI	GM3BDA-EI2W	12/6/51
GM/ON	GM3EGW-ON4BZ	21/11/53
GM/PA	GM3EGW-PE1PL	22/4/53
GW/DL	GW5MQ-DL4XS	22/9/51
GW/EI	GW2ADZ-EI8G	19/4/51
GW/F	GW2ADZ-F3LQ	14/5/50
GW/HB	GW2ADZ-HB1IV	14/9/53
GW/ON	GW2ADZ-ON4YV	13/5/50
GW/PA	GW2ADZ-PA0HA	13/5/50
GW/SM	GW2ADZ-SM6QP	1/7/53
DL/OZ	DL6SW-OZ2FR	4/3/51
DL/SM	DL2DV-SM7BE	10/3/51
EI/DL	EI2W-DL3VJ/P	29/8/52
EI/ON	EI2W-ON4BZ	21/9/51
EI/PA	EI2W-PA0FC	10/10/53
ON/EI	ON4BZ-EI2W	21/9/51
ON/GM	ON4BZ-GM3EGW	21/11/53
ON/LA	ON4BZ-LA1KB	4/7/53
ON/LX	ON4TR-LX1MS	? ?
ON/OZ	ON4BZ-OZ2FR	3/6/51
ON/SM	ON4BZ-SM7BE	2/3/53

70-CENTIMÈTRE FIRSTS

G/DL	G2WJ-DL3FM	10/8/53
G/F	G3DIV/A-F8GH	5/9/51
G/GD	G2JT-GD3DA/P	26/8/51
G/GW	G4LU-GW2ADZ	5/7/50
G/ON	G3DIV/A-ON4UV	15/10/51
G/PA	G3DIV/A-PAPON	15/10/51
GD/GW	GD3DA/P-GW5MQ	29/7/51
GI/GD	GI3QB-GD3DA/P	14/6/53
GM/GI	GM6WL/P-GI3FWF/P	9/9/53
GW/EI	GW2ADZ-EI2W	10/7/54
GW/ON	GW2ADZ-ON4UV	3/3/53
GW/PA	GW2ADZ-PA0NL	1/7/53

feel that A.J.D. has done him justice, and that the story as a whole makes a useful and interesting report on VHF happenings generally.

Though the HB's should be in full blast by the time you see this, it is, of course, being written some days before they were due to appear—so we can only hope that things are working out as planned, and that many G/HB contacts are being made on both VHF bands. At any rate, the Swiss party had ample advance information from us as to the scale of G activity to be expected, the most convenient times they could be on, and where to look for G signals—which means *not* between 144.00 and 144.10 mc only!

Dead-line for the September



When the G3GVF party was out portable on Hannington Hill on June 6 last, they had a generator power supply driven by the engine of a hand-cultivator. Here is old timer G6OU setting the throttle.

issue must be **Monday, August 16 certain**, addressed A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London,

S.W.1. With you again on September 3, all being well, when we hope to be writing about a spell of C5 conditions!

"NEW QTH'S"

This is a regular feature, in which we publish the callsign, name and address (and changes of address) of licensed U.K. amateurs as they come on the air. Any G operator is entitled to appearance in "New QTH's" on sending us the details, which are also incorporated in the G listings in the *Radio Amateur Call Book*.

CALL BOOK—SUMMER EDITION

The summer edition of the *Radio Amateur Call Book* includes a 22-page G Section listing some 8,000 licensed amateurs in the U.K., shown alphabetically by callsign, name and address, and includes all those given in our "New QTH" feature up to its most recent appearance, in the May issue of *Short Wave Magazine*. These G listings are, of course, only one part of the *Call Book* proper, which gives the callsign/address of every known amateur throughout the world. The price of the *Radio Amateur Call Book*, in the latest (Summer) edition, is 27s. post free, or 10s. without the American Section. We are sole agents for the *Call Book* in Europe and the U.K., and copies can always be obtained from us, from stock. Orders to: Publications Dept.

BACK NUMBERS

At present, some back numbers are available for each month of Volume XI—March 1953 to February 1954. But for previous years, back numbers are few and far between, and of the early post-war issues none are now left.

* * *

STANDBY TRANSMITTERS FOR SUTTON COLDFIELD

The BBC announces that medium-power standby transmitters, with an output of 5 kW Vision and 2 kW Sound, have now been installed at the Sutton Coldfield Television Transmitting Station. Switching is provided so that they can be used with either the main or reserve aerial systems.

This is a further stage in the plan to instal such transmitters at the main television stations, and when the standby equipment now under installation at Alexandra Palace is completed all stations will be able to maintain the service on reduced power in the event of a major breakdown of the main equipment.

The standby transmitters were manufactured by Marconi's Wireless Telegraph Company, Limited.

VHF WEATHER REPORT

PERIOD JUNE 19 TO JULY 16

A. H. HOOPER (G3EGB)

THREE evenings of limited EDX occurred late in June and a few isolated occasions in July. Inland super-refraction was quite frequent and will have been of especial benefit for 70 centimetres.

From the *Daily Weather Report* of the Meteorological Office, the period began with high pressure to the South and weak frontal systems crossing the British Isles, to be followed later by an unseasonable blast of Arctic air from the North. Unsettled westerly conditions then set in with depressions alternating with brief ridges of high pressure. Occasional summer days occurred but in the absence of static anticyclonic weather no major DX spell developed.

The main part of Table I shows the VHF DX openings thought to have materialised along certain directions from South-East England. They are assessed from the results of radio soundings reported in *The Daily Aerological Record* of the Meteorological Office. The evenings June 22-24 yielded good chances for the southern sector, some (indicated by underlining> being exceptional. Propagation extensions to the East and South-East were also possible during these evenings.

As usual, the first line of the Table suggests the inland extensions due to enhanced refraction in the lowest layers of the atmosphere. This condition arises from cooling of the air near ground level and develops on calm clear evenings. The figures give the GMT when the effect reached a maximum. The two evenings July 3 and 4, for example, were particularly good, with range continuing to improve until well after midnight.

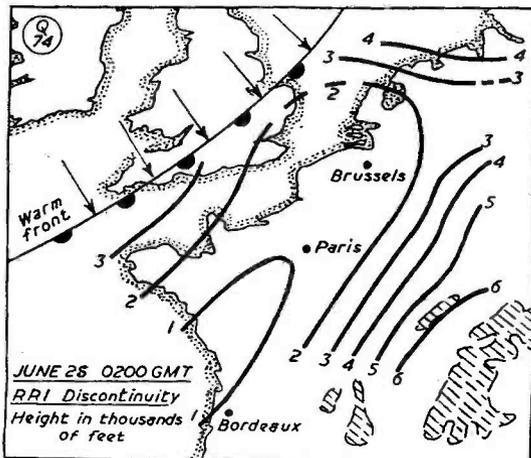


Fig. 1. A later stage of the layer which yielded limited openings for June 23/24. Confined between a warm front and the Alps, it appears to be tilting progressively upwards over the high ground.

Not brought out by the Table, which is for South-East England, are openings for GI/GM on June 28, 30 and for Shetland to GM on July 1. These were briefly occurring opportunities, as have been most other chances this year.

Fig. 1 shows the "reflecting" layer which governed EDX for the evening of June 24. It yields the corresponding entries of Table I together with additional information. The major axis of the layer lies from over Biscay for 500 miles north-eastwards to Holland. It was limited by the Alps on one side and by a warm front on the other. The layer was moving South-eastwards and had been centred over the British Isles for the previous evening. By the following evening it was well clear of us to the South-east. There is evidence that as the system drifted towards the Alps it became tilted in conformity with the steepening ground contour, thereby tending to maintain a constant height above ground level. A suggestion of this effect was observed last year (*Short Wave Magazine*, December 1953, p.621).

Pressure values as an indicator of "Nil DX" are continued for the period in Fig. 2. Pressure was somewhat less than 1018 mb on two occasions when the possibility of EDX has been shown in Table I. Results for these evenings, July 2 and 10, will be of especial interest as it may be necessary to revise the critical pressure to a lower value.

Discontinuities

For well over a year, now, we have been looking at the weather and associating VHF DX with the atmospheric conditions which comprise radio refractive index discontinuities. These are kinks in an otherwise smooth vertical gradient of RRI. We hope for such kinks to exist over extensive areas and when they do, we experience extensions of VHF range in a manner suggesting a scattering or reflection process at the discontinuity layer. We have seen how such layers change their height in space and time. Overdue, perhaps, is a picture of vertical RRI structure showing these discontinuities.

With this in mind, Fig. 3 had been prepared. In each of the four sections the pecked line gives the air temperature, the thin full line represents the moisture present, while the heavy full line is the refractive index resulting. All are actual cases from last year, selected to illustrate various features.

In the first section a temperature inversion of 13 degrees Fahrenheit is shown, lying between the levels 1700 and 2900 feet above MSL. The main feature for the water vapour curve is a marked reduction between 1900 and 2100 feet which does not exactly coincide with the temperature inversion. Thus we have warm dry air overlying cooler, moister air—a highly desirable state of affairs. The resulting refractive index structure appears as the usual decrease with height—giving a slight measure of downward bending—until at 1900 feet aloft the decrease (and hence downward bending) becomes much more rapid, and continues to a height of 2100 feet. Thereafter the normal rate of decrease is regained. It is at once apparent that this RRI discontinuity is associated not with the temperature inversion but with the moisture structure. The marked rate of decrease is sufficient, in fact, to establish a duct from 1650 to 2100 feet. For a transmitter between these two

Date	JULY																												
	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Radiation over Bedfordshire	03	02	—	02	03	23	—	04	—	—	—	—	—	01	03	02	03	04	04	—	—	—	05	05	05	21	—	—	—
NE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E	—	—	PA	WD	WD	WD	—	—	—	WD	—	—	PA	—	—	—	—	—	—	—	—	PA	—	—	—	—	—	—	—
SE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
S	45	—	—	48	45	43	—	—	—	—	—	—	47	—	—	—	—	—	—	—	—	49	—	—	—	—	—	45	—
SW	GC	—	—	GC	GC	GC	—	—	—	—	—	—	GC	—	—	—	—	—	—	—	—	GC	—	—	—	—	—	GC	—
NW	L	—	—	L	L	—	—	—	—	L	—	—	—	—	—	—	—	—	—	—	—	M	—	L	—	—	—	—	—

Discontinuities aloft, from S.E. England to countries indicated.

Table 1

The possibilities for EDX and GDX from June 19 to July 16. Especially good dates are shown in bold type and are underlined. Country prefixes show approximate direction and distances from S.E. England to which good conditions are thought to have extended.

- Notes:—(1) Conditions listed are for the evenings of the dates shown.
 (2) Figures in the first line are the times when inland super-refraction had reached its peak.
 (3) Country prefixes indicate the approximate limit of good conditions.
 (4) Sub-divisions of distance have been necessary, thus:
 ED = eastern DL, WD = western DL, L = Lancashire, I = GI, and M = G.M. (Sometimes paths to I and M are open together).
 (5) For the southern path degrees of latitude are given.
 (6) Paris is about 49° and Marseilles about 43°N. Particularly marked discontinuities are in heavy type and have been underlined.

levels and radiating energy at a wavelength, in this case, of less than about 75 centimetres a great extension of range was possible. For all VHF transmitters, regardless of wavelength, situated below 1650 feet no ducting was possible. For them the sudden kink (discontinuity) at 1900 feet was, however, useful in scattering energy and it is this effect upon which we normally rely.

In the second section we have an inversion from 5100 feet of 14°F — greater than in the previous example. Moisture, however, increases through this inversion by such an amount that its slightly beneficial effect is completely overwhelmed and the RRI gradient kinks in the opposite sense. Although, theoretically, scattering from this reversed kink is just possible this has not, in the past, proved to be a useful condition.

Since moisture increases are capable of counteracting temperature increases, there must be a critical condition where the magnitudes exactly counteract each other and the RRI gradient continues unchanged through the levels concerned. Section III is a very near shot at this, with moisture compensation for a 5-degree inversion of temperature lying at 3000 feet.

From these figures it is quite obvious that moisture is the important factor.

It is worth noting that the duct in Case I of Fig. 3 arises from warm dry air settling down from high levels on to cooler moister air beneath. It is this structure, extending over vast areas, that yields our EDX records. It is often associated with stationary anticyclones.

A further point is that all three temperature inversions are associated with frontal surfaces — the boundaries between different masses of air which give us so much rain. The overlying dry air of Case I is actually beneath the frontal surface and it is occasions like this which, the writer believes, give rise to claims of reflection from a frontal surface. They are, it is thought reflections from a zone of dry air, occasionally present immediately beneath the frontal surface.

For these three different fronts we have: Case I a good discontinuity, Case II a "reversed" discontinuity and Case III a nil effect. A demonstration of Nature in her variety!

[over

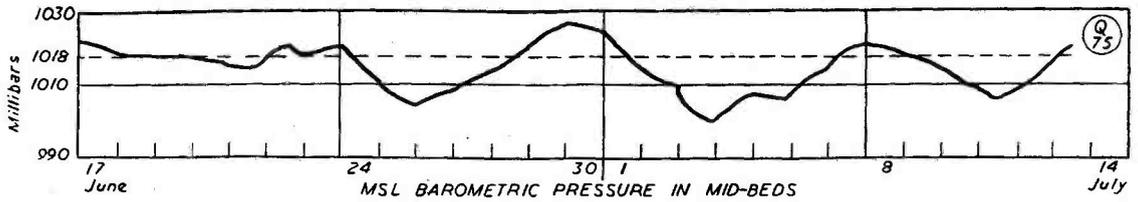


Fig. 2. Here we see how, for the first time, the pressure graph was below 1018 millibars for occasions when, from the Table, conditions were such as to give openings. The results obtained on the evenings of July 2 and 10 will require careful scrutiny in case the "critical pressure" of 1018 mB needs to be revised.

Middle East

Case IV gives a midsummer condition over the Persian Gulf. Hot dry desert air has been somewhat cooled in the surface layers by contact with the sea and has taken up a great quantity of moisture. The tremendous decrease of moisture with height and the immensely powerful surface duct (for wavelengths of less than about 1½ metres) is very evident. MB4 to Basrah at 350 miles is a certainty even for appreciably longer wavelengths and one wonders whether inland extensions to Baghdad (650 miles) are possible at night-time. Less intense examples of this type are likely in the Mediterranean basin.

Finally, consider the two ducts of Cases I and IV. Their vertical extents are much the same and consequently

the greatest wavelengths affected by them are of the same order. However Case IV is obviously much more powerful. The difference between the two cases is in the arc over which energy is trapped. Thus, the European example can trap rays radiated over an arc of plus or minus 0.3° from the horizontal, while with the second example rays over an arc of plus 0.9° from horizontal are trapped. Obviously the latter condition is considerably superior even though being at the surface limits the arc to positive angles. Were it to be wholly aloft then the arc could extend downwards to minus 0.9° and would then be three times as great as the European example.

Acknowledgement is due to the Director, Meteorological Office, London for permission to make use of information gained from the publications mentioned.

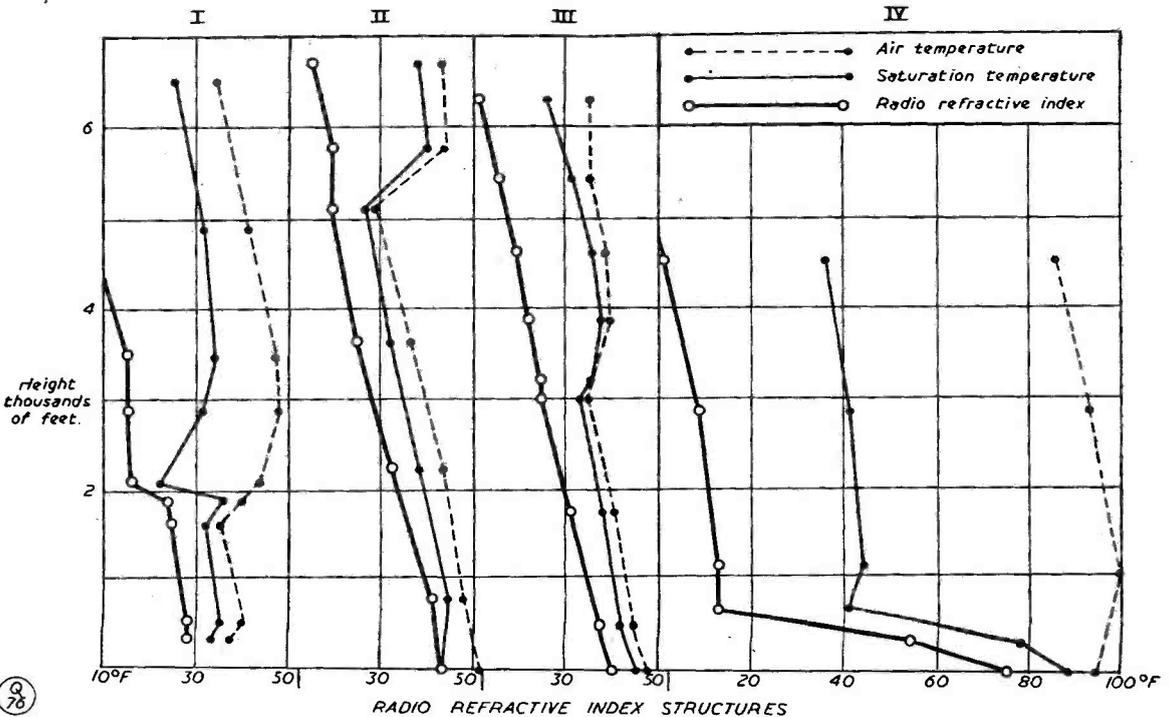


Fig. 3. As explained in the text, these graphs show how varied, from the radio view-point as well as for their effects upon our weather, warm fronts can be. Section IV shows intense duct conditions as experienced in the Middle East.

Element Length for VHF Beams

OBSERVATIONS ON STACKED ARRAYS AND YAGIS

H. E. SMITH (G6UH)

The stacked array and Yagi flat-top have become more or less standard types for VHF operation, but we still have something to learn regarding these systems. The notes following have been compiled from experiments carried out by our contributor with the object of determining the reason why so many operators have difficulty in obtaining a good workable standing-wave ratio (SWR), in spite of careful construction and many hours spent in studying the instructions for matching as given in the book.—Editor.

UNLESS the aerial system is fully efficient, one will never obtain satisfactory results on the VHF bands. The height, size, or type of aerial are, relative to efficiency, unimportant. The hardened Old Timer having operated on the LF bands for many years, may suddenly get the urge to have a stab at VHF. Aerial technique on the LF bands has been no stumbling block for him, so all he has to do is to consult his Handbook for the formula to apply for VHF aerial construction, and proceed to construct his beam. Then comes the period of perplexity and frustration! Lack of "draw" from the transmitter, a high standing-wave ratio, few contacts, and poor results generally. After a month or so he usually returns to his old haunts on Twenty or Forty, and one hears comments such as "VHF is a dead loss at this QTH, OM." Now where did this OT go wrong? His feeder was of the highest quality, his knowledge of matching systems was good, and he could work out the radiation resistance almost to within a few ohms. The trouble was that he had forgotten something, in fact, he had probably forgotten two things. First, that the resonant length for a VHF radiator decreases as the diameter of the material used is increased. Secondly, the

5500

formula — as given for VHF aerial construction applies only to aerials constructed of wire. As our friend had probably used $\frac{1}{2}$ "

or $\frac{3}{4}$ " tube for his array, it was most probably resonating well outside the band.

Example

Let us deal with one particular case. Experiments carried out with an 8-element stack constructed of $\frac{1}{2}$ " dural with the elements cut to the formula as above showed that the SWR went down and the field strength of the radiated signal went up as the frequency was lowered. The array had been designed to resonate at 145 mc and much time was spent in constructing a matching section to produce the lowest SWR at the band centre. The array was so badly off resonance that a second matching section had to be constructed before any reliable figures could be obtained at 144 mc, thus proving that the adjustments made at 145 mc were false. It is quite easy to mask a high SWR by "fiddling" the matching section, especially if it is a linear (Q-bar) type for balanced feeders.

It was thought at one time by many (including the writer) that a VHF stacked array was such a wide-band affair that it was immaterial whether the elements were 38, 39, or 40 inches long. The conclusion now is that there is an optimum operating length, which is quite critical if maximum results are required.

It may be of interest at this point to look at some loss figures and see how easy it is for losses to be present, almost without one knowing it. Reference to a Power Loss Chart will show that a 1 dB feeder loss will cause a 20% reduction in transmitted (or received) power-voltage. If a SWR of 3:1 is present on the aerial system, and this is by no means uncommon, the loss increases by a further 10%, making a total loss of nearly one-third of the

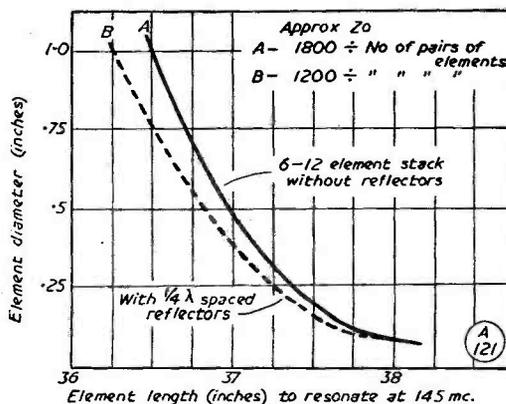


Fig. 1. Element length in inches against diameter of the element material for resonance at 145mc under (A) and (B) conditions as discussed in the text.

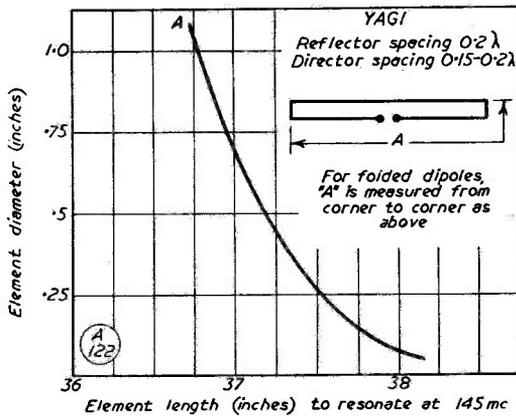


Fig. 2. Curve for the design of Yagi flat-tops, showing how the length for resonance at 145 mc decreases with the larger diameters for the element material.

power. Taking this still further, if there is a 2 dB feeder loss and the SWR is 4:1 only 20% of the available power is radiated. Applied to receiving, this means that only *one-fifth* of the signal will arrive at the input to the converter!

The Stack

(The veteran VHF type will forgive the writer for mentioning some well-known facts now and then, but these are for the benefit of the newcomer to two metres.)

As stated earlier, the formula given in most Handbooks for half-wave VHF aerials is

— = inches, applying to wire elements up

f to No. 12 SWG. As the diameter of the conductor increases, capacitance to earth and/or nearby objects, together with "end effects," causes a slowing down of the wave along the surface of the radiator. This "velocity factor" increases as the diameter of the radiator is increased.

The chart (Fig. 1) shows how element length varies with diameter when a number of elements are used in a stacked array (6 to 12 ele.). The chart does not take into account every individual case, and it may well be that earthed objects near to the stack may necessitate a further shortening of the elements by as much as half-an-inch. As will be seen, the chart gives lengths of radiators for stacks with or without quarter-wave spaced reflectors.

The Yagi Beam

The reduction of standing waves on Yagi beams is usually not so difficult, because if the radiator happens to be slightly too short

or too long, adjustment of the reflector or director spacings will compensate for the error.

At the same time, however, the performance of the beam will not be "according to the book," and unless the radiator itself is of the correct length to start with, there will be loss of gain and quite possibly a distortion of the polar diagram with much of the radiated power dissipated in minor lobes.

When constructing a Yagi beam it is most important that *all* the elements be made adjustable, *i.e.*, telescopic end sections. The order of priority for adjustability is as follows: The radiator, the first director, the second director, and last, the reflector.

As with the stacked array, the radiator length varies with the diameter of the material used. If a folded radiator is employed with two sizes of tubing, the larger of the two is the one which affects the length. The chart (Fig. 2) is offered as a guide and starting point for tuning up a three- or four-element Yagi. It should be noted that this chart only applies where the reflector spacing is 0.2 wavelength, and the director spacing 0.15 to 0.2 wavelength. Having ascertained the correct radiator length from the chart, make the reflector 5% longer, the first director 5% shorter, and the second director (if four-element) 7% shorter than the radiator. You are now in the best position to start the tuning-up procedure. (If you happen to be receiving only, further adjustments may not be necessary, but it might be a good plan to adjust the length of the director on a weak signal if you can find someone to transmit for you.)

In conclusion, the writer would stress that all the figures quoted above were derived experimentally and are offered as a guide to those who may be experiencing difficulty, and for the information of those who are considering a QSY to the two-metre-band.

BIBLIOGRAPHY OF COLOUR TELEVISION

The vast mass of technical information on the subject of Colour Television is contained in more than 50 British, American and foreign periodicals, which between them have published the work of some 250 authors. Starting with the list originally prepared by the librarian of Ultra Electric Ltd., the Television Society has performed a great public service to the radio industry and all interested in Colour TV by compiling an extensive bibliography—itsself running to 16 pages and complete to April, 1954—giving all the necessary references to these papers. The price of *A Bibliography of Colour Television* is 2s. 6d. post free, of the Honorary Secretary, The Television Society, 164 Shaftesbury Avenue, London, W.C.2.

IT may seem to some readers that we spend an undue amount of time in criticising the habits of operators on the air. Remember, though, that Amateur Radio can only be judged in terms of *what is heard*. Its main purpose is communication; all experimental and constructional work is carried out with this one purpose in view. The most fantastically elaborate gear will not communicate with anyone unless it is wielded by an operator. Thus it has always seemed strange and somewhat illogical to us that so many devotees of our hobby are technical wizards, constructional geniuses, theoretical paragons — but more than a bit dim when it comes to operating their own brain-children! Now we are not being either supercilious or derisive, but genuinely concerned with the improvement of our own status and conditions. Last month we propounded a plan for halving the QRM (by talking half as much!) and we still think there is far too much wind about. So much time on the air is completely wasted on saying nothing.

THE TERSE REPLY

There is a famous story of a CW operator, which we have heard from many people and in many forms. The gist of it, however, is this: A commercial operator had missed his usual date with World's Press News, or some similar news service, and a colleague on another station, to help him out, transmitted for his benefit the entire thing, which would probably fill three newspaper columns of small type. It took upwards of an hour to send (and at no mean speed). Our operator copied the whole lot without trouble, and at the end of it all his acknowledgment, very correctly, was "R." Just that and nothing else! Compare with the habits of the amateur, always ready to acknowledge three minutes of slow sending with "RR OK FB solid." Let us remember that "R" means "Message received and understood;" use it for just that purpose and never, *never* commit the crime of saying "R R most OK



but please repeat your name," or some such nonsense. That little letter "R" has a most important meaning, and needs no garnishment whatever.

CRYPTIC PHONES

It really would do us no harm to use more plain language on phone. The dropping of some of the comic phonetics and misused Q-signals could do nothing but good (from the readability point of view) and would certainly give us more of an adult standing with those listeners who justifiably remark that they are not interested in the amateurs because they all talk gibberish. Now and then one hears a contact (notice that we didn't say a QSO!) between two phone stations, both talking ordinary English, and how refreshing it is! "There's a little static on the band, some interference but you are readable all the time at terrific strength. A little fade now and then, but not more than two points." Is that so *very* much longer or more difficult to understand than "There's a bit of Q R Norway and some Q R Morocco but you are R 5 and S 9 with QSB to S 7?" Maybe the latter sounds clever to some, but to most listeners it is just so much Gobbledy - gook. Furthermore, our pet jargon is very misleading at times.

CRAZY CALL-SIGNS

It is with station identification that we really let ourselves down badly. Take a specimen but

imaginary station, say G3PTO. If he were to announce himself as just that—G Three P T O—he ought to be clearly understood by all and sundry. But no! it has to be "George Figure Three Portugal Texas Ontario," and so some innocent listener outside the fraternity comes to us and says "I heard a Portuguese station talking English last night . . . I think his call was George Figure Three—what does that mean?" And another unfortunate hears a station which he describes as "Dog Love Four, America, India." Is he in India or America? (Nobody ever mentioned a word about Germany.) Now of course we know all the answers and seldom make a mistake in identification; but are not the amateur bands our shop-window, wherein we display all that goes on? And, whoever may or may not be listening, is it a good thing to make ourselves ridiculous at any time or in any way?

GOOD TIME COMING?

What will the next spell of really good conditions bring to us? Last time the DX bands were right on top of their form was in 1947-48, when their occupancy was quite thin compared with the present day. This leads some to predict that the interference (QRM to you!) will become shocking and that we shall all be longing for the good old days of bad conditions. We do not think so. Nothing but good can result from the opening up of the 21 mc and 28 mc bands once more; count the American 'phones in the latter band on a good day and reflect that most of them might be somewhere else if the band weren't open. Of course a return of very good conditions will bring many operators back on the DX bands, to the detriment of their gardens and household chores, but one must remember that the locals will not be so troublesome by then. Imagine the twenty-metre band *full* of DX, with no short-skip from OH, SM, LA, YU, I, DL and the rest. We can take good conditions!



Letters to the Editor

Letters published are those which seem to us to be of general interest, but should not be read as necessarily being in accordance with our own views on the subject. We welcome readers' comments.

ANOTHER SLANT ON TVI

SIR,—*May I draw your attention to the fact that the BC sound and television receiving licences both lay it down, in the "Conditions" on the back, that the apparatus shall not cause interference with any other station. If the GPO were to enforce these conditions, it would mean that a TV receiver owner could be closed down for (a) Interfering with his neighbour's reception of the BBC Light Programme on 200 kc, and/or (b) Scattering oscillator harmonics in the amateur bands. It would seem that legal action could be taken and an injunction obtained to mitigate the nuisance in any instance where a TV receiver is causing interference!*

J. W. Robinson, GSUP, High Westhouse, Via Carnforth, Lancs.

GSUP is quite right. The fact is that TV receiver owners—who have hitherto been given far too much official consideration in the matter of TVI—must learn to accept a certain amount of interference as being inherent in the whole situation. Where amateur-caused TVI is the issue, this is fair enough, as amateurs themselves have always had to tolerate a high level of unauthorised interference on their bands. We referred editorially to the problem of mutually antagonistic radio apparatus and electrical appliances as long ago as May and July 1953. Since then, the general interference problem has got worse (and will get much worse) without amateurs being in any way responsible. For the future of Amateur Radio, every complaint of amateur-caused TVI, official or unofficial, should be challenged until TV receivers themselves (a) Do not radiate interference, and (b) Do not accept signals on any

but authorised TV channels. If this is impossible, then TV receiver owners cannot expect a clear screen every time they care to switch on. In the meantime, it is a matter of "Live and let live," and any amateur who has taken all the necessary precautions to keep his transmissions strictly within his own bands should not allow himself to be bothered by complaints about TVI.—*Editor.*

QSL's FOR SWL's

SIR,—*As a keen listener, I recently went to the trouble and expense of having a number of QSL cards printed. At first, I sent these out with no return postage; result, 40% response. Then, with return postage enclosed, there was an increase to 70%. What of the remaining 30%? Nothing. I do think that amateurs should say so if they do not QSL listeners. Instead, they leave one wondering. I always allow three months to pass before writing "hopeless" in the log. And I should add that all my cards are sent direct. It may be that amateur transmitters have too many of their own contacts to QSL, without having to send cards to SWL's. One G operator I heard actually had the nerve to admit that he had over 2,000 cards owing for contacts! Any amateur in such a situation should go QRT until he is once more "in the clear."*

A. R. Williams, 24 Marlborough Road, Ipswich, Suffolk.

Many readers, listeners and transmitters alike, would say that SWL Williams is doing very well to achieve a 70% return, even with return postage enclosed. The problem of non-QSL'ing has been with us for years, and is ventilated at regular intervals. Acres of

print have been devoted to the subject of instructing SWL's in the art of QSL'ing. But no matter how careful and selective they are in their reporting, the melancholy fact is that QSL'ing has tended to fall into disrepute since so many active operators (who have as much as they can do to keep up with cards owed for their own contacts) have become the targets for so many SWL reports. Fortunately, there are numerous amateurs who gallantly honour the tradition of QSL'ing for every card and SWL report received—but they are in the minority, since many operators no longer feel under any obligation to QSL unasked-for listener reports, unless they are of exceptional DX interest or experimental value.—*Editor.*

SPARE OUR BLUSHES

SIR,—*Will you please QSP to your very able contributor "Old Timer" a large bouquet for his recent series of articles on Aerials. I have read quite a lot of literature on the subject over the past 20 odd years, but none of this has anywhere near equalled "Old Timer's" offering. His literary skill makes an open book of the technical mysteries of the sky-wire. Could one hope for a similar attack on modulation systems?*

J. R. Simpson, ZC4CA, Box 216, Famagusta, Cyprus.

SIR,—*May I say that we in Australia look forward each month to SHORT WAVE MAGAZINE, particularly the articles on VHF, as we find that they are so realistic in their design approach.*

W. E. McGawan, VK2MQ, 12 Clyde Street, Rydalmere, Sydney, N.S.W., Australia.

RADIO OBSERVATIONS DURING SOLAR ECLIPSE

SIR,—I would very much appreciate it if you could bring the following to the notice of your readers: An annular eclipse of the sun is to take place over South Africa on December 25 (Christmas Day) this year, with Grahamstown in the path of full annularity. The Physics Department here will be making a study of the effect this eclipse may have on the ionosphere; at the same time, through the medium of Amateur Radio, it is hoped to study the effect of the eclipse on long-distance radio communication. The period of the eclipse will be 0430-0925 GMT, and the travel from West to East. It is hoped, should the support of the radio amateurs of the world warrant it, to have transmitters running continuously, under call-sign ZS2RU, in the 7, 14 and 21 mc bands throughout the eclipse period.

To carry out this experiment effectively, the support of many amateurs and SWL's will be required, and all who are willing to take part are asked to write to the address below before 1st October, so that full information may be forwarded to them personally. This will consist of report sheets, which they will be asked to fill in, giving the signal strength of our transmissions at various intervals; at the same time, details of ZS2RU transmitting times and frequencies will also be sent.

I would like to ask for the support of all Amateur Radio enthusiasts and to add that this is probably one of the first occasions that Amateur Radio has been used for planned research observations of this kind.

A. P. Dale, ZE4JC-ZS2JW, Ionosphere Research Laboratory, Department of Physics, Rhodes University, Grahamstown, Cape Province, Union of South Africa.

PAGES FOR THE SWL

SIR,—With regard to your Editorial in the May issue, and to the subsequent correspondence, I should like to say that I am dead against any lowering of the standard of SHORT WAVE MAGAZINE, and against having any extra pages for the SWL at extra cost for all other readers. After all, there are periodicals of a more elementary nature, and if the SWL cannot find one of these to suit him and really desires ultimately to take the Radio Amateurs' Examination, he cannot do better than to work through the very admirable correspondence course which is regularly advertised in your pages. That is how I myself passed the R.A.E., starting from scratch, and although I did it in three months, there is no reason whatever why the course (and the very moderate fee) should not be spread over three years, if necessary, as it may be taken as fast or as slowly as one desires. The magazine that attempts to cater for all tastes generally finishes (in more senses than one!) by catering for none.

SHORT WAVE MAGAZINE is the amateur's magazine, and everyone I contact on the air seems to be a regular reader, so it would be a pity to disturb this happy state of affairs.

V. G. P. Williams, G3FYY, 49 Melrose Avenue, London, N.W.2.

HAMFEST IN HOLLAND

SIR,—The VRZA, the Radio Society of Transmitting Amateurs in Holland, will hold its annual Hamfest this year at a beautiful camp-site in Voorthuizen, halfway between Apeldoorn and Amersfoort, during the week-end September 25-26. Accommodation will be in bungalows, and all licensed amateurs, SWL's and their families will be very welcome. There is an extensive programme of entertainment, with dances, films and cabaret, together with lectures of radio interest, a DJF competition, an exhibition of modern equipment, and various demonstrations. The basic cost for the whole week-end, including all meals and sleeping accommodation, will be 10 Dutch guilders only, or £1 sterling. Further information will gladly be given by the undersigned, who will also be pleased to accept bookings from G visitors. This is an ideal occasion to see the other end of some of your contacts, and to meet other amateurs. As an extra attraction, it might be mentioned that there will be prizes for every 25th visitor and for those who come from the greatest distance.

E. Kaleveld, PA0XE, Claes de Vrieseland 153A, Rotterdam, Holland.

LATEST ARRL HANDBOOK

The current (31st) edition of the American Radio Relay League's *Radio Amateurs' Handbook* is a worthy successor to a long line of distinguished predecessors. For nearly 30 years, the *ARRL Handbook* has held its own against all comers as the practical guide to everything connected with Amateur Radio—design, construction, theory and operating, on the HF, VHF and UHF bands—and it is not an exaggeration to say that it is kept at hand by most of the amateurs in the world, and a good many professionals as well, who find in the *ARRL Handbook* the quick answer to many a design problem. In the course of the years, probably more than two million copies have been sold. (The total sales by the 24th Edition in 1947 were 1,600,000.) The earliest copy we possess is the second printing of the

third edition, dated 1928; the present edition has nearly three times as many pages, and even from a casual comparison one can see the tremendous advances there have been in the art of Amateur Radio in the course of 25 years. The price of the 31st Edition of the *ARRL Handbook* is 31s. post free, and it is available from stock from the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS

Whether you are buying, selling or exchanging, our Small Advertisement section will repay careful reading. If you have anything to advertise, try a notice in Small Advertisements. It will be cheap, effective and read in nearly every country in the world.

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. call signs, as issued, or changes of address of transmitters already licensed. All addresses published here are reprinted in the quarterly issue of the "RADIO AMATEUR CALL BOOK" in preparation. QTH's are inserted as they are received, up to the limit of the space allowance each month. Please write clearly and address on a separate slip to QTH Section.

G3HYH, S. Hay, 118 Gilda Brook Road, Eccles, Manchester, Lancs.

G3IHI/A, D. W. Auton, 20 Edith Road, London, W.14.

G3ITF/A, Cpl. Freeman, B. S., Air Radio Servicing Flight, No. 211 A.F.S., R.A.F. Station, Worksop, Notts.

G3JGL, J. W. Thwaites, 54 Bridge Street, Pershore, Worcs.

GM3JGQ, A. Rossi, 42 Kerr Street, Kirkintilloch, nr. Glasgow.

GM3JGQ/A, A. Rossi, 111 Townhead, Kirkintilloch, nr. Glasgow.

G3JIV, G. T. Vale, 6 Abbey Terrace, Abbey Wood, London, S.E.2.

G3JIX, K. Smith, 82 Granville Road, Walthamstow, London, E.17.

G3JLK, C. C. Jeffery, 11 Jubilee Road, Knowle, Bristol, 4.

G3JME, M. Watson, 7 Wreyfield Drive, Scarborough, Yorkshire.

G3JMV, G. Easton, 46 High Storrs Crescent, Sheffield, 11, Yorkshire.

G3JNC, G. E. Crook, 294 Sutton Road, Walsall, Staffs.

G3JNO, F. D. Buck, 6 Granborough Road, Winslow, Blechley, Bucks.

G3JNX, G. T. Green, 153 Winchester Road, Davyhulme, Manchester.

G3JPG, R. R. Parker, 57 Wilton Estate, Wilton Way, Dalston, London, E.8.

G3JPQ, M. Hutchins, All Saints Vicarage, Barton Street, Gloucester.

G3JQP, F. Brown, 72 St. Mary's Road, Ilford, Essex.

G3JRQ, R. Hobson, 8 Peter Street, Hazel Grove, Cheshire.

G3JSN, J. C. Beal, 22 Crown Street, Harrow, Middlesex.

G3JSQ, J. N. Buckland, Purley Hospital, Brighton Road, Purley, Surrey.

G3JVM, R. H. Medcraft, 198 Harrow View, Harrow, Middlesex. (Tel.: HAR 7026.)

GM3JWM, W. Morris, 12 Shrub Place, Edinburgh, 7.

CHANGE OF ADDRESS

G2CZM, A. G. Pruden, 18 Market Square, Chesham, Bucks. (Tel.: Chesham 1115.)

G2FRG, K. D. Ayers, 56 Southgate Street, Gloucester.

G3AST, J. A. Plowman, 146 Ashcroft Road, Stopsley, Luton, Beds.

G3BRU, W. Priestnall, 8 Coast Road, Marske-by-Sea, Redcar, Yorkshire. (Tel.: Redcar 3144.)

G3BRV, R. C. Bennison, 75 Aylesbury Road, Wendover, Bucks. (Tel.: Wendover 3337.)

GM3BXV, T. Rutherford, Allandale, Turner Street, Keith, Banffshire.

G3CIF, J. F. Rogers, 5 Thornhill Court, Upper Deacon Road, Bitterne, Southampton, Hants.

G3CXJ, R. Davies, 9 Naseby Close, Paulsgrove, Cosham, Portsmouth, Hants.

G3DXI, R. C. Scott, 29 Barnes Road, Skegness, Lincs.

G3FRO, M. H. Hudson, 1 Eastleigh Croft, Walmley, Sutton Coldfield, Warwick.

G3FWB, P. L. Hunt, 3 Meadow, Weston Favell, Northampton.

G3HBG, K. M. Bearcroft, 59 Westlands Way, Oxted, Surrey.

G3HJP, G. Cooper, 73 Easterley Crescent, Upland Road, Leeds, 8.

G3IEX, D. J. Roper, 11 A.M.Q., R.A.F. Station, Wartling, Bexhill-on-Sea, Sussex.

G3IFD/A, T. Carlisle, 213 Runley Road, Luton, Beds.

G3IGD, D. S. K. Coulter, 12 Haypark Avenue, Belfast.

GW3ILZ, T. E. I. Bromham, Glen Haven, Clasemont, Morriston, Swansea, Glam.

GW3IMQ, L. M. Miles, 76 Vicarage Road, Morriston, Swansea, Glam.

G3IPZ, D. A. Allen, 4 Carton Avenue, Poynton, Stockport, Cheshire.

G3ITB, T. H. Bartlett, 29 Castle-gate, Richmond, Surrey.

GM3ITE, R. Costford, 215 Flemington Street, Springburn, Glasgow, N.

G3IUW, L. Pritchard, 50 Byron Avenue, Cranford, Middlesex.

G3JBI, H. W. Parnell, 49 Charlton Crescent, Barking, Essex.

G3JFF, M. J. Matthews, Flat 3, Inverdart, Kingswear, S.Devon.

G4BB, M. Storey, 104 Stanfell Road, Leicester.

G5AO, A. E. Lambourne, 18 Sherbourne Close, Hangleton, Hove, Sussex.

G5DQ, P. J. Broom, 7 Flamsteed Road, Cambridge, Cambs.

G6XA, H. J. Withers, 60 Greatheed Road, Leamington Spa, Warwicks.

G8IX, G. H. Tagg, 11 Bottleslow Street, Hanley, Stoke-on-Trent, Staffs.

G8KP, W. T. Pickard, 46 Thornes Road, Wakefield, Yorkshire. (Tel.: Wakefield 3548.)

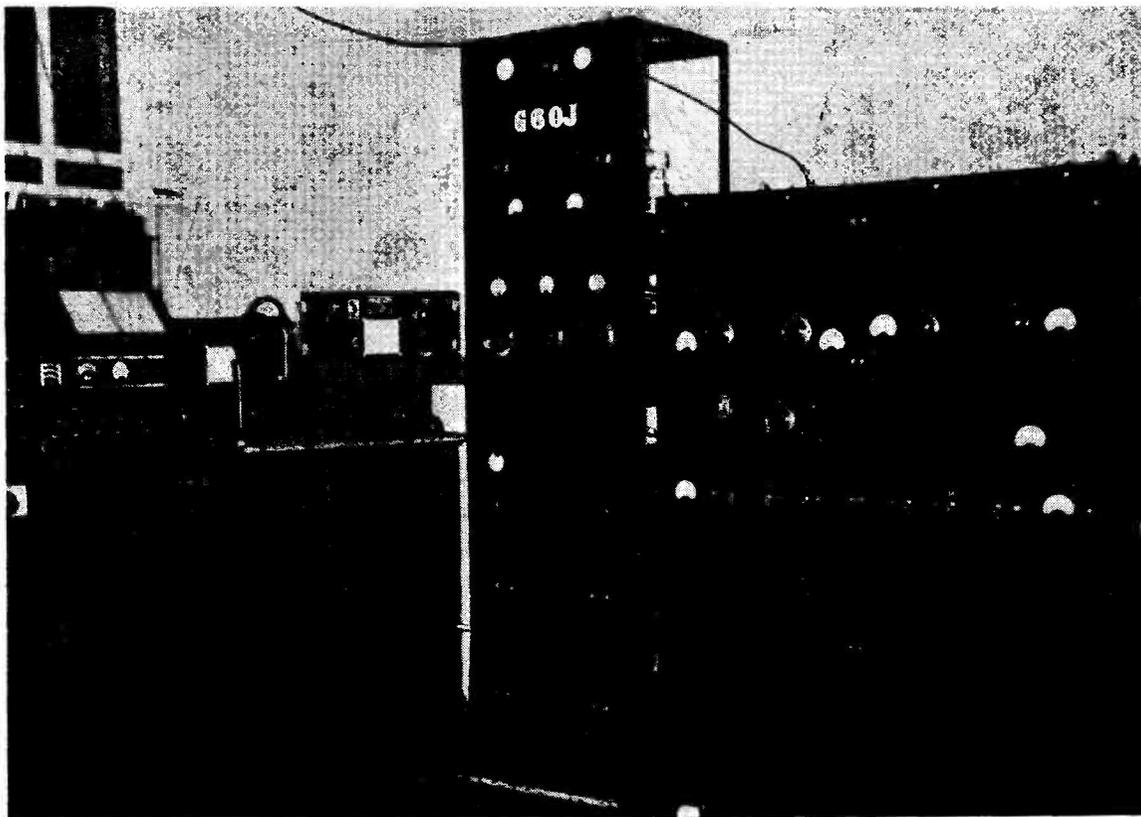
CORRECTION

G3FEV, J. R. Platt, 78 Cunningham Drive, Unsworth, Bury, Lancs.

G3GWO, M. G. Groom, 55 Broadwater Way, Worthing, Sussex.

The Other Man's Station

G6OJ



THE subject of our picture this month is a School station that has produced more than 130 qualified Amateur Radio operators—G6OJ, installed and operated at King Edward's School, Stourbridge, Worcestershire.

First licensed as long ago as 1924—in the name of the owner/operator of G6OI, J. Timbrell, B.Sc.—G6OJ has always been entirely a School undertaking, and nobody is allowed to operate the station until he is fully qualified to do so.

This view of G6OJ is of the station as it is at present, and shows, on the left, the 28 mc transmitter, running 60 watts input; and on the right, the transmitter for 3.5 and 14 mc, taking 150 watts in the PA. Both these transmitters incorporate their own power packs.

On the bench to the left are the VFO unit and the speech amplifier, built into TU cases; the

microphone is the well-known ball type. An AR88 is used for reception, and a BC-221 is available for frequency checking and control.

The whole of the work—operating and constructional—in connection with G6OJ is entirely voluntary and is done by the boys themselves outside normal school hours. For a school station, the record of G6OJ must be unique, and the boys of King Edward VIth's Grammar School are fortunate in having this side of their activities under the supervision of a master, himself an active radio amateur with his own station, of the calibre of G6OI. And G6OI is to be congratulated on the fine record he has built up for G6OJ. A good many of our schoolmaster-readers, holders of amateur call-signs, will be very interested in this brief account of the doings of G6OI/G6OJ. Indeed, quite a number of post-war licences are held by school stations.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Dead-line for Next Issue : AUGUST 13)

THE Holiday Season is with us, and many Clubs have "broken up"—though not in too literal a sense, we hope. It is, on the whole, a wise thing to do, for a Club needs to be very strongly established and very well organised to hold the interest of its members right through the summer.

Field Days, local Exhibitions and Fetes, and such-like events form a good focal point of interest, but Clubs that are not involved in such goings-on are well advised to make a clean break for six or eight weeks.

Field Days

We hear from *Bradford* that their VHF Field Day on July 4 was a great success. G2FCL/P was operated from the top of Baildon Moor, 927 ft. a.s.l., and with 8 watts input on 144 mc they established contacts up to 85 miles (with G3IOO at Oswestry).

Clifton held a D-F event on June 13, despite heavy and prolonged rain. Four teams set off at mid-day to locate the hidden transmitting site of G3GHN/P, and the winner was the present holder of the D-F Shield, Mr. D. Bennett.

Grafton had another very successful Field Day on June 19 and 20, with two stations set up on Tumulus Hill, Hampstead Heath. Many interesting contacts were made, the operators were kept busy, and the keenness of the younger members was most evident.

Members of *Ravensbourne* had a Field Day at Hextable, Kent, when G2DHV/P was set up. *Slade* held a D-F Test on July 4, and then took part in the RSGB National D-F Contest (Peterborough Preliminary) on July 11.

Stockport laid on a portable expedition in July, when G2FOS/P and G3FYE/P both operated from locations over 1300 ft., in "the wilds of Derbyshire."

Wanstead and Woodford departed themselves at Lambourne End on July 4, this being the Club's first outing of this kind.

Warrington are looking forward to their outdoor event, arranged for August 29 at Davyhulme Cottage, Dark Lane, Higher Whitley, Cheshire.

Shows and Exhibitions

Several Clubs have been showing themselves to the public at exhibitions of various sizes, and all of them report successful events. *Salisbury*, for instance, had two transmitters (80 and 20 metres) on the air at the model engineering exhibition, as well as a 'scope, a tape recorder and a 16-mm. projector showing radio films. G3IVP was operating his portable rig from a car, and made several local runs during the show.

Hastings took their part in the local hobbies exhibition during Carnival Week, and managed to fill some 60 feet of stand space with members' gear, historical exhibits and the large console housing G6HH/A, on 80-metre phone. Some short range 430-mc. gear was also in use, and members' equipment covered a full range, from a siphon Morse recorder to a radio-controlled model yacht.

Southgate held their own Amateur Radio exhibition—the first in the district—and published their own booklet for the guidance of visitors. GB3SRA was on the air for a week, and the whole affair was a great success and a credit to the Group.

Purley are running a station at their local Summer Fair on July 24, and also exhibiting members' gear.

At *South Shields*, the Club is participating in the local Flower Show, opening on August 27. Operation will take place on 20, 40 and 80 metres with the

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

BRADFORD : F. J. Davies, 39 Pullan Avenue, Bradford 2.
 BRITISH AMATEUR TELEVISION CLUB : D. W. E. Whele, G3AKJ, 56 Burlington Gardens, Chadwell Heath, Essex.
 BRITISH TWO-CALL CLUB : G. V. Haylock, G2DHV, 63 Lewisham Hill, London, S.E.13.
 CLIFTON : C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
 GRAFTON : A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
 HASTINGS : W. E. Thompson, 8 Coventry Road, St. Leonards-on-Sea.
 LANCASTER : A. O. Ellefsen, G3FJO, 10 Seymour Avenue, Heysham.
 PURLEY : E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
 R.A.F. A.R.S. : R. F. Weston, G6PZ, RAF Locking, Somerset.
 RAVENSBOURNE : J. H. F. Wilshaw, 4 Station Road, Bromley, Kent.
 READING : L. Hensford, G2BHS, 30 Boston Avenue, Reading.
 SALISBURY : H. G. Fitcher, 171 Castle Road, Salisbury.
 SLADE : C. N. Smart, 110 Woolmore Road, Birmingham 23.
 SOUTH MANCHESTER : M. Barnsley, G3HZM, 17 Cross Street, Bradford, Manchester 11.
 SOUTH SHIELDS : W. Dennell, G3ATA, 12 South Frederick Street, South Shields.
 STOCKPORT : G. R. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.
 SURREY (CROYDON) : S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
 TORBAY : L. D. Webber, G3GDW, 43 Lime Tree Walk, Newton Abbot.
 WANSTEAD : C. Stevenson, 45 Dacre Road, London, E.13.
 WARRINGTON : G. H. Flood, 32 Capesthorne Road, Orford, Warrington.

distinctive call GB3SFS. Members of RAEN who wish to join in a Sunday morning schedule on August 29 (3700 kc at 1030) are asked to notify the Secretary.

The *British Amateur Television Club* ask us to note a change of Secretary — see panel for new Secretary's QTH. M. W. S. Barlow, G3CVO, the former Hon. Sec., continues to be responsible for the club magazine *CQ-TV*. This is a very ambitious quarterly publication, of which the 21st issue has just been circulated. This coming-of-age edition is full of interest to amateur TV enthusiasts and a great credit to the Club.

Some Visits

Clifton went to Tatsfield (BBC Receiving Station) in June. *Reading* visited the B.E.A. generating station at Earley, and *Salisbury* went to see the GPO station at Portishead during July. *Lancaster* paid a visit to Mullards, at Blackburn.

Miscellaneous

The *British Two-Call Club* (qualifications: a G call and another call outside the British Isles at some time) has enrolled several new members. President is DL2RO (G2DC). Member ZL1MP (ex-GW6AA) will shortly be becoming a VP7, we are told.

Grafton is closed for August — re-open September 10, AGM on September 17. The *R.A.F.A.R.S.* (Locking, Somerset) had their AGM last month, attended by forty members. *Wanstead* have their Club Tx, G3BRX, on two metres every Tuesday from 7.30 — 10.30 p.m. They have now worked 70 stations on that band.

Forthcoming Events in Brief

CLIFTON: August 6 and 20. Constructional Evenings. August 13, Junk Sale, August 27, Quiz. All at 7.30 p.m., 225 New Cross Road, London, S.E.14.

LANCASTER: August 11, 7.30 p.m., visit to the local Automatic Telephone Exchange.

RAVENSBORNE: Wednesdays, 8 p.m., Durham Hill School, Downham, Kent — no meetings during August.

READING: No August meetings. Talks on Receiver Alignment and "Old and New Radio" during September.

SALISBURY: August 8, D-F Event.

SLADE: August 20, talk on Phase Shift in Tuned Circuits and its application to D-F. Church House, High Street, Erdington, Birmingham 23.

SOUTH MANCHESTER: August 13, Simple Oscilloscopes; August 27, Construction of Amateur Equipment.

SOUTH SHIELDS: Fridays, 8 p.m. at Trinity House Social Centre, 134 Laygate Lane, South Shields.

Deadline for next month's reports is:

First post on Friday, August 13,
addressed "Club Secretary,"

Short Wave Magazine

55 Victoria Street, London, S.W.1.

STOCKPORT: Wednesdays, at Blossoms Hotel, Buxton Road, Stockport.

SURREY (Croydon): August 10, "Ragchew Evening" at Blacksmiths Arms, South End, Croydon. September 14, Sale of Members' Gear (not junk!).

WARRINGTON: August 15, visit to G2FCV; August 17, Business and "Any Questions?"; August 29, Field Day. Normal meetings at Kings Head Hotel, Winwick Street.

TORBAY: August 21, talk on Crystal-Grinding.

Broadsheets, newsletters and similar publications are acknowledged, with thanks, from South Coast Radio Club (South Africa); Southgate and District R.S.G.B. Group; British Amateur Television Club; Surrey Radio Contact Club, and Purley and District Radio Club.

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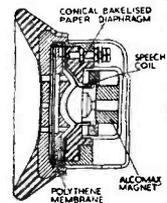
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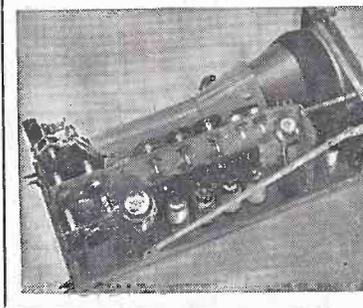
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