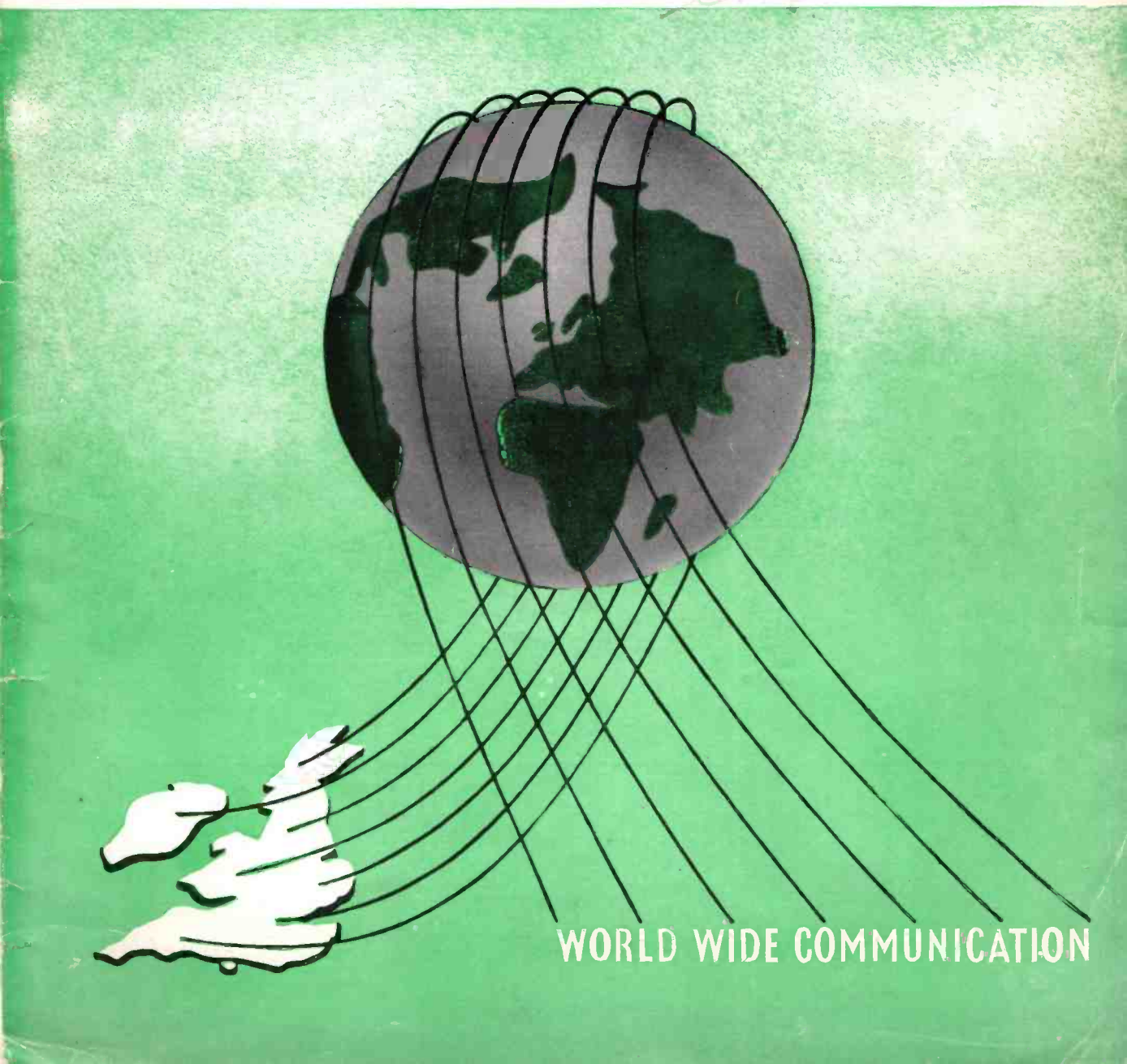
The SHORT WAVE Magazine

2/-

VOL. XIII JUNE, 1955 NUMBER 4



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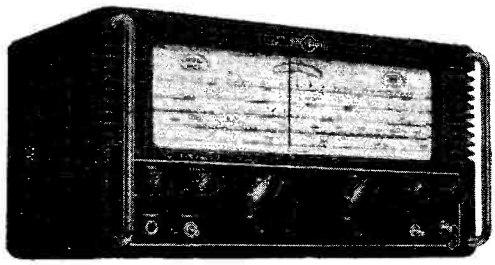

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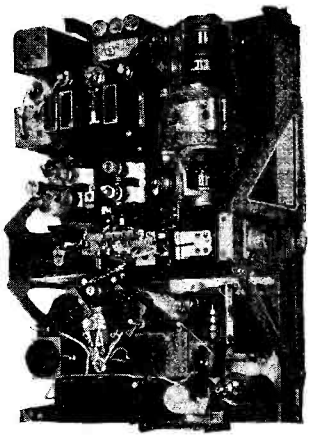

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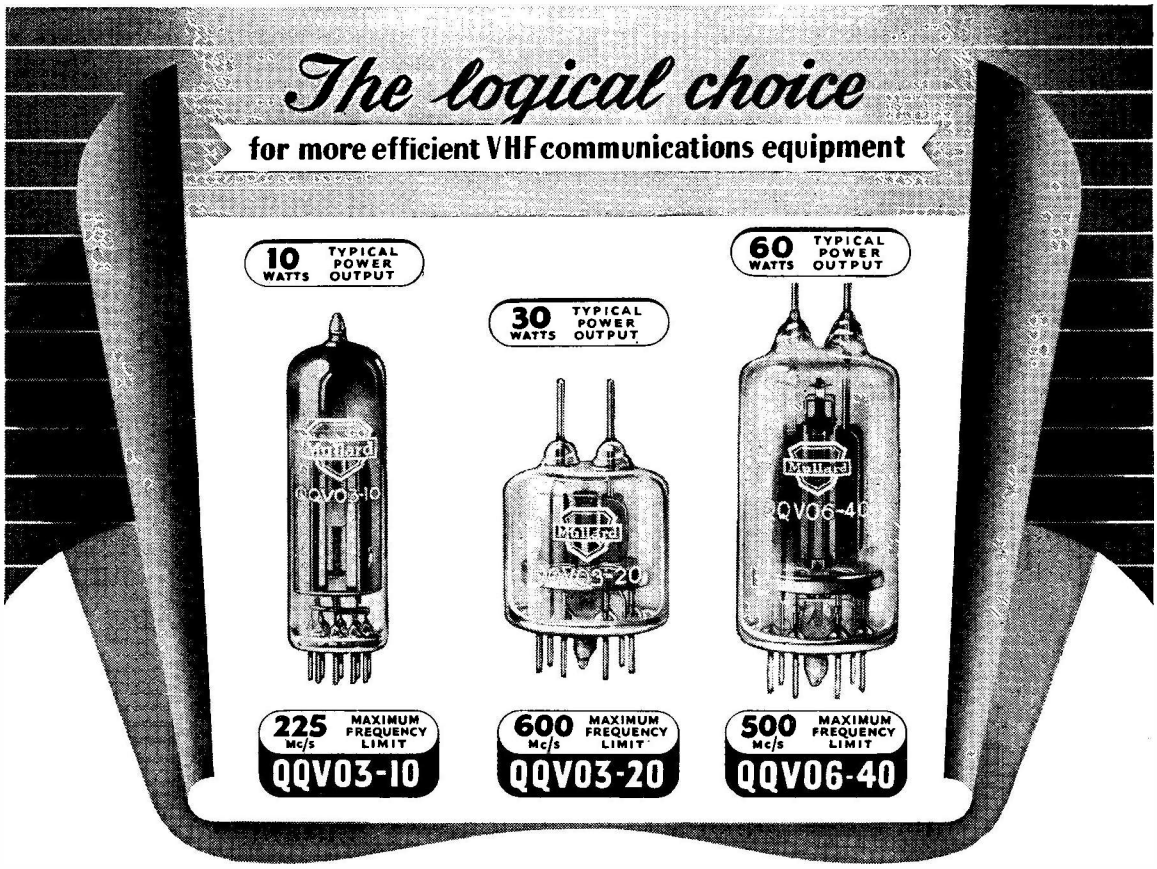

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TYPE	DESCRIPTION	BASE	HEATER		LIMITING VALUES				
			SERIES	PARALLEL	Va max (V)	pa max (W)	Vg2 max (V)	pg2 max (W)	Ik max (mA)
QQV03-10	Miniature R.F. Power Double Tetrode	B9A	12.0V 0.4A	6.0V 0.8A	400	2×5	250	2×1.5	2×40
QQV03-20	R.F. Power Double Tetrode	B7A	12.6V 0.65A	6.3V 1.3A	600	2×10	250	2×1.5	2×55
QQV06-40	R.F. Power Double Tetrode	B7A	12.6V 0.9A	6.3V 1.8A	600	2×20	250	2×3	2×120

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SHORT WAVE MAGAZINE

VOL. XIII JUNE 1955 No. 142

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Managing Editor: AUSTIN FORSYTH, O.B.E., (G6FO)

Advertisement Manager: P. H. FALKNER

Assistant Editor: L. H. THOMAS, M.B.E. (G6QB)

Published the Friday following the first Wednesday each month at 55 Victoria Street, London, S.W.1. *Telephone: Abbey 5341/2*

Annual Subscription: Home and Overseas 24s. post paid.

AUTHORS' MSS

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FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT WAVE Magazine

EDITORIAL

Progress

This issue of SHORT WAVE MAGAZINE *will be found to carry reports which are of great interest and significance from the Amateur Radio point of view.*

It is shown that the 25-centimetre band has practical possibilities, there is an account of a most interesting DX journey under the emblem of the Royal Air Force, the reception of Trans-Atlantic signals on two metres is reported, and a transistor oscillator has been tested on the 10-metre band.

Once again, we see how wide is the field of interest and activity in Amateur Radio. It may well be that in the case of the experimental results on 25 centimetres and ten metres, we are seeing the beginning of great things and that in time to come we shall be able to look back on them as landmarks in the history of our sort of radio.

Results like these are not obtained by chance — they are the outcome of planning, experimental effort and an intelligent appreciation of the possibilities, urged on by the desire to achieve something useful in a new field and to get results where none have been had before. And it is this that has always been the finest expression of the amateur spirit.

Austin Forbes G6FO.

Some T.1154 Modifications

FOR BETTER PHONE QUALITY AND IMPROVED AERIAL COUPLING

J. V. HOBAN (G3EGC)

The T.1154, still in good supply at a reasonable price, can be looked upon as one way of acquiring, cheaply, a "band-switched table topper"—for the T.1154 takes in two amateur bands, 3·5 and 7 mc, as it stands. It can be run at up to 100-120 watts input on CW, and also on phone, though at reduced power. But it is true to say that modifications are called for if results up to the best amateur standard are to be obtained. This article discusses, in particular, the problem of cleaning up the modulation, and also describes some useful alterations on the RF side. Previous articles on the T.1154 appeared in our issues of October, 1946, and December, 1953.—Editor.

"GIVE a dog a bad name." This is evidently what has happened to the T.1154, judging by the remarks heard over the air from many stations. It is true that used in their original condition, they are rough, to say the least, but the writer has achieved a very satisfying degree of success with his T.1154. Numerous requests for details of the modifications involved have inspired the writing of this article, in the hope that the information may be of value to those who have acquired an 1154 and don't quite know what to do with it.

Power Supplies

It is customary for this part of any article to come towards the end—but in connection with the T.1154 it is necessary to lay special emphasis on two points concerning power supplies. First, the transmitter was designed to operate with 1200v. For satisfactory results at least 900v. is necessary. Attempts to get good results on a mere 500v. or so will prove disappointing, as the writer's experience has shown. Secondly, an LT supply of 6v. *DC* is used in these modifications. This is obtained from a battery on trickle-charge which serves the heaters and also the relays. While it is possible to operate the T.1154 on 6v. AC, the writer has not tried this and so cannot offer any comments.

RF Modifications

Attention was first turned to the PA stage. The panel carrying the PA tank circuits was removed after all necessary disconnections had been made and the 200-500 kc PA coil was discarded as being obviously useless for amateur band work.

Next, all the tappings on the two remaining coils were taken off, leaving the coils stripped clean. As it was proposed to use the transmitter on 80 metres only, a 3-turn shielded link-coupling coil was constructed, placed at the earthy end of the 3·5 mc coil and brought out to a coax plug on the panel. The panel was then replaced and the tank circuits wired up.

The 20,000-ohm grid resistor on the PT15's (the PA valves) was now disconnected and an RF choke wired in between this resistor and the PT15 grids. On the other side of this resistor and the HT line was inserted a 5 mA grid current meter, suitably decoupled. This was placed in the position occupied by the original "Mag Feed" (or plate current) meter. The aerial current meter was removed and the plate current meter mounted in that position and rewired. (The grid current meter is merely a useful refinement and can be omitted if not thought necessary).

Aerial Tuning Unit

It was proposed to end-feed a long-wire aerial and so an orthodox aerial tuning unit was constructed consisting of a suitable coil and condenser coupled to the transmitter through a coupling coil similar to the one placed round the tank coil. The coil and condenser actually used were taken from a TU6B tuning unit, but a condenser of approx. 100 $\mu\mu$F will do just as well. The coil is of 30 turns wound 10 turns per inch with 16 SWG tinned copper wire on a 2 in. diameter former.

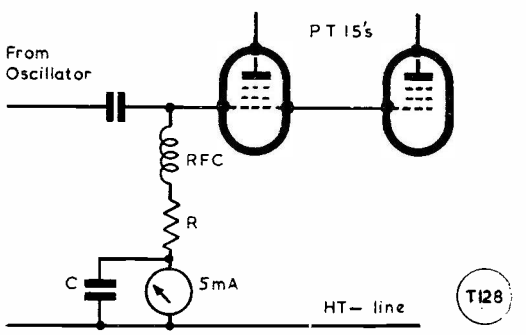


Fig. 1. The grid side of the parallel-PT15's PA, as modified by G3EGC; C is .01 μF, and R 20,000 ohms. The RF choke and grid meter are additional items and the modification as a whole results in a worth-while improvement on the RF side.

An aerial cut exactly to length (132 ft.) will load up when connected to the top of this circuit. In the writer's case, the aerial is somewhat longer and it was found necessary to tap down the coil a little way. By using a suitable relay, the receiver can be fed from the unit and earthed on "send." The whole aerial unit was built into a TU case and the coupling coil brought out to a coax plug on the front panel. The unit is now connected to the T.1154 through a short length of 80-ohm coax cable and the whole system is thoroughly earthed. (The writer uses the water main.) Before the rig will work, it is necessary to short out a 5,000-ohm resistor which is in the HT - line. This biasses off the PA and oscillator for CW working and is normally shorted out by the relay when on "send." The wiring to this resistor was removed from the relay and brought out to a jack fitted with a shorting contact to earth. By keying across this resistor, a T9 note was obtained.

Operation

The aerial tuning unit condenser is set to minimum capacity and the transmitter is switched on. The PA tuning condenser is adjusted for dip and the aerial unit is tuned until maximum plate current is drawn. The writer tunes against a field strength meter and finer adjustments can be made this way. With 900v. the T.1154 will draw about 50 mA.

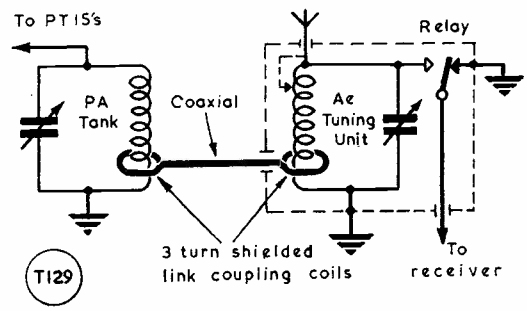


Fig. 2. In the original, the T.1154 is intended for a direct aerial connection. Better results are obtained with a separate tuning unit, enabling the PA to be properly loaded and the aerial correctly resonated. This sketch shows the arrangement used by G3EGC.

Modulation

This is the feature of the T.1154 which is most criticised, and, when operated in the original condition, quite deservedly so. Suppressor grid modulation is employed and a moving coil or carbon microphone can be used. The quality is "rough" whichever it is, but can be cleaned up quite simply. In the writer's case the method was as follows: A 50 μF electrolytic condenser was wired in across the cathode resistor (820 ohms) of the ML6 modu-

Table of Values

Fig. 3 Circuit of Speech Amplifier for T.1154

C1	= 50 $\mu\mu$F	R5	= 10,000 ohms
C2, C7, C10	= 50 μF	R7, R11	= 470,000 ohms
C3, C8	= 8 μF	R8	= 5,000 ohms
C4, C5, C9	= 0.1 μF	R10	= 165,000 ohms 5w. (for 900v. HT); 190,000 ohms, 5w. (for 1350v. HT).
C6	= .002 μF		
R1	= 5 megohm		
R2	= 1,000 ohms		
R3, R6, R9	= 100,000 ohms	R12	= 820 ohms *as fitted*
R4	= 500,000 ohms	V1, V2	= 6SJ7 metal
		V3	= ML6 (as fitted)

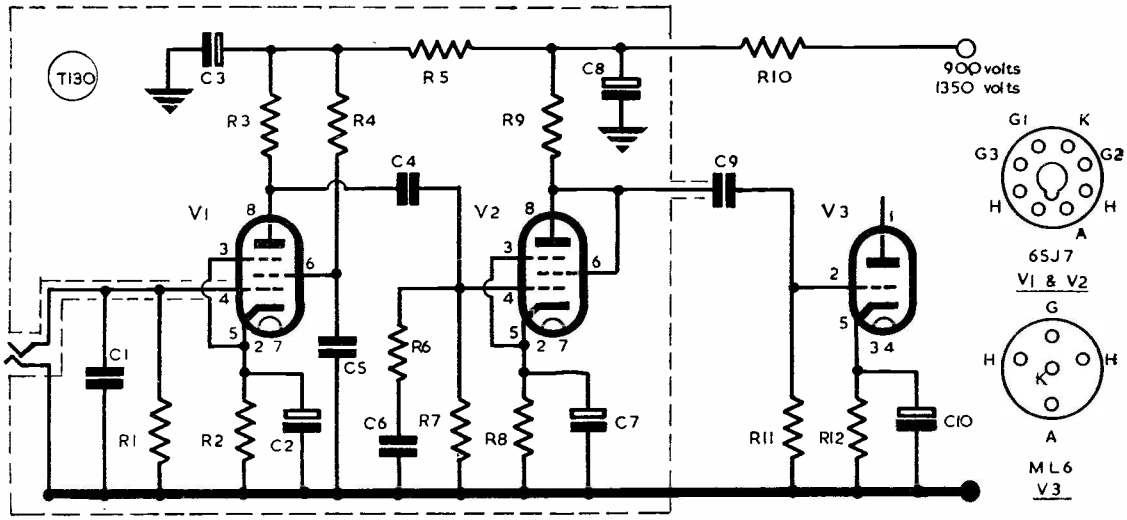


Fig. 3. Circuit of the two-valve speech amplifier incorporated in his T.1154 modulator circuit by G3EGC. V1, V2, are the new stages, for which values are given in the table, and V3 is the ML6 modulator as fitted in the original. The results on phone are greatly improved by this modification.

lator valve ; a 100 μF electrolytic condenser was put across the 2 μF condenser which decouples the microphone transformer. (This can be found above the two ML6's.) Using a GPO type carbon microphone, quality reports which can be described as " quite good " were received.

Incidentally, the energising voltage for the carbon microphone is obtained from the vitreous enamelled resistor which can be seen when the front panel is removed. This is connected between earth and the 6v. LT line. Any attempt to use AC instead of DC will put an AC voltage on the speech circuit and so some alternative means of energising will be required.

This system of modulation was used for some time, but the modulation level was low and so it was decided to improve matters. A small deaf-aid crystal insert was obtained and after preliminary experiments, a 2-valve pre-amplifier was built and coupled into the ML6. Immediately, quality reports improved, the most frequent comment being " very pleasant to listen to," and the modulation was full. The pre-amplifier was built into a small metal box and metal type valves were used. The box was fitted in the space left by the 200-500 kc PA coil. No feed-back from the PA stage is experienced. The arrangement is still in use and is giving every satisfaction. The final modulation circuit is shown in Fig. 3.

In all the modulation experiments both the carbon and crystal inserts were employed in the manner described by G5WW in his article on " Carbon Microphones " in the March, 1951, issue of *Short Wave Magazine*.

The T.1154 has been in use now for over five months, giving entire satisfaction. The whole of the U.K. has been worked, together with EI, PA, OZ, DL2, DL4, and so on, all on phone. The most recent development has been an increase in power. A new power unit was built and there is now 1350v. on the transmitter, giving an input of 100 watts. The only change necessary was to alter the modulator dropping resistor (R10) from 165,000 ohms to 190,000 ohms.

All these modifications have been carried out on the T.1154 *Type B*, but it is thought that the other makes can be similarly modified.

Practical proof of the fine job this transmitter is doing can be obtained by listening on 80 metres most Saturdays and Sundays, when phone from G3EGC may be heard. The writer will appreciate any reports on his transmissions —and you can be as critical as you like !

Modulation with the Receiver

USING THE OUTPUT STAGE FOR QRP PHONE

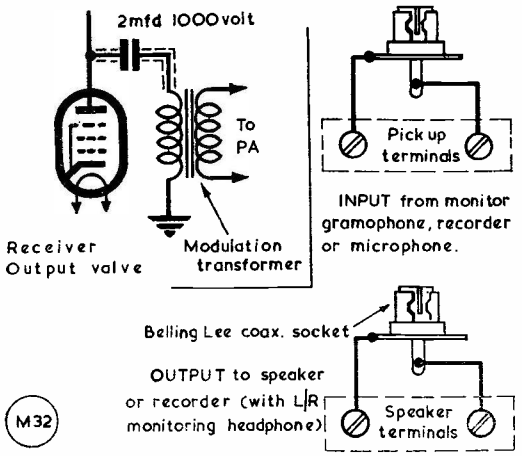
N. P. SPOONER (G2NS)

NOT every amateur takes full advantage of the many facilities and possible modifications afforded by a good receiver. By this is meant, of course, the genuine article, not the ordinary short-wave broadcast type simply fitted with a BFO, under the delusion that this addition at once elevates the entire assembly into the " communications " class. Neither can the proud title be truthfully claimed by surplus receiving equipment specifically designed for non-amateur use and band-coverage.

Of the popular models now in circulation on the amateur bands—to mention some points of interest concerning only five — does the station change-over include relay switching of the HT to the *HRO* and how many output valves have been ruined by headphone receptionists who forgot to complete the plate circuit with a jumper, or add a load in the absence of a built-in output transformer ? Is negative bias being applied to the diversity reception terminal of the *AR88* to provide BK muting, and is the " Send-Receive " switch being employed as a one-knob change-over control for the entire station ? Are the 5000-ohm output terminals of the *SX28* being used to feed directly into a tape recorder, and are the advantages of single-signal adjustment, tone, bass and selectivity control settings being fully realised during CW reception ? Has the oscillator HT of the *S640* been stabilised, and has the 40 mA drain (more than the entire load for the rest of the set) of the 6V6 output stage been cut by substituting a 6J5 (500 milliwatts) ? Are the aerial-earth terminals of the *S750* being shorted across by relay for stand-by protection, and are the two output stages being used as a modulator ?

The Modulator Possibility

This latter thought should certainly interest brass-pounders who want no expense and the minimum of extra gear for local-net telephony.

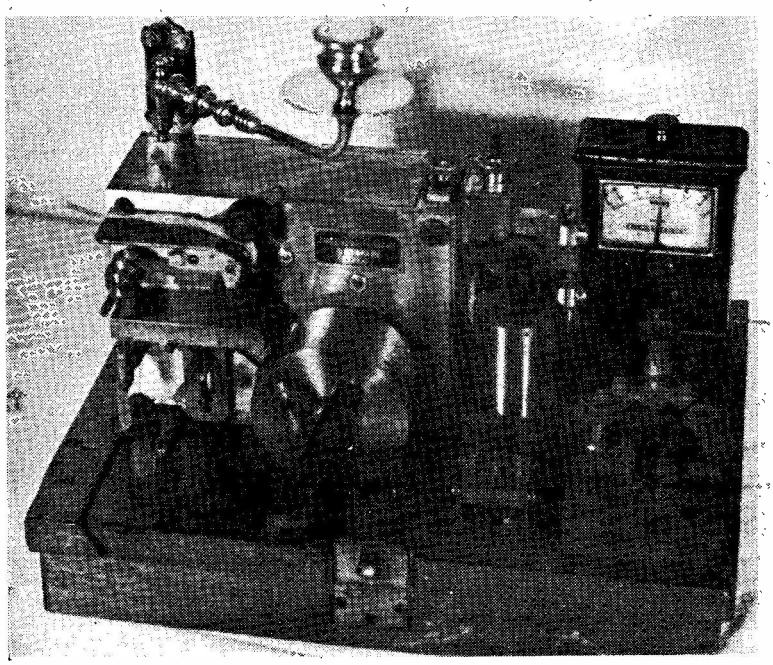


Where the requirement is low-power telephony, it is easy to adapt the audio output stage of the S.750—or any other good communications receiver—by the method discussed by G2NS and shown here. The advantages are obvious: High gain with good quality, enough audio output to modulate a 5-watt local coverage transmitter or drive a more powerful amplifier-modulator, economy of equipment, the facility of being able to record or play-back taped material through the same amplifier, and the simplicity with which all these advantages can be obtained!

While the present description happens to concern itself mainly with the S750 circuit, the idea can be applied equally well to any other type of receiver and may therefore appeal to emergency and mobile experimenters who are battling with strong interference, high noise levels and poor aerial facilities. It is during such severe conditions that a portable receiver with low sensitivity and poor selectivity will often prove to be worse than useless.

The obvious answer is to replace the weakest link in the chain and take along the main receiver that has probably already been socketed by the manufacturer for battery and/or vibrator unit supplies. Fig. 1 shows a simple way of using the receiver to avoid the cost, weight and stowage of a separate modulator. A shielded lead is taken from the plate of the receiver output valve down to transmitter chassis *via* a fixed condenser and the primary of the transmitter modulation transformer. If a crystal microphone is connected across the pick-up terminals (labelled *phono* in American circuits) an excellent modulator is immediately available. For those who have not yet handled a double conversion superhet, it might be mentioned that the S750 is one of the very few that provides for CW and phone monitoring. Instead of a sudden cutting of the HT supply upon "send," the receiver is very considerably de-sensitised when the stand-by switch is in the "off" position. The oscillator valves and the output stages remain alive and excessive RF is excluded by placing a relay alongside the receiver where the contacts will short the aerial-earth terminals. If, while permitting CW monitoring this strong protective measure drastically mutes the checking of telephony then the output of a separate phone monitor can always be fed into the pick-up terminals.

An interesting point, not mentioned in the S750 manual, is the fact that the stand-by switch can be used as a one-knob relay control for the entire station; this is done simply by



Don't laugh—this is a vintage "communications receiver," of Russian origin, which was "acquired" in Archangel about 1915. The essential parts are still in full working order. G2NS includes some notes on this historic piece of his apparatus in his article.

wiring pins 5 and 6 of the external S-meter socket in circuit with the DC supply for the relay system. On the S640, also by Eddystone, this facility is provided for by pins 3 and 4 of the auxiliary power socket.

Recorder Connection

The loudspeaker terminals of the S750 can be used as intended for reception or alternatively, with a low-resistance monitoring headphone in parallel, for feeding the receiver output directly into a tape recorder. For playback in the station, the recorder output can be plugged directly into the pick-up terminals with the band-switch turned to position G (*Gramo*) to cut out any radio signal breakthrough at the same time. Play-back over the air is accomplished in the same manner, but the band-switch remains on the band in use and the output stages are used as a modulator. A pair of relay contacts can open the microphone lead during reception if desired, to stop the microphone working in reverse, as a miniature speaker that might be damaged by very strong signals.

An alternative method, of course, would be to slow down the station change-over and disengage the microphone manually each time from the pick-up terminals.

Excellent speech quality reports are always obtained by the writer when using the Eddystone S750 in this manner; the N78 output pentode in the set will fully modulate a Top Band carrier.

The reader may now be convinced that the possession of a "stone," in the shape of a good receiver, permits the satisfactory dispatch of several "birds."

Even the museum-piece seen in the photograph lends itself to amateur adaptability. This Russian Morse inker, made in 1915 by Siemens and Galske, is complete with lighting point, galvanometer, line balancer and static arrester. It runs for 15 minutes and the colour of the paper tape, ready to take the 30-character alphabet, was pale blue! It is believed that, being easily removed, the original "solid brass adjustable candle-stick" and the key were looted in Archangel; the remainder of the apparatus found its way into an Army scrounge-bag and crossed the seas. The galvo became a voltmeter and it is known that its previous owner used the inker, with perforated tape and a contact rubbing on the pressure wheel, for automatic calls on the old five-metre band. In the writer's hands it now makes an excellent tape-puller for a modern Undulator, and after 40 years it still functions as well as originally intended!

"LETTERS TO THE EDITOR"

Once again, a number of interesting "Letters to The Editor" have had to be held over until next month. Readers' opinions on any topic of Amateur Radio interest are welcomed for publication, at the Editor's discretion.

CORRECTION — EDDYSTONE 840A

We much regret that, owing to an error, the hire-purchase details appearing in the advertisement of Messrs. Webbs Radio on p.113 of our May issue were incorrect. These details should read as follows: Eddystone 840 Receiver, price £49. HP facilities: Deposit £9 16s. and 12 payments of £3 11s. 11d., or 18 payments of £2 10s. 2d. The 840A is another fine model in the Eddystone range of communication receivers.

"MEASURING INDUCTANCE AND CAPACITY"

Those who checked through the calculations in this article in the May issue will have noticed that the value of π was exaggerated—it should, of course, have been taken as 3.14. This does not affect the argument and has only a slight effect on the accuracy. Nevertheless, it was an unfortunate error which, like all such, was only noticed when it is too late to do anything about it! (Then, of course, it rushes out to hit one in the eye). The capacity calculation at the bottom of p.128 is also incorrect—it should have been given as 26,200 ohms, making the final value 0.12 μF. We duly received the spate of "May I point out the mistake" comments that we expected when these errors were realised—some of our correspondents were humorous, others pained and a few were rather rude! But they all made some faces red. However, everybody agreed that these artithmetical slips do not in any way affect the validity of the argument—it is still a good, and a surprisingly accurate, method of making such measurements.

CARDS IN THE BOX

QSL cards for the operators listed below — for whom we have no forwarding address — are held in our QSL Bureau. Please send a large stamped addressed envelope, with name and callsign, to: BCM/QSL, London, W.C.1, and the cards will be forwarded on the next G clearance. If appearance of the callsign/address in "New QTH's" and the *Radio Amateur Call Book* is required, that should be mentioned at the same time.

G2AJJ, 3BDI, 3FT, 3FUJ, 3GIG, 3HOW, 3JWD, 3JXY, 3KAO, 3KCZ, 3KDD, 3KDG, 3KFC, 3KFT, 3KGB, 5LA, 8GR, GC2FXC, GD4IA, GI3JDC, GM3JSX, 3JYY, 3KEZ, GW3BS, 3FBB, 3JLI.

Determining Transistor Cut-off Frequency

NEW TEST PROCEDURE FOR SELECTING HF SPECIMENS

J. M. OSBORNE, M.A. (G3HMO)

With the appearance of transistor types capable of HF performance, it is very important to be able to determine the characteristics of particular specimens. Our contributor is already well known for much original work in the field of Transistory, and here discusses a simple method he has evolved for checking frequency cut-off.
—Editor.

A SIMPLE method of estimating the HF performance of transistors is described here for the benefit of those who have not the facilities of a radio laboratory. The order of accuracy may be low, but is nevertheless entirely adequate for most purposes; thus, the answer to "Will the performance have fallen of at *X* mc to a point where the transistor is of little use?" is generally sufficient. Strictly speaking the characteristic to be measured is the cut-off frequency at which the current amplification, *alpha*, has fallen by 3 dB, *i.e.*, to 0·7 of its LF value. Above this frequency a transistor is not much use as an amplifier, and, although cut-off does not mark the limit of oscillation, the efficiency and output soon drop off above this.

Alpha is the ratio of the change in collector current for a given change in emitter current. The circuit shown in Fig. 2 on page 12 of the March, 1954, issue of *Short Wave Magazine* is suitable for making static (zero frequency) measurements. To obtain an *alpha* value under AC conditions, a signal is injected in the emitter and the resulting output measured in the collector circuit. To compare the input and output current, the AC voltage developed across small resistors in the emitter and collector circuits can be measured. This will give the ratio of input to output currents (*alpha*) at the signal frequency. By varying this the variation of *alpha* with frequency can be determined.

Test Circuit

Fig. 1 shows the basic idea. Putting R1 and R2 at the base end of the emitter and collector simplifies circuitry. The collector is by-passed to R2, as otherwise the battery circuit would load the collector and reduce the current amplification. Fig. 2 is the skeleton circuit showing how a receiver with an S-meter may be used to measure the input. By simply changing over the base connection from one end of R to the other, we automatically change from input to output. Since an S-meter scale is unlikely to be linear (it would be a poor S-meter if it was) and would probably have to be calibrated for this purpose, it is preferable to vary either the input from the RF source or the value of R so as to keep the S-meter constant. Thus we avoid the necessity of calibrating it and obtain our result from the variation in input necessary to keep the output constant. The complete circuit with bias supplies for emitter and collector is shown in Fig. 3. This set-up is based on the Transistor Processor and Tester described on p.80 of the April, 1954, *Short Wave Magazine*, together with an AVO signal generator and an R107 receiver fitted with an S-meter.

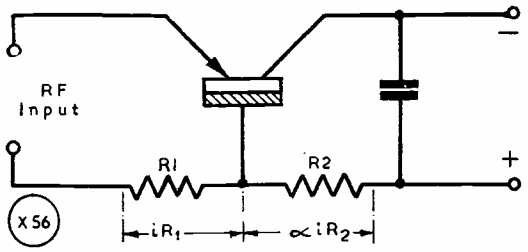


Fig. 1. The current gain of a transistor at RF can be obtained by comparing the voltage across R1 and R2, provided R2 is small. Thus "alpha," which determines the goodness of a transistor, can be measured at different frequencies.

The writer used the AVO signal generator to provide RF input (one can often be borrowed from a friendly source, even if one does not possess such an instrument). As it has an attenuator built in, the RF can be varied by known amounts. It has a scale marked up to 50 μV and has multiplying ranges. The curves

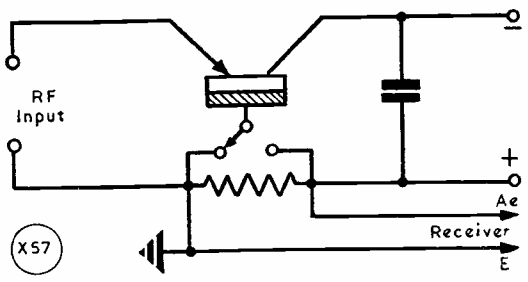


Fig. 2. Outline of a practical circuit based on the principle of Fig. 1 showing how one resistor, of about 100 ohms, can be used both on input and output sides by switching in the base.

Table of Values

Fig. 3. The test circuit complete

R1	= 2,200 ohms	C1	= 0.01 μF mica
R2	= 100 ohms	RFC	= RF Choke
R3	= 1,000 ohms	G	= Transistor under Test
VR1	= 5,000 ohms		

shown in Fig. 4 were taken with the collector at 10 volts and the emitter bias set to give to 0·5 mA. The signal generator was adjusted for 20 μV output with the range at × 100. This implied about 2 mV but provided that the S-meter gives a comfortable reading and that the transistor is not overloaded to the extent of varying the collector current meter (showing rectification) then its exact value is unimportant.

Obtaining the Readings

With the base of the transistor taken to the earthy end of R2 the transistor output current reading is noted on the S-meter. The base connection is now transferred to the other end of R2 so that the S-meter now reads the input current (disconnect the battery while making the change.) The input is increased by the attenuator until the S-meter again reads the same. The ratio of the increase gives *alpha* directly. Assuming that the attenuator was initially set at 20 μV, a setting of 40 implies an *alpha* of 2, 45 an *alpha* of 2·25, and so on.

It is assumed that the value of input current remains constant when the base is changed from one end of R2 to the other. In fact, the change in resistance might cause a slight alteration, but this will be small because

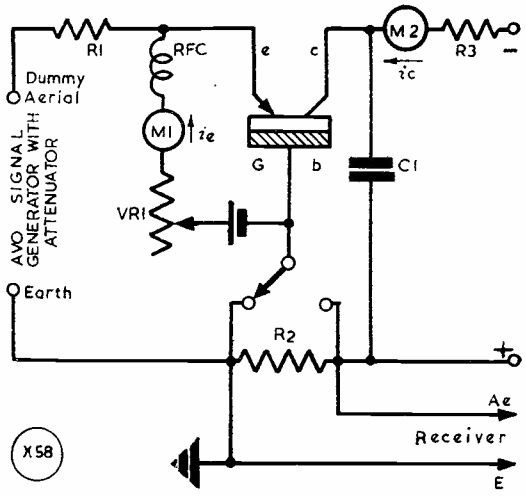


Fig. 3. A complete circuit as in Fig. 2, with the addition of bias. As explained in the text, with this set-up the variation of "alpha" against frequency can be determined to a degree of accuracy sufficient for most practical purposes.

R1 is in circuit all the time and so will mask the effect and reduce any error to a negligible amount. By swinging the AVO and receiver through the frequency range in which you are interested a series of points can quickly be found.

From the curves plotted in Fig. 4 it will be noted that the new G.E.C. HF transistor EW51 and a home-made specimen based on the same type of germanium have the best characteristics. The GET2 was the next best and gave tolerable

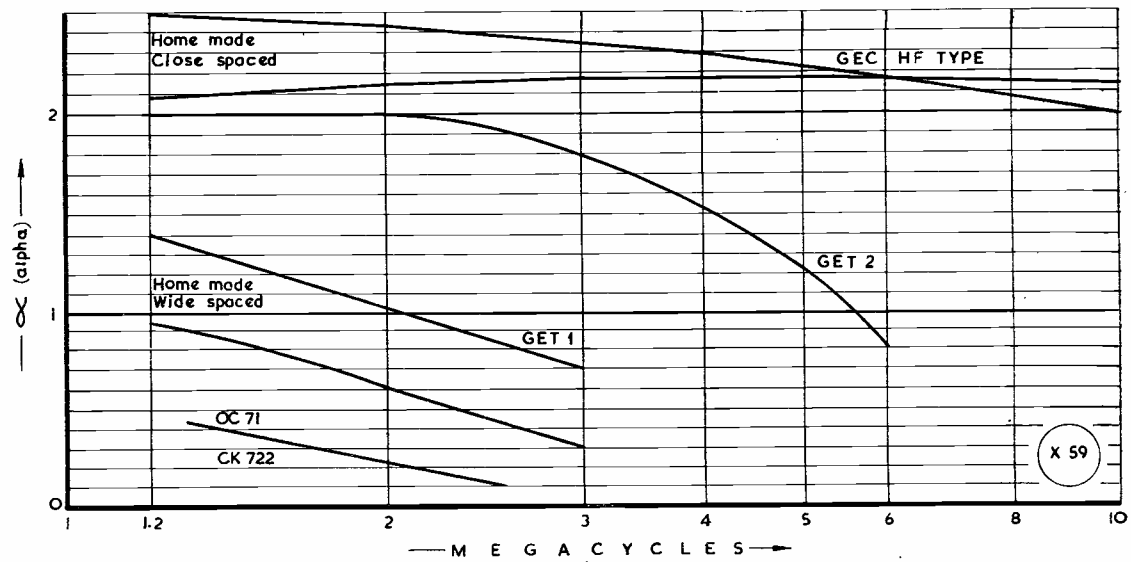


Fig. 4. These curves show typical results obtained with the apparatus shown in Fig. 3. It will be seen that a very clear indication is given by the method described, and that as "alpha" begins to drop with frequency, it falls off fairly rapidly.

results on 3·5 mc, while the other transistors were of no use except perhaps on Top Band. These were already partly cut off below 1 mc. It should not be assumed that these results are representative of any particular type of transistor; they apply only to specimens in the possession of the writer.

Failing an AVO, the output from a CO or VFO might be used for measuring the *alpha* in each band. In this case R would have to be variable and calibrated in order to set the S-meter to the same reading on input and output. The ratio of R-input to R-output gives *alpha* in this case. While there are various possible sources of error the most serious one is probably the attenuator as this is not intended to be a precision adjustment. However, the readings obtained are both repeatable and consistent with results achieved with the transistors in RF equipment and so the method is entirely satisfactory for comparative purposes.

(Editorial Note: Since the foregoing was written, G3HMO has succeeded in producing controllable PDC oscillation on 29 mc, in the 10-metre band, using a specimen of the new G.E.C. EW51 point-contact transistor. This goes off easily in the base-tuned circuit and, with a few milliwatts input, gives enough RF output for the signal to be identified locally. Attention is now being directed to stabilising the oscillator with an overtone crystal—full details of these interesting developments, and the results obtained, will be reported in due course.

The G.E.C. EW51 transistor is an HF type actually designed for use in pulse circuits such as those involved in digital computer apparatus. The limit-frequency of the EW51 is not claimed by the makers to be higher than 4 mc. However, a particular specimen, selected by the process discussed by G3HMO in his article above, is, as stated, giving useful RF output on 29 mc).

AMERICAN SUBSCRIPTION SERVICE

Readers are reminded that we can accept, in sterling, subscription orders for the Amateur Radio publications *CQ*, at 29s. post free, and *QST* of the ARRL at 36s. post free, each for a year of 12 issues, delivered by mail from the States. Orders to: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SCHOOL CCF TRANSMISSIONS

The comment by a correspondent—"Letters to The Editor," p.130, May SHORT WAVE MAGAZINE—on the subject of school CCF nets has brought some protests, and it is fair to put the other point of view. Most of the larger schools in the country, and all the well-known public schools, have a CCF ("Combined Cadet Force") organisation, on the lines of what used to be known as the "School OTC." The only difference is that the CCF of the present-day represents all three Services. The frequency band, in the 5000-5250 kc range, allotted for school CCF operation is only 15 kc wide and is monitored officially by the War Office. Operators on CCF nets are cadets who, having had some training in soldiery and passed their "Certificate A," have specialised in signals. Before being permitted to go on the air they have to complete a course which includes field telephones and exchanges, line laying, signals organisation and procedure, and "walkie-talkie" working with Army Type 18 and 38 Sets. When they go on the air, with an Army 12 Set and R.107 receiver, the "traffic" naturally tends to be of school interest. But at the same time they learn, in the most convincing way possible, how to operate a net, what its limitations and requirements are and, in many cases, have their interest stimulated in Amateur Radio as a hobby. When these cadets, who are usually NCO's and sometimes Under-Officers, go forward to do their National Service, they have a background of practical knowledge and experience which is invaluable, both to them and to their superiors in the Service they join. It should be added that all CCF activities are carried out voluntarily, as a spare-time pursuit outside school hours.

PHOTOGRAPHS

We are always interested to see, for possible publication in SHORT WAVE MAGAZINE, photographs of Amateur Radio interest—either equipment, stations or personalities. Prints should be clear and sharp, identified lightly in pencil on the back, with separate descriptive notes. Payment is made, on appearance, for all photographs used.

BRITISH INSTRUMENTS EXHIBITION

This will be on at Earl's Court, London, S.W.5, from June 28 to July 9. A very wide range of instruments and measuring equipment of all kinds and for every purpose will be displayed by some 150 British manufacturers. They include firms whose names have been known for many years throughout the world for the quality of their products: Cambridge Instrument Co., Cooke Troughton and Simms, Crompton Parkinson, Elliott Bros., Everett Edgcumbe, Evershed and Vignoles, Ferranti, Gallenkamp, Nalder Bros. and Thompson, and Negretti and Zambra—to mention only a few who were familiar to scientists and engineers before the era of radio communication.

XTAL XCHANGE

This space is free for those wishing to *exchange* crystals; set out your notice in the form shown here, on a separate slip headed "Xtal Xchange—Free Insertion" and please note that all negotiations should be conducted direct.

G3IOZ, The Gables, Kilsby, Nr. Rugby, Warks.
Has 4680 and 8225 kc crystals, ½-in. mounting, and 6497.9 kc, ½-in. pins. Wants 100, 500 and 1000 kc bars, any mounting.

G3IQO, 20 Asbridge Street, Liverpool, 8.
Has crystals 100, 5000, 6410, 6480, 6840, 6940 and 8465 kc. Wants any frequency 1805-1900 kc.

G3KFP, Roudo, Gweal-au-Top, Redruth, Cornwall.
Has 6444 kc crystal. Wants 1000 kc bar, or any frequency for 3.5 mc band.

JOURNEY WITH IRIS

STORY OF AN EPIC FLIGHT—THIRTY THOUSAND MILES OF AMATEUR RADIO

F. JOHNSTONE (G3IDC)
(Royal Air Force Amateur Radio Society)

From press and broadcast, many readers will already know something of the great journey recently undertaken by a Hastings aircraft of the Royal Air Force for the purpose of surveying Signals facilities on the R.A.F. long-distance routes to Australasia and the Far East. Some will also be members of the R.A.F. Amateur Radio Society, and will know that it has affiliated groups consisting of locally-licensed amateurs serving with the R.A.F. at home and overseas. What will not be so well known is that Amateur Radio in the R.A.F. has the full backing and active support of those in authority at the Air Ministry—so much so, in fact, that it was possible for G3IDC, officially representing the R.A.F.A.R.S., to accompany "Iris II" on her recent Signals survey flight, in his capacity first as a licensed amateur and secondly as an R.A.F. member of the crew. The head of the Signals Branch of the Royal Air Force is the Assistant Chief of the Air Staff (Signals), an appointment now held by Air Vice-Marshal L. Dalton-Morris, C.B., C.B.E., who has himself taken the keenest personal interest in the Amateur Radio results and experiences discussed in this article. All who read it will agree that G3IDC made full use of his opportunity.—EDITOR.

SHORTLY after last Christmas, it was arranged that the writer should join the party of the Inspector of Radio Services (G/Capt. C. C. Morton, C.B.E.) on his tour of the Far East, Australia and New Zealand. Needless to say, a chance like this comes but once in a lifetime!

The official purpose of the flight — made in Hastings *Iris II* — was to check all Signals facilities and radio navigational aids on R.A.F. Transport Command routes, and this particular survey trip was the longest yet organised for that purpose. The crew duty assigned to your correspondent was that of assistant signaller and, whilst on the ground, there was the additional and very pleasant responsibility of making personal contact with the local amateurs at our stopping-places. The intention underlying this was to form branches of the Royal Air Force Amateur Radio Society at all the main R.A.F. stations we visited.

R.A.F. Amateur Radio Society

The purpose behind this idea of forming local R.A.F. Amateur Radio clubs is threefold: A licensed operator who joins the Service and finds himself posted abroad has no "weight allowance' enabling him to take his gear with him; if, when he arrives at his overseas station, he finds a flourishing local group, he can start up straight away under the club call-sign using the equipment already there; in the meantime, he can apply for his own local licence and arrange for his gear to be sent out to him. Secondly, such active groups encourage recruits to Amateur Radio itself from among the locals, with the advantage of the help and facilities the Service can provide. Thirdly, it would certainly be agreed that a man who has a hobby closely allied to his Service "trade" will be far better at his job than a man who works simply because he must.

It can be said here that as a direct result of this trip, local clubs were started at no less than ten R.A.F. stations overseas. with all the benefit that will ultimately accrue to the individuals concerned, the R.A.F. Amateur Radio Society and the Service itself.

Itinerary and Formalities

Permission to carry the G3IDC transportable station on the trip was readily granted; arising from this, a secondary objective became that of endeavouring to keep in touch, by Amateur Radio, with G8FC, the Hq. station of the R.A.F.A.R.S. at Locking, Somerset. The most important "chit"—without which the trip would have lost some of its savour—was, of course, the permission to use the G3IDC call-sign followed by the prefix of the country in which we happened to be; this came from the Commonwealth Telecommunications Board, London, through the good offices of W/Cdr. W. E. Dunn, O.B.E. (G2LR) and actually arrived just before *Iris II* was due to roll down the runway at R.A.F. station, Benson, Oxfordshire, on the first stage of our long journey.

Taking off on February 12, the first night stop was at Malta; next day, on to Cyprus, where G3IDC went on the air with ZC4 as the suffix. It is truly amazing how people can live together on the same station and not know each other's interests or hobbies; even chaps working together in the same section had no idea that the man next to him was a radio amateur! This extraordinary state of affairs was encountered throughout the trip, and one wonders whether all amateurs are as shy!

After Cyprus, on to Aden, where we found it pleasantly warm — perhaps with a twinge of conscience for those at home, shivering in the February weather of the U.K. It was your correspondent's good fortune to be invited to broadcast on the "Aden Forces Network"; the response to an appeal for potential amateurs was very heartening indeed. Here, as at other places, accommodation for establishing an amateur station is at a premium. But amateurs the world over have an eye perpetually open for a "good site"; no matter how small the building, or even the room, invariably it is chosen for convenient aerial erection.

The next calling points were Riyan, Salalah and Masirah Island—no more than small staging posts on our route but perfect examples of an amateur paradise. None of the time and money-wasting distractions of a town; just working, swimming and

Amateur Radio — who could ask for anything more! Eastwards again, and our next landing, the fabulous gem of the Indian Ocean, Ceylon. There 'midst waving palms, silver sand and to the tune of crashing breakers and dazzling lines of surf, G3IDC/4S7 was on the air for a few days. The outstanding local personality was 4S7YL, Suma, who could charm any man from beach or sailing club. Penang was our next call, where at R.A.F. station Butterworth we were welcomed by VS1BP (G8PF), who was to join *Iris* on the trip through to Singapore. Within an hour or so of arrival we were on the air, thanks mainly to VS1BP's foresight in having a 250-ft aerial erected ready.

The following day, a Sunday, we broke in on the Malay Amateur Radio Society's 40-metre phone net, at 10.30 a.m. local time (0330 GMT). VS2DQ, our first contact, had quite a lot to say about "using a G call out here"—until the appropriate document was read out to him! Two hours later, he collected your correspondent and VS1BP in his car for a run out to his rubber plantation at Kuala Ketil, near Kedah.

G3IDC, with his transmitter, at R.A.F. station Benson on April 28 last, on return from his long-distance survey for the R.A.F. Amateur Radio Society during the tour, by air, of the Inspector of Radio Services to the Far East and Australasia. The trip took about ten weeks, covering 30,000 miles, and G3IDC was able to operate under some ten different Commonwealth prefixes—an experience which even a millionaire might envy! His own account of this tour appears in the accompanying article.

The Far East

The next leg of the flight was to VS6; having been warned of the difficulties in getting out from Hong-Kong, the approach to it is calculated to make one even less optimistic, for the final circuit at R.A.F. station Kai-Tak merely tends to heighten foreboding. Mountains surround Kai-Tak on practically all sides, with no opening in the direction of the U.K. With low power and a mediocre aerial only 15 ft. high, chances with G3IDC/VS6 were not of the best. However, all this was more than made up for by the welcome from the local amateurs; VS6AE, one of the founder-members of the Hong-Kong group, gave full details of the local organisation, and the R.A.F. lads from Little Sai Wan and Sek Kong, VS6CT and VS6CW, came over for the week-end. It was a great pity that VS6GC—often worked from G3IDC and G8FC—was not able to get along for this meeting.

Business concluded, we changed direction and were heading south, *via* Saigon, to Singapore; there, most of the local amateurs seemed to be away on odd jobs. However, G3IDC/VS1 raised G8FC again after a break of eight days. As time was short at Singapore, very little could be done towards forming clubs at Changi, Tengah and Seletar, but the ground work was laid.

Australasia

Leaving Singapore very early one morning, we took the long leg over the Timor Sea—in which so many aircraft have been lost without trace—for Darwin, Australia, there to be sprayed, fumigated and generally disinfected until we were nearly asphyxiated. Having had no rest to speak of for nearly 48 hours, your correspondent slept peacefully through a tropical thunderstorm that broke just as we arrived. Two days later found *Iris II* touching down at the Royal New Zealand Air Force station

at Whenurpai, Auckland, in the North Island of New Zealand. An overnight stop, and we were on our way to visit the Thermal Region of the North Island, in transport kindly provided by the R.N.Z.A.F. for the *Iris* party. The magnificent sights of Rotarua, with its fantastic scenery, the boiling pools and geysers, set in a majestic mountain landscape with fir forests dropping down to crystal-clear lakes, is something never to be forgotten.

From Whenurpai, we were on our way to R.N.Z.A.F. station Wigram (Christchurch), and from there to Ohakea, near Wellington. Here, personal contact was made with ZL2IY, an official of the N.Z. Amateur Radio organisation, who took your correspondent under his hospitable wing, and arranged introductions to many of the amateurs in Wellington. At Ohakea, the one active club station of the R.N.Z.A.F., signing ZL2WP, is kept on the air by ZL1AJW, ZL2APK and ZL2WM; at the moment, operation is confined to 80 and 40 metres, but it is planned to be on Twenty very soon. Two days with them and we returned to Whenurpai before leaving to visit the Royal Australian Air Force. The countries raised by G3IDC/ZL2 while at Whenurpai were DL, EA, G, GM, HB, I, JA, LA, ON, OZ, PY, VE, W, YJ, ZP and ZS. This reflects more credit on those who could find the small signal from G3IDC/ZL2 than on the 25 watts and odd length of wire used.

The next time *Iris II* touched down it was at the R.A.A.F. station at Richmond, 60 miles from Sydney. The R.A.A.F. had arranged for the party to spend Easter as near Sydney as possible; this was at Bankstown, a suburb of the city, and no sooner had we settled in than the phone was ringing; VK2QL and VK2YC were making themselves known. The next three days were spent very pleasantly, meeting a good many of Sydney's amateur population and seeing all the local places of interest. One of the highlights of this occasion was meeting VK2APQ, who specialises in two-metre operation. He suggested a call on Two, signing G3IDC/VK2—never has such a commotion been heard on the two-metre band!

By Easter Tuesday, we were at R.A.A.F. station Laverton, near Melbourne; there, G3IDC/VK3 was on the end of an extended "Lazy-H" system on 70 ft. self-supporting wooden poles; that aerial certainly did the 25 watts proud.

Homeward Bound

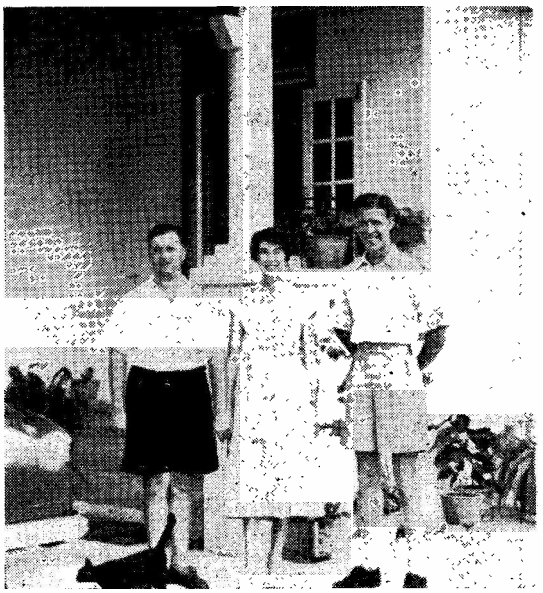
With the end of the Australian tour nearly in sight, we flew back to Darwin, and the next day were in Singapore again, to find that G3IBW had arrived from the U.K. and was coming on the air with a VS1 call. From Singapore, the route was homeward to England, overnight stops at Bangkok and Calcutta bringing us to Karachi. Pakistan was the last country from which permission to operate had been given, and also the last from which G8FC was worked; even though our stay was short, many stations were raised by G3IDC/AP2. The R.A.F. station at Habbaniya, with its well-known amateur call-sign YI2AM, was our next touch-down, and we left the lads there in fine fettle, even though their 866's are a little the worse for wear!

Forty-eight hours later, at 1445 BST on April 28, *Iris II* landed back at R.A.F. station Benson with a good 30,000 miles covered since our departure ten weeks earlier. It says much for her crew, the ground personnel on the many legs of our route, and the aircraft herself, that not once was her take-off delayed by any fault or failure.

It is of interest to add that an important task during the trip was the making, professionally, of the colour film, "A Date with Iris," and for this we were carrying a unit of Pathè Films. Apart from providing a record of the flight, the intention of the film is to show the public the conditions under which R.A.F. personnel, men and women, serve in overseas establishments and the sort of places to which sons, husbands and daughters are posted during their service with the Royal Air Force. As such, it should be of great interest, and in due course you will be able to "see it at your local cinema."

In Conclusion

On a personal note, perhaps I should apologise to many G's who found I was not on the air very long at each session. The reasons for this were that my first consideration was to work G8FC, our own "base station"; secondly, to make personal contact with as many local amateurs as possible wherever we happened to be; and thirdly, to do all I could towards forming an R.A.F. Amateur Radio club and see it firmly established before we left. This did not leave me a great deal of time for going on the air, though I usually managed two or three hours most evenings. I must also acknowledge the co-operation, which was deeply appreciated, of many



VS2DQ, XYL-2DQ and G3IDC (right) at Kuala Ketil, Malaya. Wherever he made himself known on his long journey, G3IDC was overwhelmed with hospitality. The gear was set up here and operated as G3IDC/VS2.

amateurs who, hearing my tiny signal endeavouring to raise G8FC, moved off the frequency to make things a little easier for G3GNS, who did most of the operating on G8FC.

Finally, my abiding impression of this trip is, as ever, the fine bond of fellowship between radio amateurs all over the world. It was always in evidence; the hospitality was overwhelming and generous to a degree. Indeed, it was of a kind that we should be glad to reciprocate a little more freely whenever the opportunity occurs.

This wonderful hobby of ours, combined with this particular flight as a member of the *Iris* team, gave your correspondent the unique opportunity of meeting in person many amateurs who before had only been known as "fist or voice." What an experience!

HOLIDAY CONTACTS IN BELGIUM

If you are going to Belgium on holiday, or on business, you can make personal contact with ON4's by noting the following details: *Antwerp,* any Thursday, at 8.0 p.m., at Bass, Keizerlei; *Bruges,* Wednesdays, 7.0 p.m., Steenstraat 75, Vieux Bruges; *Brussels,* Fridays, 8.30 p.m., Limousin, Avenue Marnix 29A; *Charleroi,* 1st Saturday each month, 7.30 p.m., Café des 8 Heures, Place Charles II; *Ghent,* Wednesday or Sunday evenings at Lange Kruisstraat 4; *La Louvière,* last Saturday but one each month at Hotel du Commerce, 6.30 p.m.; *Liège.* 2nd Thursday each month, 8.0 p.m., Hotel d'Angleterre (behind Thèatre Royal); *Malines,* 1st and 3rd Friday each month, 8.0 p.m., at ON4ED, Leopoldstraat 25; *Mons,* last Saturday each month, 5.30 p.m., Novada, Grand Place.

These are meetings of the local ON4 groups, at which visiting G's would, we are assured, be specially welcome. No prior arrangement is necessary, though contact can be made by telephone with ON4IB, Bruges 34540, who is city manager for UBA, the Belgian Amateur Radio organisation.

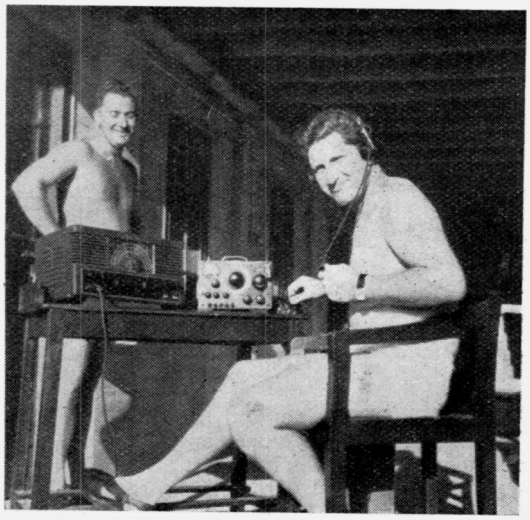
G.E.C. EQUIPMENT FOR GENEVA-ZURICH MICROWAVE LINK

The General Electric Co., Ltd., of England, has supplied the equipment for another microwave radio television link in Switzerland. It connects Uetliberg (Zurich) with La Dole (Geneva), and on the way ties in with the trans-Alpine Chasseral-Monte Generoso link, which was supplied by the G.E.C. 12 months ago for the Eurovision exchange of programmes. The new link forms part of a television network which will cover most of Switzerland.

NEW TELEVISION DOWNLEAD CABLES

British Insulated Callender's Cables Ltd. have recently introduced a new range of television downlead cables incorporating cellular polythene insulation. They have been developed as an answer to the problem of the increased cable attenuation which occurs at the higher frequencies at which commercial television will be operating. The range of BICC solid polythene-insulated cables introduced some years ago specifically for television downleads has proved completely satisfactory for all reception conditions associated with Band I frequencies. The development of Band II (frequency-modulated sound) and Band III (television) broadcasting, however, introduces new problems arising basically from reductions in anticipated signal strengths and increased losses in the aerial downlead—inevitable when using higher frequencies. Thus the attenuation in any cable is approximately doubled when changing from 50 mc to 200 mc.

In general, attenuation can be reduced by increasing cable dimensions or by the use of alternative materials as the dielectric. Research has shown that cellular polythene provides the most effective and practical alternative, since it has a very much lower dielectric constant than solid polythene, although its electrical characteristics, such as dielectric loss and insulation resistance, are comparable. Also, the attenuation values are comparable with those of semi-airspaced cables, without their inherent susceptibility to the ingress of moisture.



At R.A.F. station Mauripur, with G3IDC's little transmitter to the right of the Eddystone receiver. These two happy-looking chaps (dressed for the climate) are F/Sgt. Currie, on the key, and S/Tech. McCafferty, G3IBW; the latter will shortly be on the air with a VS1 call.

CHANNEL ISLANDS TELEVISION STATION

Work is in progress on the BBC Television Station at Les Platons in Jersey, which is to serve the Channel Islands, and it is hoped that it will be ready for service in September this year. For the first few months the transmissions may not be up to the final standard, because the Wenvoe reception link from the mainland may not be consistently reliable until the permanent station at North Hessary Tor in South Devon is completed about the end of this year. Subject to this qualification, the station in the Channel Islands will carry the full TV programme service.

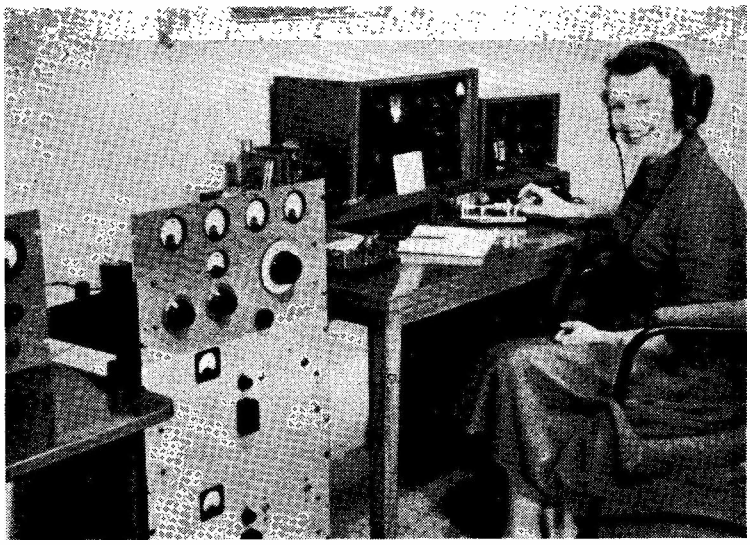
DX COMMENTARY

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

A SURPRISING number of letters are to hand concerning last month's preamble, in which the view was aired that this should be a real Commentary rather than a series of lists of DX worked, heard or missed. Every one of our correspondents on this theme is in agreement, some of them even swinging too far and stating that nobody is really interested in what stations the other fellow has worked. We don't propose to go to either extreme.

While one realises that nothing is so boring to *some* people as long lists of DX call-signs which they have never even heard (and, possibly, have no hope of hearing), we also feel sure that pages and pages of generalities about the DX bands would only be rubbing in what any intelligent reader can find out for himself. The middle course is once more the best, and until someone convinces us that we are mistaken, we shall be glad to record the first tentative DX sallies of the newest G3 with as much enthusiasm as we can work up over the fact that old G6 . . . has just raised VR2 for the nineteenth time, although his next-door neighbour has never even heard one.

So, please, we want your *comments* on the bands and their particular goings-on, just as much as your personal catalogue of successes and failures. Anything funny, interesting or merely excruciating . . . . all equally welcome if they have some bearing on this mysterious subject of DX, which no one has yet been able to define. (Incidentally, we will offer a small prize to the reader who supplies, in our opinion, the best attempt at a definition of those two exasperating letters.)



OD5AF.

CALLS HEARD, WORKED and QSL'd

Conditions on the Move

There is no doubt that the bands are changing, although there is no evidence of any spectacular improvement in all-round conditions. But, apart from the swing from winter to summer DX, one notes all sorts of little pointers from time to time. *Twenty* is now open practically throughout the twenty-four hours. The KH6, KL7, W6 and W7 DX is often there in the early mornings (0800 BST is still quite lively, if you don't believe in early rising); and at some time in the night there is a change-over from East Coast to West Coast W's, during which the aspirant to a WAS Certificate can pick out a few of the rarer States. Daylight conditions vary from day to day, but keep to the old pattern—after the West Coast W's comes Oceania, then Asia, then the East Coast W's again, then South Africa, and finally (most nights) South America, sometimes with an overlay of East Coast W's throughout, sometimes without them.

Now we feel that *Fourteen* should be following a similar pattern by now, if there were sufficient activity to show it up. One or two Sundays have suggested that this is so, but in one respect it is more like *Ten* than *Twenty*. Those who remember *Ten* when it was wide open will recollect that the period 0900-1100 was very often one of the best times of the whole day, with Asia, Oceania and the Pacific, and sometimes even South Africa—all coming in well. *Twenty* is like this sometimes, but one tends to think of it as dull after 0930 or so, until the mid-day DX starts up. We have a strong hunch that *Fourteen* will be at its most interesting in the mornings, once conditions are good enough to

ensure that it is well populated. Also, it should have the advantage that Europeans are a bit more subdued, and we should not have that S9 screen of II's and SM's to break through.

New Ones

Two new countries appear on the list for DXCC credits, and will be adopted for the other well-known DX certificates. They are listed as Saint Martin and Sint Maarten. The former is defined as all French territory between the limits of 17 and 19 deg. North, and 62 and 64 deg. West. The latter refers to all Netherlands territory within the same boundaries, and, of course, includes PJ2MA, recently active from those parts.

The ARRL still refuses to recognise Sicily as a country separate from Italy, which has incensed the IT's considerably, to the extent of putting out a proclamation that they will neither work nor QSL W stations until they are recognised. Of course, this decision does not hurt the W's at all, since, for the moment, the IT's are just ranked as another II!

Top Band Topics

No further DX is reported on *One-Sixty*, but we read that stations active on the band now include KH6IJ, KL7TM, KG4AB and XE2OK. Seems to us that on this band we now have plenty of DX activity under the wrong conditions, while on *Fourteen* we have good conditions and not enough activity . . . .

WABC remains a very popular certificate, as the list on another page will show. County-chasing seems to be a kind of apprenticeship to world-wide DX work, attracting many of the newer G3's. At least one G3K . . is well in the running for WABC already. The scores in the Top Band ladder are continually being changed, as are the positions, although G5JM (Buckhurst Hill) has consolidated his hold on the upper rung with a new high of 96/96, which is going to be hard, if not impossible, to beat.

G3FAS (High Wycombe) has jumped 18 counties in one report, with the GM3IGW Expedition's three, and G3GQS/A (Scillies) included. G3JHH (Hounslow) now has his full quota of QSL's (77/77). G3JEQ (Great Bookham) is the highest-scoring G3J . . , with 90/90, and he queries the maximum score. We used to make it 98, but, with the Scillies in, it looks more like 99 at present. We really ought to stir up some activity on Lundy Island, if only for an excuse for making it the 100!

G3HDQ (Woodford) suggests a separate ladder for Counties worked on phone, and a phone WABC. We are game, if there are sufficient entries; so send in your phone scores separately if you are interested. G3CO (London, S.E.14) has heard a buzz that G5PP/P will be off again over the Whitsun week-end, but that will be all over before this reaches you.

G3KEP (Bingley) would like a Junior Net on the band, for operators under the age of 18. He suggests Saturday evenings, 1900 hrs on 1980 kc, and will be there himself, probably with G3KEA and G3JKM.

G5FA (London, N.11), after having been off One-Sixty for eighteen months, suddenly came to life and polished off his WABC In this he was helped by GM3IGW/A and G3GQS/A. (In passing, it occurs to us that it must be very gratifying to these portable lads to think of all the activity they can inspire, and all the people they are keeping out of bed!)

G3IQO (Liverpool) was recently operating a one-watt battery transmitter from Ashurst Beacon and Pex Hill, Lancs. He would appreciate reports from anyone who heard G3IQO/A, as the receiver was rather indifferent at

PA0VD, Rotterdam, is ex-PK4VD (1947-'48) and now has a neat living-room layout running, as he says, "moderate power." The transmitter is EF50-EF50-6V6-807, covering 3.5, 7 and 14 mc, but operated mainly on 40-metre CW; the power supply is on the same chassis as the transmitter, the whole of this part of the assembly being in a BC-348 cabinet. Receiver is an HQ-120 and the aerial a 7 mc doublet. Some 55C have been worked post-war on Forty.

the time. Also, he would be glad to meet anyone interested in a trip to some rare county this summer. Finally, he forwards news from G3JXE, who was aboard the trawler *St. Nectan* on December 9, and logged several stations when he was 33 miles W.S.W. of Bear Island—DX some 1500 miles, or about the same distance from Liverpool as London is from Ankara. Among the loggings were G3KAT (349), G3IMP (549), G2BB (569), G3HHV (449), G3JVI (569), G3HGD (569), G3ATU (55/69), GI2CVS (569), GM3DOD (569) and GM3EFS (559).

TOP BAND COUNTIES LADDER

(*Starting Jan. 1, 1952*)

Station	Confirmed	Worked
G5JM	96	96
G2NJ	95	95
G3HIS	94	94
GM3OM	93	95
GM3EFS	93	93
GI6YW	93	93
G5LH	92	92
G6VC	91	91
G3JEQ	90	90
G3CO	87	88
G5JU	87	87
G3HIW	86	90
G3EUK	82	88
G3BRL	78	79
G2AYG	77	78
G3JHH	77	77
G3FTV	73	81
G3IGW	72	82
G3DO	71	72
G3GYR	69	70
G3JKO	68	79
G3HZM	63	68
OK1HI	62	62
G2HAW	61	70
G2HKU	61	62
G3JBK	60	71
G3FMZ	60	68
G5FA	60	66
G3FAS	58	71
GM3JNW	58	68
G3JJZ	57	69
G8CO	49	64
G3KEP	48	67
G3FTV/A	47	65
G2CZU	46	47
G3DGN	43	59
G3JJG	42	55
G3IAD	38	59
G3JZG	33	49
G3JYV	33	48
G3FNV	31	54
EI8J	31	47
G3HQT	30	36
G3JVK	24	39
GM3JZK	23	37
G3HQT	20	29

G6VC (Northfleet) makes it 91/91 with a Selkirk QSL, but still wants to work Peebles, Perth, Sutherland and Wigtown. G3HKQ (Worksop) claims his WABC, and wants to know if anyone else heard ON4IF calling "Test," and later "CQ" on Top Band. He worked him, and heard others in QSO, but still wonders if it was "all right."

G2NJ (Peterborough) takes the second place on the ladder with 95/95 (the first 91 were worked on a crystal-controlled rig). G3HIS (Cubley) goes into third place with 94/94. Thus, for the first time, we have three G's heading the list, and doubtless GM and GI will have something to say about this at a later date!

GM3DOD (Greenock), claiming his WABC, says that there are three of them active in Renfrew—himself, '3JKG and '3HZA, with a very occasional burst from '3HZN. GM3DOD started on the band last November, and has had 260 contacts since then. "I came on for CW practice," he says, "and, by golly, I got it!"

The DX on Twenty

We have already hinted that there is quite a lot doing on this band throughout the twenty-four hours, and there is certainly no limit to what one can winkle out with the necessary time and patience. Unfortunately, all our correspondents this month complain of lack of time, what with gardens, interior decoration, XYL's and all the other hazards that beset us. Between them, though, they have cleaned up quite a bit.

G3DO (Sutton Coldfield) worked VS5CT (Brunei) on phone for a new one. G3TR (Southampton), also on phone, found evening conditions excellent for South America, and afternoons very good for the East, although the only new one for him was AP2U—his 150th country on phone.

G5BZ (Croydon) had a nice bag on CW, including FI8BG, VP8BD, KA5CW, ZD6BX, FB8BR and KG1AA. (Don't get worked up about that last one—KG1 is the new prefix for U.S. personnel in Greenland, OX being reserved for the Danish types). 'BZ also worked the mysterious MP4JO and queries his QTH.

LB1LF, whom we recently mentioned as being active on Jan Mayen, had the misfortune to be attacked by a dog, and to lose a hand as a result; he was rushed back to Norway by air, and has now recovered, but remains there as LA1LF. Readers who worked Arne will join us in our commiserations on this very unusual accident.

MP4QAL (Qatar) is still keeping that country on the air, although 4QAK is on his way back home and the others also seem to have left.

The mysterious G7DW/MM, mentioned a month or two back, is real. He is on a world tour, alone, in a forty-foot boat, and is becoming interested in operating from those rare spots. Various DX Clubs in the States are planning to subscribe for some good gear. Operation at present is strictly unofficial, but there are hopes of getting it legalised, possibly with a VP2/MM licence.

MP4JO (14035) is a W6 operating under cover, and we do not yet know his exact QTH. He certainly raises a tea-party every time he shows up, but that may be more from hope than from genuine information.

Among the exotic ones known to be active on *Twenty*, but not necessarily workable from here, are VR3A and VR3C, ZD8AA, ZC2PJ (Cocos), KC6CG, VP5BM and 5DC (Turks Is.), C8GA (Peiping) and BV1US (Formosa).

DX on Fourteen Metres

Some very encouraging reports are to hand about *Fourteen*. Not only are conditions improving on

Short Wave Magazine
DX CERTIFICATES

The following have been awarded since the publication of our last list, in the February issue:

WFE
No. 20 W6GPB (San Rafael)

WABC
No. 81 G2HAW (Hounslow)
82 G3ILN (Ossett)
83 G3HZM (Manchester)
84 G3ITY (Chester)
85 G8KU (Scarborough)
86 OK1HI (Prague)
87 G3FMZ (Keighley)
88 G3HOI (Compton Bassett)
89 GI3IVJ (Belfast)
90 G5FA (London, N.11)
91 GI3JEX (Belfast)
92 G3HKQ (Worksop)
93 G2HKU (Sheerness)
94 G3JBK (Bexleyheath)
95 GM3DOD (Greenock)

FBA
No. 47 OZ7BG (Copenhagen)
48 W1VG (West Hartford)
49 W9ABA (Wilmette)
50 PAØSPR (Bussum)

WNACA
No. 77 DL7AH (Munich)
78 ON4QX (Antwerp)
79 EA4BH (Madrid)

Details of MAGAZINE DX AWARDS and CERTIFICATES, and the claims required for them, appeared in full on p. 323 of the August, 1954 issue.

the new band, but operators all over the world are waking up to that fact. GW3AHN (Cardiff) now heads the ladder with his score of 117 (93 on phone), and is very pleased with the way things are shaping. He reports terrific signals from MP4KAC in the early evenings, and equally good stuff, later, from the West Indies, Central and South America. New ones since the last report are VP8AQ (South Shetlands), VP4LL and two VP7's all on phone.

G3HCU (Chiddingfold) also pulled in VP4LL to score 102 on phone. Others worked by him were VP5, 6 and 9, KZ5, SU, 5A, ZC4 and ZS. He reports that on May 12 the band did not fade out until 2330 GMT.

DL2RO (Hamburg) sends a 21 mc-only report this time, and says he has improved his reception a full two S-points by putting up a ground-plane instead of his good old half-wave dipole. He, too, has found Africa, Central America and the West Indies uniformly good, but better QSO's for him were with JA3AH (0915), VR2CG immediately afterwards, VS6CQ, VK6RU and HZ1HZ. This was all on April 24, a really good day, and JA3AH was still there, S7 at 1130. After that, nothing in the real DX line appeared until late in the evening. The above-mentioned were on CW, but phone contacts included MP4KAC, VP6FR, ZS9G, OQ5HL and KZ5KA—all 1700-1900 GMT.

G3KCT (Cosford) is ex-VS7DB. During a quick look on 21 mc he heard ZB1AJX, 1JAH and 1JRK, all putting in strong signals.

G5BZ raised CT3AN on phone for a new one, also MP4BBE and LU9DAZ on CW. G2YS (Filey) got FF8AJ, who is in French Guinea and useful for the DUF. G2BJY (West Bromwich) puts his score up by two, with HC1WL and EA6AT.

G3TR (Southampton) has jumped to 98 on phone, with the help of HK, VP9, PZ, ZD3, VP8, VS2 and SU. He thinks the band is still very erratic, in spite of some excellent openings. SWL Healey (Horsham, Sussex) sends an interesting 14-metre list, of which the better ones come from CX, EL, FF8, OD, TA, VP6, VP8 and ZS3—all on phone.

Ten Metres

Down in the forest something stirred, this particular forest being more like a desert—the ten-metre band. DL2RO heard from VQ4AQ that contacts between VQ4 and LU, PY and ZS were now commonplace. G3HCU has found CT, EA, LU, PY, OQ and ZS on, but hasn't got his Tx going yet.

GW3AHN reports a good opening on May 3, when he worked CX4CS and LU3AAT, 5AE and 5DC, all on phone and with reports of S7 to S9 plus. He has heard the same stations several times since, usually peaking around 1930 GMT, so he thinks something really is stirring at last.

G3CO corrects a slight error in these columns last month, when the stations quoted as having been heard by him on Fourteen were really on *Ten*—again, they were strong ones from South America.

Strays

G3JHH raised SP9CS for his first SP on *Eighty* . . . DL2TH (Buckeburg) is going great guns on *Twenty* now and has made his DXCC with CP5, HH, HZ, KR6MC, KV4AA and 4W1AB. He doesn't know where the latter is, but he should be in Yemen . . . G3KCT has been working *Forty* since April 1 and has raised most of Europe as well as a mysterious customer signing ZM2AJ (?).

G2BJY also worked *Forty* from mid-December until March, and

raised some West Coast W's but no other DX; now he is playing with two N.Z. ZC1 transmitters, one on *Eighty* and one on Top Band, and finds the QRP work very fascinating.

G5LH (Horbury) has a new band-switched rig going, mostly on Twenty and Eighty phone . . . G2HKU has a new TVI-proofed rig in the testing stage, OK on Eighty, and he hopes to be on the HF bands as well . . . GI6YW passes on the sad news that G5WD, of Sutton Coldfield, must be listed as a Silent Key. He was old GI5WD, of Belfast and Portrush, whence many Old Timers will remember him from the early days.

One for the Glossary, from G3JHH:

> "Had a QSO with you-know-who, on a frequency of you-know-what, and discussed Project A" :—(I hope I have a vast listener audience and they are all suitably impressed).

One-Act Playlet

Scene : Around 14100 kc.
Time : 0800 GMT.
Enter KH6ACD, calling a short CQ. *Exit.*
Enter miscellaneous rabble, calling KH6ACD for some two minutes. One character remains aloof (some 20 kc aloof) and shows individuality by calling "KH6CAD" for nearly five minutes.
Re-enter KH6ACD after about 30 seconds, replying to a clear-cut type who called him for only that length of time. He is just audible through the miscellaneous rabble, and finishes his lines just as their shouting dies down. Thus, when they finally listen, he is no longer there. So they all return to the scene and repeat their parts.
KH6ACD and the clear-cut type try their best to maintain an earnest conversation through the rude noises of the crowd, but eventually part, with grave salutations, and leave the stage on either side.
Rabble, Greek Chorus and the rest continue to shout for KH6ACD with ever-increasing ferocity, including the individualist, who must by now be well outside the theatre, still calling "KH6CAD." *Curtain* (we switched off).

This, we regret to state, is just a typical occurrence on *Twenty*, and is an object lesson in the wastage of watts. Practically all the time the rabble were in full cry, KH6ACD was actually transmitting, and his contact was presumably just managing to receive him through the din. It could all have been avoided if everyone had made an initial call of 30 seconds or less, instead of going on for two minutes. Do people still exist who imagine that if they haven't tickled the DX man's ear in 30 seconds, they will have a chance of being heard two minutes later? Possibly it takes them two minutes to hear anything themselves—or a minute and a half to change over? We regret to state that one or two G's were observed among the crowd, but they were not the worst offenders.

DX Miscellany

VS2DW (Ipoh) thinks VS2 must still be a rare spot, judging by the scramble on his frequency after a CQ. He normally enjoys rag-chewing on phone with 4S7, XZ, VU, KR6 and the like, but comes on the bug "to give the boys a chance." This has now developed into "nightly bug-smashing with nothing but swopping of RST's." He uses a modified BC-610 (150

G3KEA is in Dryden House at Oundle School and was licensed in January of this year; the gear is set up in his study and so far as school activities allow (prep., and so forth!) he is one of those G's who keep the 40-metre band going.

watts) and a dipole, and is quite a potent signal in the U.K.; QSL's on receipt of the other man's card.

VS2CP (Rengam, Johore) writes that he will be on leave in England by the time this appears; he mentions that VS2EB has left Malaya for good, and that VS2DQ will be off in June. These three stations all used 20-metre beams, and '2CP hopes that other VS2's will follow suit, to maintain the potency of the signals from that part of the world. VS2CP's own beam, now dismantled and in store pending his return, is a 4-ele wide-spaced job on a 42-ft. boom, but it weighs about 80 lbs. only; the element spacing is 0.2 w/l, and it is carried on a home-made tower 40 ft. high.

G2TA (Wealdstone) has returned to the air after a long absence, to a specially-chosen QTH 500 feet above sea level, and is astounded at the difference it makes. Results this year seem to be as good as they were from the old location five or six years ago. The first six VK's called all came straight back, as did four out of five ZL's, and some 48 countries have been worked in the first 60 hours of operation. Times on the air amount to fifteen minutes before breakfast and after lunch, with half an hour in the early evenings. Nice QTH, that!

G2YS tells us that ZD9AD will be on the DX bands from Gough Island during the coming winter. . . . ZD3A is often on 14060, around 2000 GMT. He is genuine, and QSL's should go to Box 285, Bathurst . . . FD4BD, if you hear him, is ex-FD8AB, still in Togoland . . . ZD8AA is well known by now, and gives snappy QSO's to all and sundry—but don't sit on his frequency . . . JZØKF has left New Guinea, but JZØAG is holding the fort. Frequently around 14100 kc, 1300-1500 GMT. . . . Nice phones on Twenty, if you can find them, are VS5CT (14110), CR5NC (14160), KC6UZ (14230), VK9BS, 9RC and 9SP (various) and FR7ZA (14190).

Two cases of piracy are reported. G3IUB (Bordesley Green, Birmingham) suffers from a pirate using his call on phone, calling himself Max and other names; 'IUB himself uses only QRP CW. G3KFL, the real one, is rock-bound on Eighty, but there is a pirate using his call on Forty; the real one is an ex-member of the YI2AM Club, and would like to meet any other ex-members on 3510 kc.

Skeleton Slot on HF

In a very interesting letter, VQ4EU (Nairobi) describes his results and experiences with a Skeleton Slot designed for 14/21 mc (it covers both bands) from the data given by G2HCG in his article in the January issue of SHORT WAVE MAGAZINE. Between March 12 and April 20, VQ4EU made 184 contacts using this aerial; 152 on the 21 mc band, and 32 on 14 mc. Coverage has been world-wide, with signal levels of S8-9 in and out. Altogether, in the words of VQ4EU, it "has been producing wonderful results, particularly on 21 mc"; it is a very effective low-angle radiater. His dimensions are 30 ft. high by 10 ft. wide, with the bottom section only 6 ft. off the ground, construction in 1-in. diam. dural tube; feed is by open-wire line (160 ft. long) with a 300-ohm matching section. The gain over a 137ft. long wire is 3 S-points in the best directions! Because this Skeleton Slot is also producing loud signals from South America on the *ten*-metre band, VQ4EU hopes shortly to be fully operational on 28 mc as well as on 14 and 21 mc, using the Slot as a beam for all *three* bands. (If this design had originated in Northampton, Mass., instead of in Northampton, Eng., we would have heard much more about results like this long before now! Let it be noted, therefore, that the HF Skeleton Slot is due entirely to the original work of G2HCG.—*Ed.*)

New Abbreviations?

In what we might call "well-informed circles" there is a strong feeling that our procedure might need smartening up in preparation for the stirring times ahead. Remember that when conditions are on top of their form, there will probably be at least twice as much activity as there was in 1947-8. A lot of it will be concerned with snappy working of new countries (hopefully!) and, whatever you think about rubber-stamp QSO's, you must admit that they have their uses at certain times.

One suggestion passed to us is that stations *not* on the chase, but wishing for leisurely rag-chewing contacts (and everyone has the right to do just that) should call "CQ RC." Wanted — another abbreviation for those who wish to make some short and snappy ones.

Admittedly it is up to the rare DX station himself to decide how he wishes to dole out contacts, and if he is wise he will never call CQ at all.

Other sensible suggestions that have come our way are "QSLB" (for "QSL" *via* Bureau"), "QSLD" (for "QSL Direct"), and "QSLA" (for "Will QSL

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
GW3AHN	117
G4ZU	115
G4ZU (Phone)	110
G5BZ	110
VQ4RF	108
DL2RO	104
G3HCU (Phone)	102
G3TR (Phone)	98
G2WW	98
GW3AHN (Phone)	93
G3DO	84
G2BJY	83
G6QB	82
ZS2AT	80
G2VD	80
G2YS	79
G3FXB	77
G3CMH	71
G3CMH (Phone)	68
GM2DBX	67
ZB1KQ	64
ZB1KQ (Phone)	63
5A2CA (Phone)	60
GM2DBX (Phone)	58

after I receive your card"). If there is a strong feeling that any or all of these are necessary, we will take the matter up with some of the leading DX Clubs, who will propagate the ideas. It doesn't take long for a new one to get known among the real DX-chasing fraternity, who all read the same journals and, in broad terms, all work the same stations!

The ideal state of affairs, it seems to us, would be for the "rare" station to be allowed to make his own contacts, his own way, unmolested for part of the day at least; and then for him to give forth a code word meaning "Let Battle Commence," meaning that he would give quickies to all and sundry—the more the merrier—but *not* to those who monopolised his own frequency or generally behaved themselves like clots.

Any ideas on this subject will be welcomed and thrown open to discussion. We must be ready for the big DX breaks that are coming. Meanwhile, the dead-line for July is **first post on Friday, June 17.** For the benefit of overseas readers, the one after that will be *Friday, July 15.* Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Until next month, 73, Good Hunting, and—BCNU.

DX COMMUNICATION FORECASTS

CHARTS FOR JULY 1955

R. NAISMITH, M.I.E.E.

THE forecasts given on the charts refer to the month of July and to radio communication by way of the F2 region of the ionosphere. As already indicated, they refer to the mean values for the month, and there may be a fair day-to-day variation. In general, when the maximum usable frequency is higher than the predicted value there is no difficulty in maintaining communication on the frequencies denoted on the charts. It is the days of ionospheric storm or near-storm conditions which are liable to cause the greater trouble. These are, however, not so serious in these summer months, since radio transmission will frequently be continued automatically in the daytime by reflections from the lower regions E and F1. The MUF for these regions is only slightly below that given in the forecasts for region F2. Magnetic storm effects in regions E and F1 are very small indeed compared with the effects in region F2. It follows that in the summer months it is possible to work closely up to the predicted frequency.

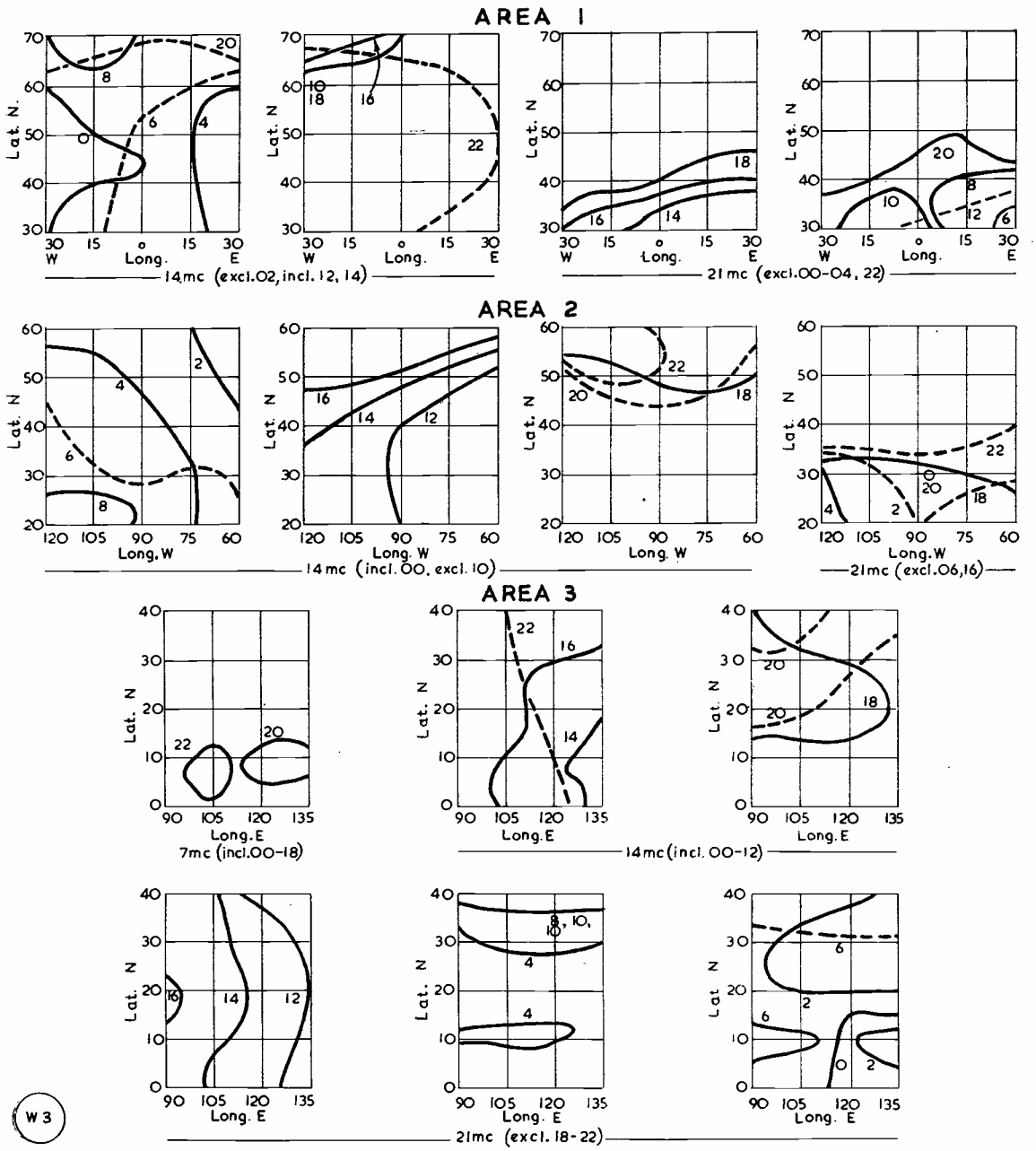
Sporadic E Propagation Effects.

At this season of the year there are frequent reports of somewhat spectacular type of transmission which, strangely enough after a quarter of a century of observation, still leaves the cause of the phenomenon something of a mystery. There have been all kinds of suggestions, varying from thunderstorms to meteors and including particles radiated by the sun. As frequently happens in cases of this kind, there are different causes producing a similar effect. From the point of view of readers of SHORT WAVE MAGAZINE, the chief effect of this sporadic-E type of propagation is the possibility of easy communication over long distances on the higher frequency bands using very low power.

Here again, although radio amateurs have already contributed a great deal of useful information on medium distance VHF communication, much of it is difficult to interpret in terms of Sporadic-E conditions, since it might equally well have been due to refraction in the lower atmosphere. It is for this reason that, although the cases are less frequent, the long-distance VHF observations are more readily interpretable. The great increase during the last few years in the number of television transmitters in the VHF band and the more widespread use of the new VHF frequency-modulated transmissions, coupled with reports from radio amateurs, should provide a wealth of observational data from which it will be possible to estimate the places of concentration and the rate of movement of the sporadic clouds, perhaps leading ultimately to the cause. Apart from the general statement contained above, that this phenomenon is observed most frequently in the summer and in the daytime, supplemented by the statistical relationship established from past experience, the sporadic nature of the effect makes it unsuitable as a subject for forecasts! While it may be an explanation of communication on frequencies higher than the predictions suggest, it is always advisable to explore the situation carefully before accepting Sporadic-E as the authentic explanation.

Sudden Ionospheric Disturbances (S.I.D's)

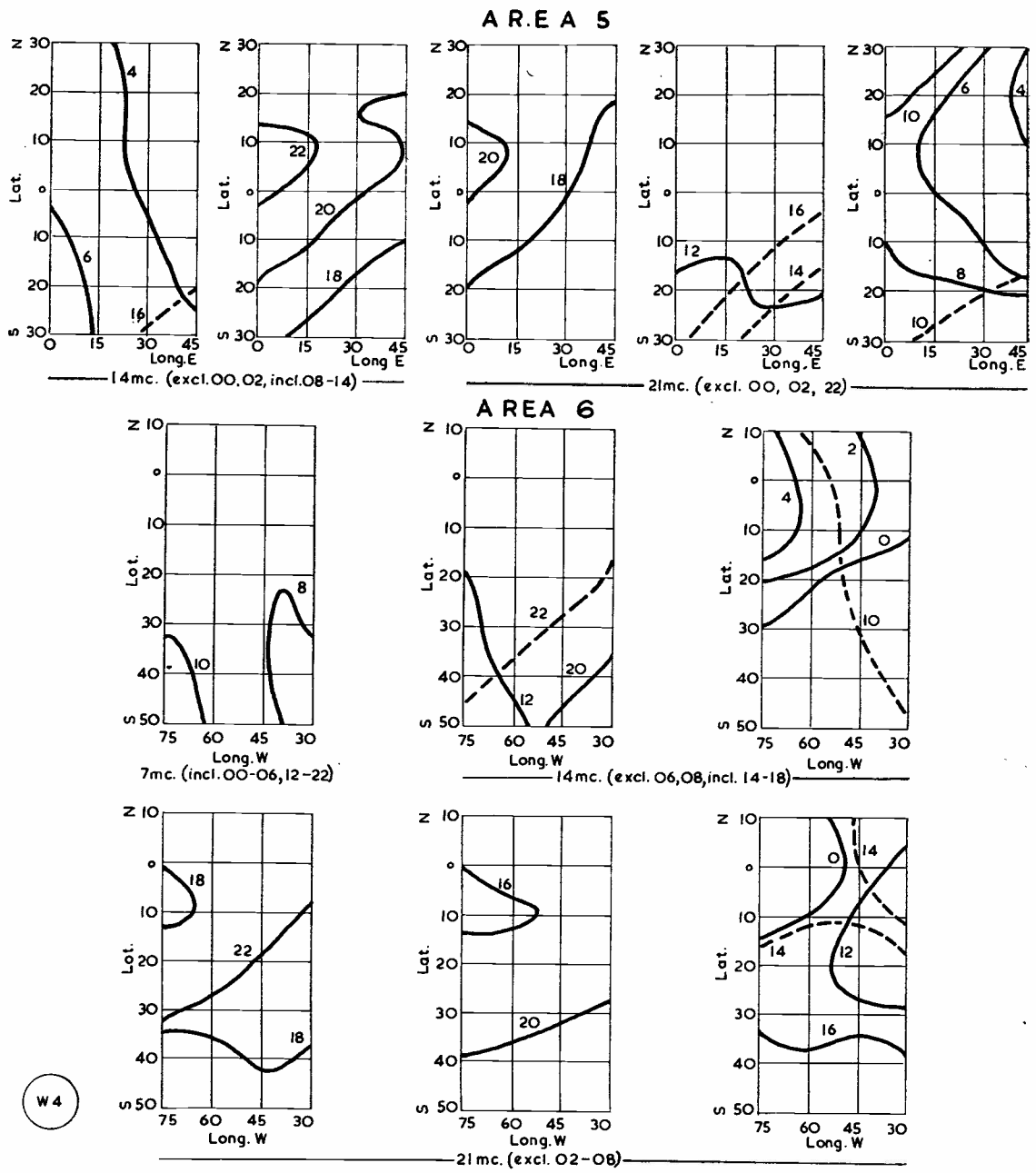
Among the many natural phenomena affecting long-distance radio communication, the number of "Sudden Ionospheric Disturbances" (S.I.D.'s) observed in recent years has been very few. However, it is well to remind ourselves that, in passing from the present sunspot minimum conditions, there will be an increasing number of these in the months ahead. They are associated with a chain of events which began as a Solar flare. This, in turn, is frequently associated with a sunspot. The S.I.D.'s are of considerable scientific interest and, for that reason, are well worth reporting in as accurate a form as possible, particularly in relation to the time of observation. The impact on the ionosphere is generally so sudden it may appear as if the station to which one is listening has abruptly closed down. Since they are caused by a sudden burst of ultraviolet radiation from the sun, the effect on the ionosphere is limited to the daylight hemisphere. There is, however, a secondary effect which may affect any part of the world some hours later. This is due to the burst of particles emitted at the same time as the eruption on the sun. These particles travel much slower than light and arrive some hours



later than the S.I.D.'s. On arrival in the earth's atmosphere they may cause a magnetic or ionospheric disturbance.

The observational aspect of the S.I.D. has had an interesting history. They were observed fairly frequently in the 1928/29 sunspot maximum period, and were attributed to working too near to the maximum usable frequency. Their absence in the following 1932/33 sunspot minimum appeared to confirm the deduction that higher frequencies could be used at sunspot minimum than at sunspot maximum, which, of course, is quite incorrect.

Then it appeared difficult to explain why an increase in ionising radiation occurring on the sun should cause worse conditions for radio communication. This is, of course, only part of the observation, because during an S.I.D. radio communication is actually improved in the long-wave part of the spectrum. It happens that the reflecting region for the long waves and the absorbing region for the short waves are situated near the same level in the atmosphere. The effect of this increase in the



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absorbing region affects the amount of energy reaching the higher regions E and F from which it is reflected. Although the onset of the disturbance is generally very sudden, the recovery is more gradual. The effect may last from a few minutes to several hours.

Another interesting property of this radiation is its ability to pass through the normally reflecting layers without making any appreciable alteration to them. An important consequence of this observation is that if the frequency in use is right at the time an S.I.D. begins, it will still be right when the effect of the S.I.D. ceases. No gain will therefore result from changing frequency.

On the other hand, in the case of really long-distance transmission and if the S.I.D. occurs near the beginning or end of the day, it may be possible to restore communication by working over the dark path—if one exists.

AMATEUR RADIO — For The Beginner

PART III

WIDE-RANGE DC TEST METER

By **A. A. Mawse**

LAST month we were considering means of measuring current, voltage and resistance — a meter of this kind is indispensable, whether you pay in the region of £10 10s. 0d. for a commercially-made job which will measure both DC and AC, five guineas or so for a DC model, or decide to make your own instrument—as I have done—contenting myself with a design which will respond only to DC for the sake of simplicity, backed up by a moderately-priced 0-20 volt moving-iron AC meter for measuring heater voltages and low-voltage AC ranges.

The basic movement consists of a 0-1 milliameter with a nice open scale, marked off into fifty divisions —these are still readily available on the surplus market—and this was built into a small chassis. The exact size is not critical, but I found one measuring 2½″ x 6″ x 8″. to be convenient. The internal resistance of these meters vary from type to type, but it is usually marked on the scale in very small figures. Mine was 100 ohms and, from the formula $E = I \times R$, it is easy to see that a full-scale reading would be obtained with an applied voltage of 0.1 volts, or, in other words, its sensitivity is 1000 ohms per volt.

I decided upon four voltage ranges: 0-10 ; 0-50 ; 0-250 ; and 0-500 ; and four current ranges: 0-1 ; 0-25 ; 0-100 ; and 0-500 mA, as being most suitable for general requirements, and, in addition, made provision for resistance measurements up to about 100,000 ohms.

Assembly and Chassis Work

Having decided upon the basic design, the next thing was to assemble the required parts, and a list of these is given herewith, which should be studied in conjunction with the wiring diagram. The setting out of the main parts on the chassis presents no difficulty, and if you look at the photograph of the finished instrument you will see that the meter and selector switch and input terminals are fitted to the top of the chassis and the single variable resistor (which is of the pre-set type) is accommodated on the front. Having marked their respective positions, proceed to drill out the necessary holes: In regard to the hole for the meter, if you have a hole-cutter in your kit, this is a simple matter—it is just a case of setting the cutter to the correct radius and using your carpenter's brace to work on the chassis from both sides. If you are less fortunate, then the way to set about it is to scribe a circle slightly smaller than the desired radius and centre-punch round this circle a large number of points fairly close together. Then, with a suitably-sized drill, make a ring of holes and finally, with a metal block underneath the chassis to provide support, link up these holes with the aid of a cold chisel and hammer. It should then be possible to knock out the centre without damage to the chassis and finish off with a half-round file.

Before the actual assembly, we come to the question of what kind of finish to apply to the visible side of the chassis. There are many to choose from: One is the bright finish produced with the aid of metal polish, a rag and elbow grease (this looks very effective for a short time, but tends to finger-print rather badly and also to tarnish with age) ; another is to apply one of the wrinkle finishes which can be obtained quite easily (this looks professional, but I have never tried it) ; another is to immerse the chassis in a solution of hot washing soda for a few minutes—a chemical reaction is set up and the metal-work becomes white with a satiny-matt appearance. When this is obtained, stop the process and rinse off thoroughly in cold running water, drying with a soft cloth. This is effective but sometimes, owing to impurities in the metal, is inclined to be somewhat patchy.

There is a very interesting method, described by G3FLP on p.27 of the March issue of SHORT WAVE MAGAZINE, using " Vim," " Ajax " or a similar household cleaner, which would be worth trying. I happen to be the fortunate possessor of a Wolf Cub drill, and I have found that, by fitting a circular brass-wire brush into the chuck and with the drill running, a work-over of the surface using a circular motion produces a most pleasing and permanent effect. Whichever method is eventually decided upon, I do suggest that it is standardised so that each of your pieces of equipment are finished in the same manner. (That is why I have dealt with this subject at some length.)

Another point to be decided upon at this stage is the method to be employed for marking the controls on chassis work. G3FLP also has something to say about this, which seems to be within the reach of almost everyone. Years ago I acquired a set of numbered and lettered punches, so that my method is to punch-mark the desired inscription in the soft metal, filling in afterwards with Indian ink applied by means of a very fine paint-brush.

Now let us return to the job in hand, and I refer you again to the circuit diagram. The nine switch positions will correspond to the ranges shown in the Table.

The shunt resistors R5, 6 and 7 require some explanation. Their values will depend upon the internal resistance of the meter, but, in any case, their combined value will be quite low — probably not greatly exceeding 4 ohms ; as they are not readily

obtainable, this is how I overcame the problem: I obtained a 750-watt heater element from the local branch of a well-known chain store at an outlay of about 1s. 8d., and, since this wire will not lend itself to soldering by the usual methods, I made up a little block of three terminals on a scrap of insulating material. I attached short lengths of 16 SWG tinned copper wire to the under-part of the terminals, making sure the retaining nuts were screwed well home, and then soldered the other ends of these wires on to contact tags Nos. 6, 7 and 8 of S1. I then completed all the wiring of the circuit except for all the resistors.

Next, I wired-up temporarily R8 and R9 in series with the 4½-volt battery and connected them across the input terminals. With the switches connected to No. 9 contact, I then adjusted R9 until I obtained an exact full-scale reading of 1 mA. The next step is to connect one end of the heater element to Terminal No. 8, and, with the switches put into the same position (No. 8), adjust the amount of resistance wire in circuit between No. 8 and the negative meter terminal until the meter reads exactly two divisions. Then cut off the surplus wire and make fast, cross-checking once or twice that nothing has altered. Next, with the switch on No. 8, re-set R9 until you once more obtain a full-scale reading—which is now 25 mA. Make a trial contact between a point on the resistor and Terminal No. 7 and turn the selector switch to No. 7 position and note the reading on the meter, the object being to adjust the length of shunt in circuit between Terminals 8 and 7 until the meter reads exactly 0.25 mA. *It is important to break the battery circuit each time* you make an adjustment, because if the shunt ceases to make contact with Terminal 7 with the power on, you will do grave injury to the meter. *Do not on any account overlook this point.*

After one or two trials, you will get the right setting. Cross-check once more with the lower scale to make sure everything is in order. Finally, proceed in exactly the same manner with the final step. With the selector switch on No. 7, adjust R9 to read full-scale — which is now 100 mA — and make a trial connection with a shorter length of the shunt resistor, this time on Terminal 6. The corresponding meter reading on position 6 should then be 0.2 mA, equivalent to 500 mA full-scale. Be sure to carry out the same precautions as before in order to safeguard the meter from disastrous overload. The more difficult part of the job has now been done, and work can proceed with the wiring-up of the series resistors R1 to R4 inclusive, and finally the connection of R8 and R9, together with the battery, in their correct positions. The battery can be retained in place underneath the chassis with a clip made from a piece of scrap aluminium, bent to shape and bolted to one of the chassis walls.

METER RANGES

No. 1	—	0-500 volts equiv.	to	10	volts	p/div.
No. 2	—	0-250 ,,	,,	5	,,	,,
No. 3	—	0-50 ,,	,,	1	,,	,,
No. 4	—	0-10 ,,	,,	0.2	,,	,,
No. 5	—	Ohms scale				
No. 6	—	0-500 m/amps,,	,,	10	mA	,,
No. 7	—	0-100 ,,	,,	2	,,	,,
No. 8	—	0-25 ,,	,,	0.5	,,	,,
No. 9	—	0-1 ,,	,,	20	μA	,,

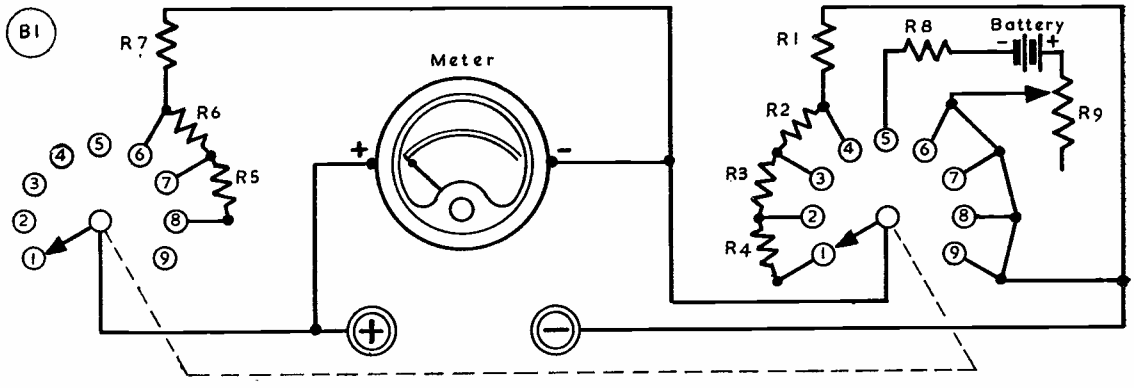
Calibration

All that now remains is to prepare a calibration chart of resistance values with the aid of the Ohms Law formula. When the selector switch is turned to position 5 and R9 is adjusted until the meter gives a full-scale reading (the input terminals being short-circuited, of course), then, with a 4.5-volt battery and

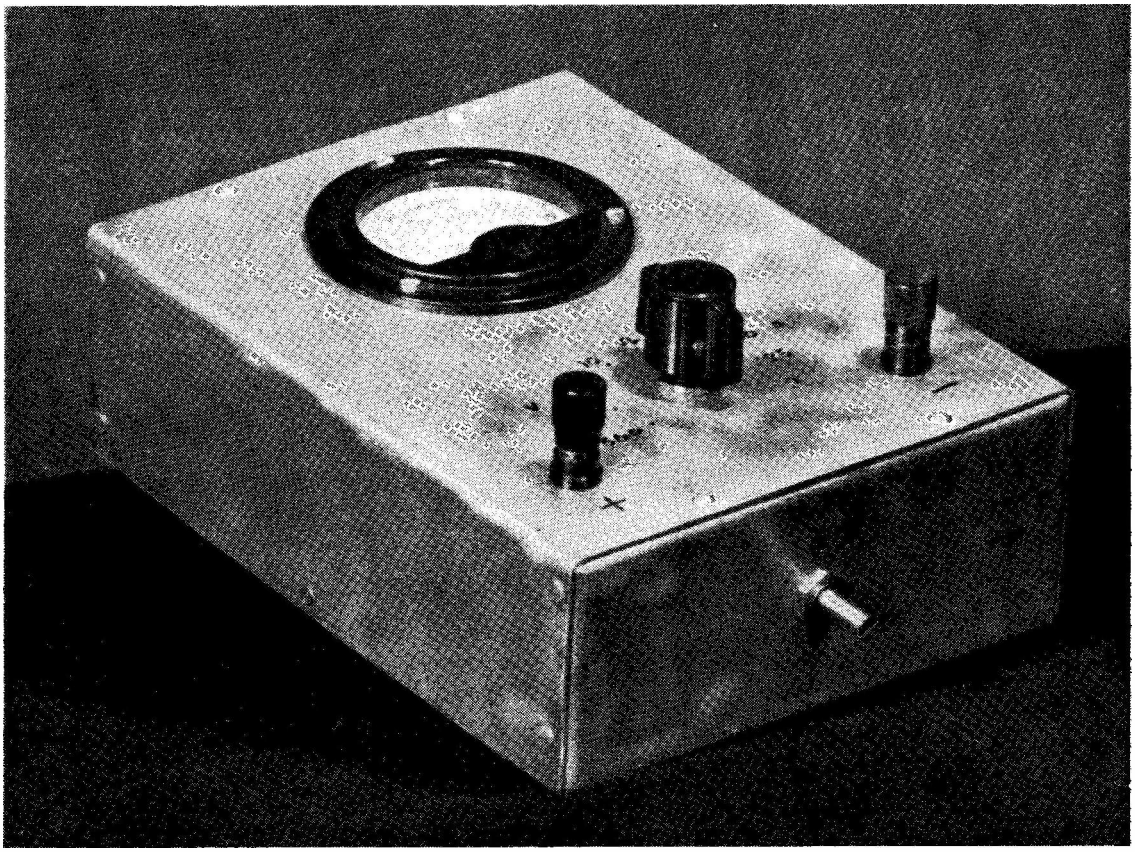
Table of Values

Circuit of the Amateur DC Test Meter

R1	= 10,000 ohms	all 5% tolerance
R2	= 40,000 ohms	all ½ watt
R3	= 200,000 ohms	
R4	= 250,000 ohms	
R5, R6, R7		*see text*
R8	= 4,000 ohms 20% tolerance, ½-watt	
R9	= 1,000 ohm wire wound potentiometer, ½-watt	
S1, S2		2-pole 9-way wafer switch
B	= 4½-volt torch battery	
M	= 0-1 moving coil milliameter	



Circuit of the DC Test Meter constructed for the essential measurements. It is easy to put together, cheap to build and will be found indispensable once you have it! The photograph shows the way in which this particular model was actually built; other forms could be adopted, provided the general principles are followed—remember, too, that the 0-1 mA meter must be a good one if the readings are to be reliable and consistent. F1, F2 in the Table of Values is the ganged switch.



General appearance of the DC Test Meter described in the article. It covers the voltage-current ranges met with under practical conditions and will also measure resistance. The heart of the instrument is the 0-1 mA moving coil milliammeter. The text gives you full details for construction and calibration. The slotted spindle on the front drop is for screw-driver adjustment of resistor R9.

1 mA flowing, the internal resistance of the circuit must, of necessity, be exactly 4,500 ohms. Any other position on the meter can then be worked out from the formula:

$$R = \frac{E \times 1000}{I} - 4500$$

For example, at full-scale:

$$R = \frac{4.5 \times 1000}{1} - 4500 = 0 \text{ ohms}$$

and for a reading of 8.0 mA:

$$R = \frac{4500}{0.8} - 4500 = 1125 \text{ ohms}$$

R being the value of the unknown resistor applied across the input terminals. The best plan is to calculate a series of readings in this manner, and to express the whole thing in graph form, which can be kept handy for ready reference. Always short the input terminals and make sure the resistor R9 is adjusted to give a full-scale reading (equal to 0 ohms) before making any resistance measurements.

To finish off the instrument you can, if desired, attach a pair of flying leads to the input terminals with insulated test prods — in any case, for any measurements involving all but low voltages, either use insulated test prods or make the meter connections to the apparatus under test before the power is switched on. Next month I shall be discussing the construction of a power pack and the general question of safety measures in the handling of power, so will have quite a lot more to say on this important point.

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. callsigns, 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.

DL2WY, A. L. Langford, British Forces Network, Cologne, B.A.O.R. 19.

DL2XZ, J. C. Martin *(G3JVC),* 23 Aldensley Road, Hammersmith, London, W.6.

DL2YN, Lt.-Col. Sir E. Y. Nepean, Bt. *(G5YN, ex-VS1YN),* R. Signals, 11th Air Formation Signal Regiment, B.A.O.R. 15.

G3GEH/A, W. G. Dyer, A.M.I.E.E., Punters Rest, Mill Lane, Shiplake, Oxon.

G3GPH, A. Ward, 30 Watery Lane, Lancaster, Lancs.

G3JQX, R. J. Lill, 52 Edgehill Road, Winton, Bournemouth, Hants.

G3JSV, D. A. S. Holmes, 17 Greenways, Broomfield Road, Chelmsford, Essex.

G3JVC, J. C. Martin *(DL2XZ),* 23 Aldensley Road, Hammersmith, London, W.6.

G3JVQ, T. D. Bittan, 17 Moscow Road, Clive Vale, Hastings, Sussex.

G3JVQ/A, 1927008 SAC, Bittan T.D., Hut 75-R, "B" Flight, Technical Wing, R.A.F. Station, Bletchley, Bucks.

G3JYG, J. Kirby, Holt Hall, Holt, Norfolk.

G3JYZ, T. S. Cartwright, 29 Ladymoor Road, Coseley, nr. Bilston, Staffs.

G3KAQ, B. E. C. Lavender, Sgts' Mess, R.A.F. Station, Thorney Island, Emsworth, nr. Portsmouth, Hants.

GM3KBP, A. G. Kerr, 31 Main Street, Beith, Ayrshire.

G3KCF, R. M. Kent, 173 Carisbrooke Road, Newport, Isle of Wight.

GW3KCZ, W. J. Siertsema, Cefn House, Groesynyd, nr. Conway, Caerns.

G3KEY, R. Turner, 48 Cole Valley Road, Hall Green, Birmingham, 28.

G3KFL, Cpl. D. R. Britten, 16 A.M.Q., R.A.F. Station, Digby, Lincs.

CHANGE OF ADDRESS

G2BRR, R. G. Rugg, 87 Dunnington Road. Wootton Bassett, Wilts.

G2CBS, L. G. Thompson, 28 Overdale Road, Knighton, Leicester, Leics.

G2DFX, T. J. Evans, The Pharmacy, High Street, Eynsham, nr. Oxford.

G2DTQ, A. Goode *(ex-GW2DTQ),* 128 New Victoria Street, Mansfield, Notts.

G2HKJ, A. R. Knight, 20 Sandy Way, Walton-on-Thames, Surrey.

G3BMM, J. W. Lymer, 93 Knowles Hill, Rolleston-on-Dove, Burton-on-Trent, Staffs.

G3BWH, R. Tulloch, 35 Northfield Road, Rising Bridge, nr. Accrington, Lancs. *(Tel: Rossendale 1718).*

G3COY, V. J. Reynolds, 90 Prince's Road, Hartshill, Stoke-on-Trent, Staffs. *(Tel: Stoke-on-Trent 44875).*

G3DKX, A. Perry, 229 Fuller's Meads, Potter Street, Harlow, Essex.

G3DVV, J. O. Brown, 21 Great Tattenhams, Epsom Downs, Banstead, Surrey.

GM3EAK, R. Macfarlane *(ZD6RM),* Moness, Robertson Terrace, Forfar, Angus.

G3ELH, P. R. A. Dolphin, 28 Manor Road South, Hinchley Wood, Esher, Surrey. *(Tel: Emberbrook 5796).*

G3FKK, J. R. Borrill, 15 Drayton Close, Longhill Estate, Hull, Yorkshire.

G3FPI, W. B. Hopkins, 122 Westmorland Avenue, Luton, Beds.

G3GCG, R. C. Murden, 148 Bedonwell Road, Bexleyheath, Kent. *(Tel: Erith 3392).*

G3GHI, A. D. Naylor, 11 Cranley Gardens, Wallington, Surrey.

G3GYV, J. Speakman, Thornycroft, Hodge Lane, Hartford, nr. Northwich, Cheshire.

G3HBW, A. L. Mynett, B.Sc., 52 The Rutts, Bushey Heath, Herts.

G3HCQ, R. T. Gabriel, 40 Bradley Road, Enfield Lock, Middlesex.

G3HFG, D. H. Strudwick, 20 West Street, Emsworth, nr. Portsmouth, Hants.

G3HPA, A. L. Langford, 19 The Green, Southwick, Sussex.

G3HQI, K. R. R. Bowden, 53 Crouch Hall Lane, Redbourn, St. Albans, Herts.

GM3HSB, R. I. Coutts, 12-F Ainslie Place, Muirton, Perth.

GM3HXT, R. Innes, 23 Institution Road, Fochabers, Morayshire.

G3ICH, 3204779, Cpl. Pitt, P.N., 4 Weston Avenue, Stanbridge Road, Leighton Buzzard, Beds.

G3IND, D. H. Boyles, 30 Felbrigg Road, Seven Kings, Essex. *(Tel: Seven Kings 7619).*

G3JAA, Mrs. P. J. Pitt, 4 Weston Avenue, Stanbridge Road, Leighton Buzzard, Beds.

G3JLR, F. R. Wilds, 16 Balmoral Avenue, Crosland Moor, Huddersfield, Yorkshire.

G3JSN, J. C. Beal, Fairlight, Westfield Lane, Kenton, Harrow, Middlesex.

G3JUG, D. B. Shiers, 144 Winchester Road, Basingstoke, Hants.

G3JZL, W. K. Montford *(ex-GW3JZL),* 15 Grosvenor Road, Market Drayton, Shropshire.

GW5BI, V. J. Bartlett, 25 Partridge Road, Roath, Cardiff, Glam. *(Tel: Cardiff 22568).*

G6AU, C. C. Algar, 13 Portal Grove, Burnley, Lancs.

GM6RV, W. B. Stirling, 31 Clyde Terrace, Ardrossan, Ayrshire.

G8OY, J. Meredith, 31 Orchard Drive, Fleetwood, Lancs.

CORRECTION

G3JHC, B. Jenkinson, 23 Newsham Road, Sheffield, 8, Yorkshire.

VHF BANDS

A. J. DEVON

Reception of W1AW Reported on Two Metres—

G3CGQ/G5RZ Make Contact on 25 Centimetres—

The London VHF Meeting—

Plans, Ideas and Suggestions—

Station Reports and News—

WITH a good deal to discuss this month, we must go straight to the mutton — so to speak.

The most interesting report to reach us this time is that GW8SU (Porthcawl, Glam.) heard W1AW, the ARRL Hq. station, on 145.6 mc at about 0140 BST on the morning of May 10. At the moment of writing, we have no absolute confirmation of this, but the W1AW normal transmitting schedule does make it a possibility and it is much to be hoped that the reception will finally be confirmed. However, it is also only fair to say that, at the Editor's request, our old friend met. man G3EGB did a survey of the route from the Eastern United States to South Wales for the period and found no evidence to suggest that a tropospheric path existed, though in mid-Atlantic conditions were favourable over a considerable distance—in excess of the European record, in fact. But this area of good conditions was not wide enough to connect both ends of the GW8SU-W1AW path.

There are, of course, other known mechanisms by which a two-metre signal could be received across the Atlantic, connected with intense disturbances in the upper layers of the ionosphere, and this is the season of the year when sporadic-E effects usually begin to be experienced. So far, there has been no authenticated case of spor-E having been the cause of long-distance coverage on the two-metre band, though it used to be common enough on five metres.

Further details of this extremely interesting and important matter are awaited with some impatience! In the meantime, congratulations to GW8SU on what must have been a thrilling experience for him.

Success on 25 Centimetres

The next result to be discussed is something much more local but, in its own way, just as important. On May 16, between 7.0 and 8.0 p.m., G3CGQ (Luton) and G5RZ (Leighton Buzzard) carried out a further series of tests on the 25 cm (1250 mc) band over their 10½-mile path. With the transmitter at G5RZ and receiver at G3CGQ, they succeeded in bridging the gap, which is a normal QTH-to-QTH path over undulating country, with the local obstructions usual in built-up areas.

G5RZ was using one of his own "kettles," as described in detail in his articles in the February-March issues of SHORT WAVE MAGAZINE; this oscillator, running 8w. input, is heavily tone-modulated by Heising control and radiates a steady MCW type of signal; the aerial at G5RZ for these tests was a T-fed Slot of his own design which, on local checks with a field indicating device, has proved to be a very effective radiater, strongly directional and giving an excellent radiation pattern with marked polarity effect. The mounting of this beam is integral with the transmitter (to minimise feeder loss), and the whole assembly, set up on the desired line-of-shoot, can be varied in both horizontal and vertical planes.

The receiving equipment at G3CGQ is as outlined on p.92 of "VHF Bands" in the April issue, except that the aerial now in use for reception is a ½-wave dipole backed by a 10-in. parabolic reflector, with the dipole at the focal point of the reflector—this being found by the simple process of turning the bowl towards the sun and positioning the dipole by observing its reflection.

A plot of the path G3CGQ-G5RZ, in plan and elevation, was made from the Ordnance Survey sheets of the district and the line-of-shoot determined for both ends; this gave the starting point for subsequent beam adjustments.

The G5RZ signal as received at G3CGQ was not loud, but it was identifiable and—by using 160 metres as a talking channel—it was possible to control adjustment procedure at both ends. Tests showed that the G5RZ beam was relatively flat, within 10-15°, in the horizontal plane, but that the vertical angle was critical; at G3CGQ, the horizontal angle was the critical one, a ½-in. movement of the bowl being enough to lose the signal.

During the ten days or so before the successful result with G5RZ over the 10½-mile path, G3CGQ and G3FUL (also Luton) conducted intensive tests over their local distance, of 1350 yards! A copy of the G5RZ "kettle" at the G3FUL end fed into a ½-wave dipole with a sheet reflector and enabled G3CGQ to adjust his receiving equipment for maximum performance. The signal G3CGQ-G3FUL is S9+ over an obstructed path, and is amply strong enough to modulate G3CGQ's transmitter, enabling him to play back on either Top Band or Two Metres.

The significance of the highly successful G3CGQ-G5RZ result is that it is believed to be the first time in Amateur Radio history that point-to-point communication (QTH-to-QTH) has been achieved over any reasonable distance on the 25 cm band using amateur designed and built equipment throughout. That is to say, gear which is repeatable by anybody wishing to get on 25 centimetres. Indeed, that has been the objective throughout these tests. [over

Full constructional details of G3CGQ's receiver and the beam array used by G5RZ will appear in an early issue of SHORT WAVE MAGAZINE. In the meantime, development work is being pressed forward. G5RZ has in hand the design and construction of a larger and better dish, which will be more controllable; G3CGQ will be testing an oscillator constructed to the G5RZ design, and in order to investigate propagation conditions over the 10-mile path, it is intended to maintain a regular schedule.

Lines of Thought

And that is not all. In Northampton, G2HCG, in collaboration with G2BVW, has been experimenting with a magnetron oscillator on 25 cm and is also getting very encouraging results with a local super-regenerative receiver using a GL446A. It is hoped shortly to investigate the possibilities of the point-to-point path Leighton Buzzard to Northampton. Having heard about all this, the PE1PL group are also designing for 25 cm and hope before long to have a controlled transmitter running 50w. in the PA.

It will be noted that all tests in mind are QTH-to-QTH; it is taken for granted that any line-of-sight path can be covered without difficulty, *i.e.* if both ends are raised high enough, by portable expedition, much greater distances would be achieved. (In fact, that has already been done.) So the present investigations are strictly point-to-point, with whatever advantages can be taken at the home location. While it is probably true that ultimately we shall come to controlled transmitters and stabilised receivers of the superhet or converter type, at this stage—with the 25 cm band undeveloped and almost unoccupied—simple equipment in the SEO category seems to be the right approach, more especially as relatively enormous gain can be obtained with paraboloids of quite manageable dimensions. From what is known of the propagation factor, the practical application of 25 centimetres will be point-to-point working over short distances—the

TWO-METRE ACTIVITY REPORT

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

SWL, Bridgend, Glam.

HEARD: G2ADZ, 2AIW, 2BAT, 2BHW, 3CGE, 3CQC, 3FAN, 3FIH, 3FKO/P, 3FWW, 3GNJ, 3HSD, 3HSD/P, 3ION/P, 3KHA(?), 3MU, 4GR, 4SA, 5BM/P, 5TZ, 6NB, 6RH, 6TA, 8DA, 8IL, GC2FZC, GW3EHN, 3EJM, 3KEN, 8SU, 8UH. (*April* 17 *to May* 14).

EI2W, Dublin, Eire.

WORKED: EI5Y, 6A, G2CBR, 2NY, 3GZM, 3HII, 3IWJ, 3JZN/P, 5AU, 5YV, 6NB, 6WF, 6XM, GI3CWY, 3GXP, 3IJM, 5AJ. (*April* 11-30).

G2HDY, London, S.W.15.

WORKED: G2DTO/P, 3GSE, 3ISA, 3JXN, 4GT, 5MA/P, 8KW/P, 8KZ, 8UQ/P.
HEARD: G2ABD, 2AIW, 2BDP, 2CD, 2LW/P, 2WS, 2XV/P, 2YC, 2YV, 3ABA/P, 3BK/P, 3CGQ, 3DF, 3DIV/P, 3DVQ/P, 3FD/P, 3EYV, 3FEX/P, 3FQS, 3FRG/P, 3GSM, 3GSM/A, 3IES, 3IUL, 3JMA, 3KEQ, 4CI, 4JJ/P, 4KD, 4SA, 5DS, 5DT, 5KH, 5KW/P, 5TP, 5YV, 5WW, 6AG/P, 6JI, 6LL, 6NF, 6OX, 6TA, 6TA/P, 6XM/P, 6YP, 8LN. 8SK. (*Sunday, May* 1*st, only*).

G3IER, Cheltenham, Glos.

WORKED: G3ABA/P, 3CVK, 3EXW, 3FIH, 3FKO/P, 3FRY, 3GBJ, 3HSD/P, 3HTY, 3IRA/P, 3ION/P, 3JGY, 3JZG, 3KFT, 3MA, 3MA/P, 3NL, 3NL/P, 3YZ, 3YZ/P, 4SA, 5BM, 5BM/P, 5ML, 6JK/P, 6VX, 6WF, 8BP, 8ML, GW3GWA/P.
HEARD: G2BMZ, 2HCJ/P, 3DA, 3EPQ, 3FMI, 3GNJ, 3GUD, 3HAZ, 3HII, 3IOO, 5AU, 5KW/P, 5YV, 6OZ, 6XM.

GW3GWA, Wrexham, Denbs.

WORKED: G2FJR, 2HGR, 2HOP, 3AGS, 3ATK, 3BJQ, 3BPJ/A, 3CCH, 3CUZ, 3DA/P, 3DKF, 3EPW, 3FMI, 3GHU, 3GPT, 3HII, 3IOO, 3IWJ, 3JZN, 3KEQ, 5YV, 6FK, 6LC, 6QT, 6TA, 6WF, 6XM, 6XX, 8BP, 8VN.
HEARD: G2BVW, 2FNW, 2FTS, 2HCG, 2XV, 3CC, 3DMU, 3GHO, 3JZY, 4AU, 5BD, 5JU, 5TZ, 6NB. (*March* 27 *to May* 11).

GW3GWA/P, Vroncysylla, Denbs.

WORKED: G2AK, 2ATK/M, 2AVQ, 2CVD, 2FCL/P, 2HCJ/P, 2NV, 2NY, 2YM, 3ABA/P, 3AGS, 3AUC, 3AYT/M, 3AZT/P, 3BJQ/P, 3BPJ/A, 3BY, 3CLG, 3CSC, 3CVK, 3DKF, 3DO, 3DQQ, 3EJO, 3EPW, 3FMI, 3FRY, 3HAZ, 3HII, 3HSD/P, 3HTY, 3IER, 3IOO, 3IUD, 3IWJ, 3JZN/P, 3MA/P, 3NL/P, 3PY, 3YZ/P, 4JJ/P, 4SA, 5AU, 5JU, 5ML/P, 5YV, 6FK, 6JK/P, 6QT, 6SN, 6WF, 6XM/P, 8ML, 8PX/P, 8UQ/P. (*Sunday, May* 1*st, only*).

G3JZG, Willenhall, Staffs.

WORKED: G2FJR, 2YM, 3ABA/P, 3ASC, 3CRH, 3EPW, 3HHD, 3HXS, 3IER, 3IUD, 3KFD, 3YZ/P, 4JJ/P, 5JU, 6NB, 6XM, 6XX.
HEARD: G2AHP, 2ATK/M, 3AGS, 3DKF, 3DTG, 3EGV, 3HII, 3KEF, 5BM, 5TZ, 6TA.

G2CZS, Chelmsford, Essex.

WORKED: G2BCB, 2BVW, 2HDY, 3ANB, 3BJQ, 3CLW, 3CVO, 3EGV, 3EPW, 3EYV, 3FKJ, 3FNL, 3GAV, 3GGJ, 3GOZ, 3IIT, 3IJB, 3JXN, 3KEQ, 5TZ, 6LL, 6TA, 6XX, 8KW/P, 8LN, 8PX, 8SC, PE1PL.
HEARD: G2BDP, 2BMZ, 2DDD, 2FTS, 2UJ, 2UN, 3CGQ, 3FD, 3FEX/P, 3FYY, 5YV, 6FO, 6NB, 6XX, 8NM, 8RW. (*April* 1*st to May* 14).

SWL, Brentwood, Essex.

HEARD: G2ABD, 2AHL, 2AIW, 2BDP, 2BMZ, 2BNI, 2CZS, 2DTO/P, 2HDY, 2HDZ, 2CD, 2LW/P, 2MV, 2TP, 2WJ, 2WS, 2XV/P, 2YB, 2YV/P, 3BRX, 3BSU, 3CGQ, 3CLW, 3CVO, 3CZU, 3DIV/P, 3DVQ/P, 3ECA, 3EYV, 3FAN, 3FEX/P, 3FJS, 3FNL, 3FQS, 3FRG/P, 3FSG/P, 3FUH, 3FYV, 3GAV, 3GDR, 3GHI, 3GOP/P, 3GOZ, 3GSM, 3GSU, 3GVF, 3HQZ, 3HWJ, 3IAM, 3IES, 3IJB, 3ISA, 3IUL, 3JMA, 3DF, 3FD/P, 3GV, 3VI, 3WS, 3XC, 4AJ, 4CW, 4FB, 4KD, 4SA, 5KH, 5KL, 5KW/P, 5LK, 5MA/P, 5RD, 5TZ, 5YH, 6AG/P, 6JI, 6LL, 6NB, 6OX, 6SG, 6TA/P, 6XH, 6YP, 8KW/P, 8LN, 8RW, 8SC, 8SK, 8UQ/P. (*April* 19 *to May* 15).

G3GHO, Roade, Northants.

WORKED: G2ANS, 2ATK/P, 2HCG, 2LW/P, 3ABA/P, 3AGS, 3BJQ/P, 3CKQ, 3DVP, 3EJO, 3EPW, 3FAN, 3FD/P, 3FQS, 3GQR, 3GSO, 3GWB, 3HXS, 3HZF, 3IIT, 3ION, 3IUK, 3IYX, 3JKO, 3OZ, 3YZ/P, 4JJ/P, 5AU, 5BM/P, 5DS, 5KW/P, 5ML/P, 5WW, 5YV, 6AG/P, 6FK, 6JK/P, 6OX, 6PJ, 6PO, 6TA, 6WF, 6YU/P, 8IL, 8PX/P, 8UQ/P, 8VN.
HEARD: G2AIW, 2HOP, 2NM, 2YB, 3AOK, 3EGG, 3IOO, 3IOE, 3KEQ, 3WW, 4AU, 4MW, 4SA, 5JU, 6XH, 6XM, 6XX, 8KW, 8NM.

G6TA, London, S.W.16.

WORKED: G2ABD, 2AHY, 2ANS, 2ANT, 2BDP, 2BMI, 2BMZ, 2BVW, 2DGY, 2DUV, 2HDY, 2YB, 3AGR, 3BHJ/A, 3BJQ, 3BSU, 3BYY, 3CKQ, 3CLW, 3DKF, 3DQC, 3FD/P, 3FEX/P, 3FMI, 3FQS, 3FRG/P, 3FUH, 3GAV, 3GHO, 3GHU, 3GKZ, 3GSM, 3HCU, 3HHD, 3HII, 3HQZ, 3HZJ, 3IES, 3IJB, 3IOO, 3IUL, 3IWJ, 3JKO, 3JKY, 3JMA, 3XC, 4GT, 5AU, 5KW, 5LO, 5ML, 5WW, 5YH, 5YV, 6AG/M, 6FK, 6LL, 6OU, 6OX, 6SG, 6XM, 8BP, 8PX, 8RW, 8UQ/P, 8VN, 8VR, GW3GWA. (*April* 14 *to May* 14).

G3YH, Bristol.

WORKED: G3FIH, 3FKO/P, 3HSD, 3HSD/P. 5BM/P.
HEARD: G3GNJ, 4GR, 6NB, GW8UH. (*April* 18 *to May* 8).

G3CKQ, Rugby, Warks.

WORKED: G2ANS, 2HOP, 3AZT, 3BA, 3BJQ, 3DJX, 3DKF, 3EJO, 3FUW, 3GHO, 3GKZ, 3GWB, 3HHD, 3JGY, 3KEF, 5LJ/A, 5SK, 5TZ, 6SN, 6TA, 6YU, 8VN.
HEARD: G2ACV, 2AIW, 2XV, 3CGQ, 3FAN, 3GHU, 3GVK, 3HII, 3IUK, 3JZG, 3KEQ, 4SA, 5YV, 6FO, 6RH, 6XM, 8BP, 8PX/P, 8UQ/P.

G3DBP/G3JKO, Beeston, Notts.

WORKED: G2AIW, 2FNU, 2FZU, 2HCG, 3ABA/P, 3AZT/P, 3BJQ, 3BJQ/P, 3BPD, 3DKF, 3DO, 3DVK/P, 3EGE, 3ELG/P, 3FAN, 3FUW, 3GFW, 3GHO, 3GSO, 3GVK, 3IUK, 4JJ/P, 5ML/P, 5JU, 5TZ, 5YV, 6AG/P, 6CW, 6OX, 6TA, 6XM/P, 6XX, 8VN.
HEARD: G3CGQ, 3CYY, 3DQQ, 3DTG, 3GAL, 3HII, 3IUD, 5MA/P, 5ML, 5KW/P, 6NB, 6PJ, 6PN, 6YP, 6YU. (*April* 21 *to May* 9).

G2ADZ, Woolacombe, N. Devon.

WORKED: EI4E, G2BAT, 2BHW, 2BMZ, 3AUS, 3CQC, 3DA, 3EPW, 3IWJ, 3IUD, 3MA/P, 3MU, 3NL/P, 5BM/P, 5YV, 6XM, 8DA, 8SB, GC2FZC, GW2ACW, 3EHN, 3KEN, 8SU.
HEARD: G2ATK, 3FIH, 3FWW, 3HSD; 5ML, 5TZ, 6FO. (*March* 14 *to May* 7, *mainly* 7.0 - 8.0 *p.m.*).

SWL, Coventry, Warks.

HEARD: G2ACV, 2ADQ, 2AK, 2AOK, 2ATK, 2ATK/M, 2AVQ, 2BVW, 2COP, 2FNW, 2HCJ/P, 2HCG, 3ABA/M, 3ABA/P, 3AZT, 3AZT/P, 3BA, 3BJQ, 3BJQ/P, 3CKQ, 3CRH, 3DKF, 3DKZ, 3DO, 3EJO, 3EPW, 3FAN, 3FMI, 3FUW, 3FW, 3GHO, 3GHU, 3GKZ, 3GNJ, 3HHD, 3HII, 3IER, 3IOB, 3IUD, 3IVF, 3JGY, 3JZG, 3NL/P, 3YZ/P, 4JJ/P, 4SA, 5BM, 5JU, 5KW/P, 5MA/P, 5ML, 5ML/M, 5ML/P, 5SK, 5TZ, 5YV, 6CW, 6FK, 6JK/P, 6NB, 6PO, 6SN, 6TA, 6WF, 6XA, 6XM, 6XX, 6XY, 6YU, 6YU/M, 8BP, 8UQ/P 8VN, GW3GWA, PA0BP. (*April* 17 *to May* 16).

G2BRR, Wootton Bassett, Wilts.

WORKED: G3NL/P, 3FKO/P, 3IRA/P, 4AP,

5BM/P, 5HB, 8DM, 8UQ/P.
HEARD : G2DTO/P, 3FD/P, 3YZ/P, 3ABA/P, 3AHX, 3AQQ/P, 3EES, 3HSD/P, 3IOO, 3ION/P, 4GR, 4KD, 4SA, 5JU, 5MO, 5TZ, 6JK/P, 6OZ, 8IL, GC2FZC. (*April* 18 *to May* 1).

SWL, Earlsfield, S.W.18.
HEARD : F3LP, G2AHP, 2AIW, 2ANT 2AST, 2BDP, 2CZS, 2DTO/P, 2DVD, 2HDY, 2HDZ, 2LW/P, 2TP, 2YV, 3ABA/P, 3BHJ/A, 3CGQ, 3CLW, 3DF, 3DIV/P, 3DVQ/P, 3EGV, 3EVV, 3FEX/P, 3FNL, 3FQS, 3FRG/P, 3FSG/M, 3FT/P, 3FUL, 3FYY, 3GHI, 3GOZ, 3GSE, 3GSM, 3GVF, 3HII, 3HZJ, 3IAM, 3IM, 3ISA, 3IUK, 3IUL, 3IUO, 3JMA, 3JXN, 3KEQ, 3XC/M, 3YZ/P, 4CI, 4GT, 4KD, 4RO, 4SA, 5DT, 5KW, 5KW/P, 5MA/P, 5TP, 5YU, 6AG/M, 6AG/P, 6BO, 6FO, 6LL, 6NB, 6NF, 6OX, 6SG, 6TA, 8KZ, 8RW, 8SC, 8SK, 8UQ/P, 8VR. (*April* 14 *to May* 16).

70-Centimetre Band Only

G2HDY, London, S.W.15.
WORKED : G2DD, 2DD/M, 2FKZ, 2HDJ, 2HDZ, 2QY, 2RD, 3EOH, 3FP, 3FSD, 3FZL, 3GDR, 3HBW, 3IRW, 3JMA, 3JQN, 3JQN/A, 4CG, 4KD, 4RO, 5CD, 5DT, 5KH, 5KW, 5TP, 5UM, 6NF, 6YP, 8KZ, 8SK/P.
HEARD : G2WJ, 2WS/P, 3ECA, 3EOH/P, 3EYV, 3MI, 5RD, 8SK. (*March* 26 '54 *to March* 26 '55).

actual range depending more than ever upon aerial height—with a privacy (for those who want it) attainable on no other active amateur band.

One of the great attractions of UHF work is that so much can be done with only a transmitter, beam system and a simple indicating device which can be carried about in the vicinity, or set up in the garden as a target for the beam ; this enables much investigation to be carried out before actual communication is attempted.

London VHF Meeting

Taking place on May 14, with a total attendance of over 120, this was undoubtedly one of the most successful VHF gatherings yet held. The arranged programme was such that from 11.0 a.m. to 11.0 p.m. there was enough going on to hold the interest and attention of all who had come to make a day of it. A certain number were there only for the lunch, or the afternoon discussions, or the dinner which terminated the proceeds—but most were there all the time. This says much for the organising ability of G4KD, who laid it all on.

It is impossible here to chronicle all that happened or to list everyone present, except to say that it was a great pleasure to meet DL3FM, F9CQ and a member of the well-known PE1PL group, together with representatives of EI and GM. Of the lecture-demonstrations, probably the most striking and informative was that by G2FKZ/G3FZL on "Matching and Mismatching." G3HBW demonstrated his cavity resonator for 25 cm, which can be run as a power tripler from a 430 mc driver. G2DD discussed a very well-built, transportable, 70 cm transmitter, lighting up a lamp RF load in a most convincing way, and G5CD described some very useful new types in the S.T.C. range of UHF valves.

After the dinner, at which Dr. R. L. Smith-Rose, C.B.E., D.Sc., of the Radio Research Board, was the guest of honour, PE1PL played back some of the recordings made over there of G phones worked on the two-metre band. F9CQ, speaking in very good English which he said he had learnt *via* Amateur Radio (it was his first visit to England and he had only arrived that morning) outlined VHF activity and interest in France. DL3FM, who spoke in German, brought fraternal greetings and a D.A.R.C. pennant for the chairman, and gave the number of DL's active on VHF as about 200.

Altogether, a most successful occasion, in a very pleasant atmosphere, very well organised, and well supported by the VHF fraternity.

Doings on the Air

The first field-day outing of the year, on Sunday, May 1, had good backing by both fixed and portable stations, but weather conditions were dreadful (for those /P) and propagation conditions poor (for those looking for DX). No great distances were covered and some of the /P stations even had difficulty in working much beyond 100 miles. A case in point is GW3GWA/P, at a spot 1290 a.s.l. in Denbighshire, from which they were unable to work stations towards the South Coast. As usual, however, low-powered stations on good sites were putting out very strong signals over relatively short distances.

G3JKO (Nottingham) reports that the University Club station G3DBP is again on the two-metre air, using a CC converter (by G3GHU) with a B36, a fixed SSE/NNW beam and a 70w. into a BC-640 ; G3FAN and G5TZ are their best contacts since the resumption, which was just too late to catch the mid-April opening. G3DO (Sutton Coldfield) reports a move in Annual Counties, three having been gained from /P stations on May 1st. G3YH (Bristol) puts in a calls h/w list, and GM3DIQ (Edinburgh) asks us to mention the fact that the four 5-element Yagi in one - wavelength - square beam assembly, as used by G3IOE (*see* p.147 May "VHF Bands"), is

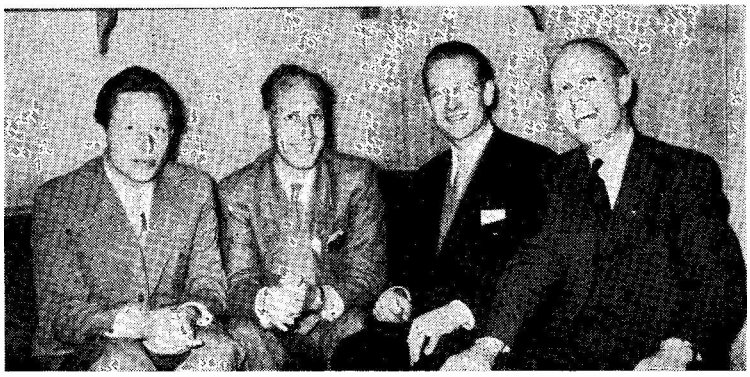
At the London VHF Meeting on May 14 last. G2MC (extreme left), EI2W (light jacket), G6FO (centre), G2AIW (papers under arm) and G4KD (near right) have a noggin together before the lunch.

actually to the design by GM3DIQ himself, and is the subject of an article in hand for SHORT WAVE MAGAZINE.

G2ADZ (Woolacombe, N. Devon)—of all things, the poor chap has had *mumps* since last he wrote—has succeeded in forging a solid link with GC2FZC (St. Peters, Guernsey) over the 140-mile path across the hills of Devon, GC2FZC usually being RS-59 on a regular schedule. G2ADZ is still short of contacts in most other directions, though he has the GW stations as his locals, over the water, and has been working EI4E in Killarney again. Activity at G2ADZ is mainly during 7.0-8.0 p.m., and once again he asks that beams be turned in his direction; to the west and north he thinks his site may be superior to G5YV's or G6NB's, because he is perched 620 ft. above the sea, with no local obstructions in those directions. He is one of the few stations in the country with an all-sea path to the Eastern United States.

G3HAZ (Birmingham) checks in again after a long absence from these columns. with a claim for All-Time Counties, and says he hopes to be more active; gear for both VHF bands is still in full working order, the beam installation now being a 12-element wide-spaced all-metal stack for Two, and a 24-element stack of the same pattern for Seventycems; on the receiving side he is working on a combined 144/430 mc converter, *sans* RF stage but with a common 25 mc cascode IF amplifier feeding into the main receiver; this is giving results on both bands but needs more doing to it.

GW3GWA (Wrexham) reports that his local GW3INV will be on Two shortly, using an indoor beam, and on CW only. His survey of the famous Horseshoe Pass disclosed that it would be a climber's feat to get to the summit, though a station could be set up if the gear were really transportable and QRP; GW3GWA remarks that the matter is in hand. From the other site on May 1st, 56 stations were worked /P until the smoothing choke in the power pack went down with a flash in the middle of a QSO, inspiring gags about "smoke in the choke" and "fire in the wire."



Continental visitors at the London VHF Meeting on May 14 were DL3FM (left), PE1PL and F9CQ, with G4KD on the right. Though it was F9CQ's first visit to this country, he addressed the meeting in English.

G3CKQ (Rugby) thinks that horticulture must be one reason for the absence of many a two-metre man at this time of year—well, *something* has to be done about the garden, and there can be few who, fortunate enough to have outside aerial space, are not prodded by she-who-must-be obeyed to "get weaving round that *grass*." However, G3CKQ has improved the converter and brought in two more counties for the All-Time and also qualifies for the Annual table.

G3GHO (Roade, Northants.) writes to say he is still alive, "though when I listen round on Two some evenings, I wonder"! With conditions as flat as they have been since the April opening, apparent activity has again been low—though the local groups are still up every evening, working one another and looking round the band. G3GHO says the taxi-drivers are beginning to complain about the QRM on *their* band, so we had better look out for two metres!

On the other hand, G3JZG (Willenhall, Staffs.) reports the activity in the Midlands as sufficient to keep him busy, and he has qualified for Annual Counties with 16C, G2FJR and G3HXS being his best DX to date.

G2CZS (Chelmsford) advances in the Tables (in spite of the gardening hazard!) and has been trying hard to raise G2BMZ, well heard on several occasions. G3IER (Cheltenham) has repaired the damage done by the winter gales and reports two new local stations active, and worked — G3EXW (Stroud) and G3KFT (Cowley, Glos.). G2HDY (London, S.W.15) puts in calls h/w lists for both bands; that in respect of 70 cm is for a whole year and represents stations worked consistently under any conditions. Using the driver stage for the 430 mc tripler as a transmitter on two metres, G2HDY is on the latter band again after an absence of nearly four years—he celebrated his return by a contact with G6XM (York) on May 8, in the middle of the afternoon. This was a Sunday, and the date for which conditions are generally reported "good" since the opening on April 19.

G5MR, from his vantage point at Hythe, Kent, was able to join in on the French "Coupe REF" contest during April 30/May 1st; but conditions were poor, though the F's had been coming in well during the previous week, and he only worked nine stations. However, one was F8ME (Plerin) at 245 miles, which was good going under the prevailing conditions. Vernon says that while it might be the ambition of most G's to work any French station (*see* p.149, May "VHF Bands") his is to work G's! He remarks that the F's frequently discuss his S9 signal with one another, wondering why they do not hear many more G's. The suggestion is that G's should beam in the right direction more often, and search

carefully, when, says Vernon, they would have little difficulty in getting French contacts when conditions are at all reasonable.

Portable DXpeditions

Gerry of G2XV will be signing GW2XV/P on the summit of Snowdon during the week-end July 2/3; this will give Caernarvonshire to those able to raise him—which should be virtually everybody, as the site is 3,500 ft. a.s.l. Remarkable results were always obtained from this site in pre-war days on the old 5-metre band, when GW6AA/P, using a modulated SEO transmitter and a dipole, was heard on super-regenerative receivers all over England.

A portable expedition of a different sort is that scheduled by our Swiss friends for July 29 to August 7, when they will be on Mt. Rigi, 5000 ft. a.s.l., signing HB1GW, HB1IV and HB1MO (on all bands), the two-metre sessions being on 144.66 mc at 2100, 2200 and 2300 BST daily; we must all hope for a spell of good conditions, both for them and for us, as if we get anything like a summer break, there may be a chance for EI and GM contacts.

More Station Reports

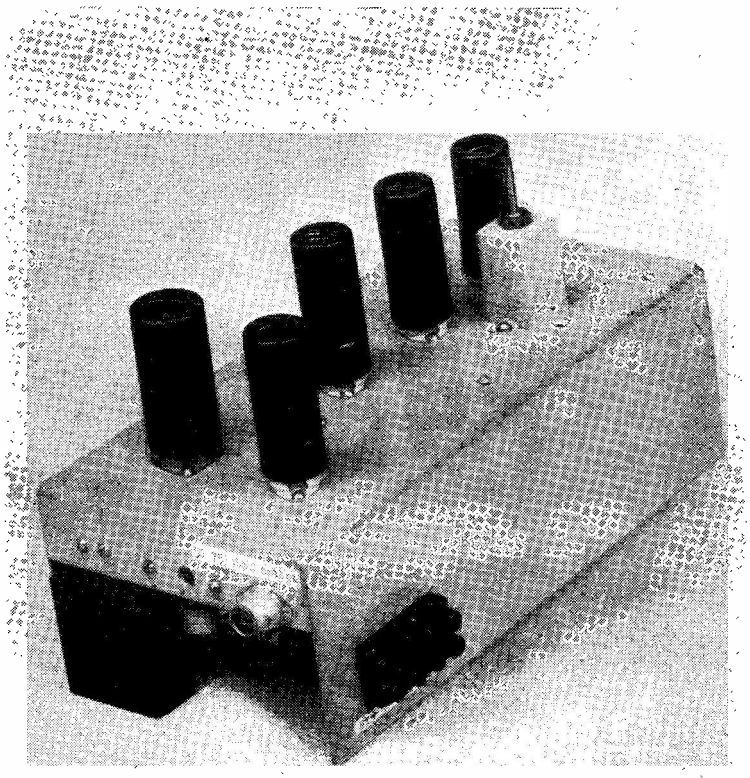
G2BRR (Wootton Bassett) was glad to hear the activity on May 1st, and sends a calls h/w list. Though G6TA (London, S.W.16) is still in BCI/TVI difficulties, he keeps going, and has made progress in both the Tables.

EI2W (Dublin), much tied up with business, has not been as active as he would have liked, but is there as often as possible on 144.1 and 434.7 mc. He is maintaining a regular Wednesday afternoon session, 1430-1600 BST, and would welcome schedules with stations available at that time. An EI VHF county link is planned, to bring in more stations outside the Dublin area, and EI2W will be glad to arrange schedules or help with equipment tests; new stations on in Dublin are EI2G and EI9G, with EI5Y also active.

Writing from Nairobi, VQ4EV, our old friend ex-G3GBO, reports on VHF results and activity out there; VQ4EV/VQ4VL have a regular schedule at 1830 BST, being joined occasionally by VQ4SS; VQ4AA at Kajiado, 35 miles from Nairobi, gets S9 + phone from both VQ4EV and VQ4VL. Other VQ4's equipped on the receiving side are VQ4ERR and VQ4BP, while VQ4CH is building for the two-metre band, and VQ4FB (ex-G3CAT) now has his two-metre gear out from home. As Don of VQ4EV puts it, "Our move to stir up VHF activity is bearing fruit, even if it is a bit green at present"! Never mind, it will all come with time, and we are quite certain that the VQ4 clan, well located as many of them are, will soon be covering great ranges and finding how much interest the two-metre band holds for them. On a rather nostalgic note, VQ4EV ends his letter: "Longing for the London two-metre contest QRM"!

SWL Reports

SWL Ball (Brentwood) was getting a very good signal from G2BMZ (Torquay) towards the end of April, and on the field-day occasion on May 1st, 63 stations were logged. SWL Cox (London, S.W.18), with a better aerial, mentions May 8 as a good day, when he received F3LP at RS-58, working G6NB. SWL Lee (Bridgend, Glam.) some 20 miles further north than G2ADZ, is now receiving GC2FZC regularly and follows the schedule between those two stations, the path distance Bridgend-Guernsey being about 170 miles; the odd thing is that very few other stations can be heard in a southerly direction from Bridgend, and it would certainly seem that with the G2ADZ-GC2FZC schedule so well established (it opens at about 1845 BST



Half rear-side view of the two-metre converter described in detail in the May issue of "Short Wave Magazine." The neutralising coil L3, for the 6AK5 in the first RF stage, is in the screening can, the brass rod being the slug adjustment. The nearest valve in this view is V4, the EC91 cathode-follower, with V5, the oscillator-multiplier giving injection at 120 mc, immediately to the left. The valve sequence is: 6AK5 neutralised 1st RF; EC91 GGT 2nd RF; EC91 mixer with 120 mc tuned output; EC91 cathode-follower; and 12AT7 oscillator-multiplier giving 120 mc from a 6 mc crystal.

each evening) it would pay a few more West Country and South Wales stations to be on around that time.

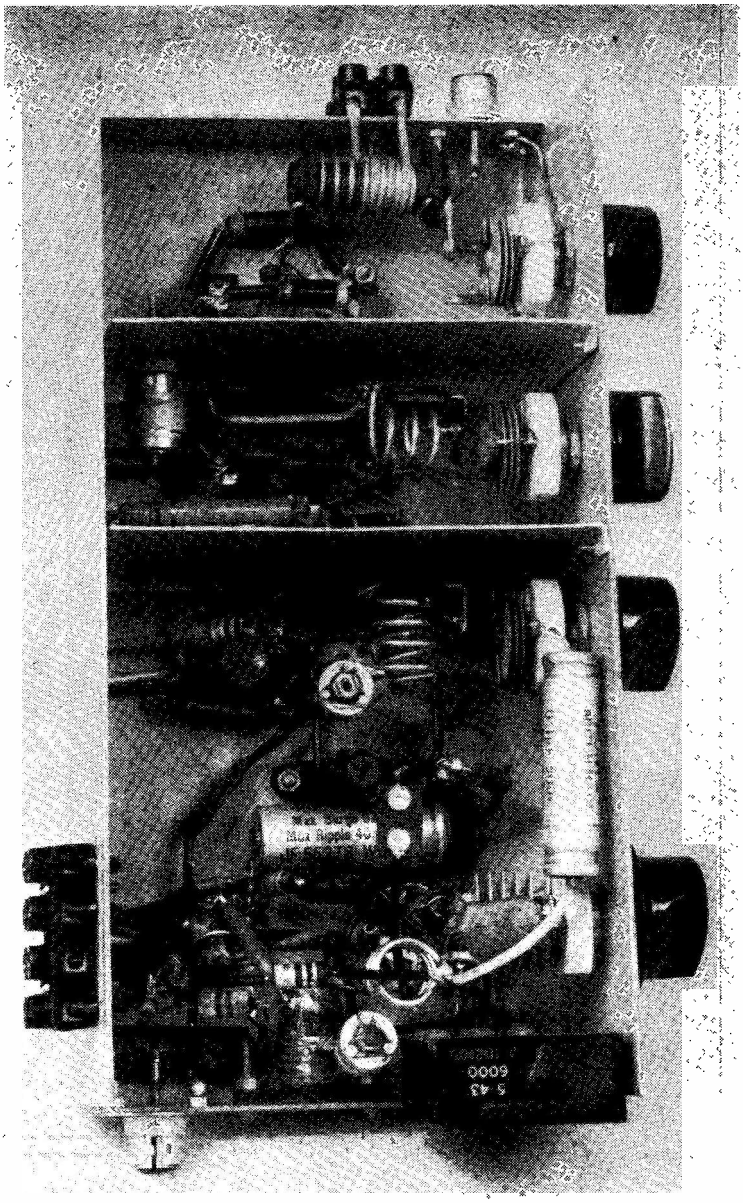
SWL Drybrough (Coventry) was glad to log his first PA, though he says it was bare identification and no more; conditions have been generally poor, though the field day activity on May 1st made a very welcome change; TV oscillator harmonics are becoming a menace with him, too. (That is the worst of making the gear too good—one begins to find a lot of things one would be far better without!).

G6LI/PE1PL Schedule

G6LI (Grimsby) has been good enough to send in an excellent report covering the whole period of his schedule with PE1PL from January 17 to May 14; the presentation is in graphical form, with barometric pressure also shown. We hope to print this in next "VHF Bands," as it is extremely interesting and well worth detailed study by all who are concerned with VHF propagation over long-distance paths.

By May 14, the schedule had been kept on 219 days with only two failures; the results show that since October last there has been a virtually unbroken 6-day-a-week path across the North Sea, the distance being about 180 miles. Other interesting points are that conditions—in terms of signal level at G6LI—on this path follow the barometric variation at G6LI fairly closely. On the other hand, some of their "good days," *e.g.* March 3 and April 29, do not fit in with the general state of conditions inland, while on March 30 (when there was something of an opening) PE1PL was very weak at G6LI; on April 19, a sudden improvement was noted with PE1PL up to S6, in keeping with the conditions as generally reported on that occasion.

G6LI is to be congratulated on the completeness of his data, the careful way in which he has kept his records, and the form in which he presents his results. It all adds up to a worth-while effort which gives a very convincing picture of the reliability of the path.



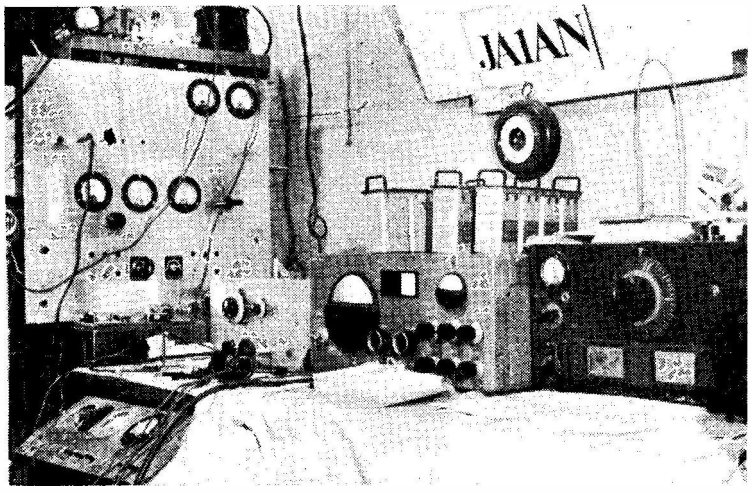
Inside the two-metre converter described by G6UH in our May issue. The upper compartment contains the circuitry round V1, which is a triode-connected neutralised 6AK5; next below is the 2nd RF stage with the series-tuned coil L4 tuned by VC2, on which a regenerative build-up is possible; the mixer, oscillator-multiplier and cathode-follower stages are in the large compartment, the IF output socket being lower left. Condenser VC4, which controls the degree of oscillator injection, is the lowest black knob on the right. (References are to the circuit diagram on p. 153, May "Short Wave Magazine").

We are asked to announce that a big VHF gathering is planned in Manchester for Saturday, September 17, at the Grosvenor Hotel, Deansgate. An attendance of 100-150 is being reckoned on by G8SB, who is organising the event and already has promises of support from various parts of the country. Tickets will be 15s. each, obtainable from: G3GB, 10 Deal Street, Newton Heath, Manchester, 10; or G3AGS, 101 Grange Drive, Manchester, 9. Overnight hotel

accommodation can be arranged for those coming from distant parts. It is expected that for this occasion the chair will be taken by the Editor of SHORT WAVE MAGAZINE, and it is intended to run the event on lines similar to the very successful Cheltenham VHF meeting in March last year. Though there is some time yet before reservations have to be in, it would obviously help the organisers considerably if they could have "a statement of your intentions" as soon as possible.

VHFCC Election

Having issued VHF Century Club Certificate No. 179 to JA1AN last month, the claim this time is from Walter Klein, DL3JI, Giessen (No. 180), who has the distinction of gaining his VHFCC entirely on DJ/DL contacts—he sends no single G card, though he did enclose a few "over the odds" for other countries outside Germany. These include 9S4AL, proving activity in the Saarland (the card is dated July last year), F8YZ, HB1LE and three PA's. So we send our felicitations to DL3JI.



As reported in May "VHF Bands," JA1AN is now a member of our VHF Century Club. This is his station, operated almost exclusively on the 6-metre band and running 250w. input. There is considerable JA activity on 50 mc; in fact, JA1AN gained his VHFCC on 6-metre contacts alone!

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1954

Starting Figure, 14

From Home QTH only

Worked	Station
40	G5YV
39	G3GHO
35	G2FJR
34	G5MA, G6TA
29	G3BJQ, G3WW
28	G3DO, G3FIH
27	G2CZS
26	G3FYY, G5DS
25	G8VN
24	G2CZS, G5JU
23	G2DVD
22	G2ADZ, G3IIT
21	G3IER
20	G2AHP, G3DVQ, G3HWJ, G3IRA
19	G3HHD, G3ITF, G5BM
18	G3DBP, G5MR
17	G3CKQ
16	G3JZG
14	G2HDZ, G3EGG, GM3DIQ

Note: This Annual Counties Worked Table opened on September 1st, 1954 and will run for the twelve months to August 31, 1955. 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, additional claims need show only counties worked as they accrue. QSL cards are not required for entry in this table.

W1AW Regular Schedule

In view of the occurrence already discussed, we have looked up the W1AW schedule for the VHF bands, and find they are operating as follows: On 52.00 mc and 145.6 mc at 0100 BST onwards on CW and 0200 BST onwards on phone, daily from Monday morning to Saturday morning.

It would be particularly interesting to have reports on any reception of the 6-metre signal, which is, of course, a much more likely proposition than the two-metre transmission, and may perhaps be receivable on some occasions during the coming months.

Small Thoughts

If you are badly situated for some particular direction, have you ever thought of trying a parasitic radiator? That is, a dipole so placed that it lifts you over the obstruction, and on which you shine your beam when you want to transmit (or receive) from that direction. Oh, yes, it works! You do not need to connect anything to the dipole, which merely re-radiates the energy it picks up from your beam, or other people's. For a fixed direction, opposite to your beam heading, a reflector system could be used for increased gain. Probably, however, a fixed multi-element stack on high ground would give better results.

Another suggestion is that for all-round coverage *locally* on two metres, it might be better to use, instead of beams, a quarter-wave spike, or ground plane, for transmission and reception. With the coming of VHF VFO's, this would enable local nets to get together on the same frequency, without the necessity for beam swinging. There are *pros* and *cons* here, but it is worth a thought.

And That——

Dries up your old A.J.D. for another month. We look forward to hearing from you, with calls h/w lists, claims for the tables, and your own ideas, suggestions and criticisms, in good time for the July issue, dead-line for which will be **Monday, June 20 certain,** addressed to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. With you again on July 8, all being well, by which time A.J.D. hopes to have had a few days' leave. *(Really!—Ed.).*

Simplified Crystal-Mixer VHF VFO

HIGH STABILITY WITH AMPLE DRIVE OUTPUT

V. G. P. WILLIAMS, M.A. (G3FYY)

There can be no question that more and more attention is now being given to VFO operation on the VHF bands. Already, some excellent VFO-controlled signals can be heard on two metres. Provided the VHF VFO is a good one and is not used in the manner of VFO's on the HF communication bands — that is, that the principles of the Band Plan are observed—there is much to be said for VFO operation on two metres. In any case, the problem is an attractive one from the experimental point of view, so that this article will stimulate further interest in the subject. Though his design is relatively simple, the signals now to be heard from G3FYY on two metres, using the VFO as described here, justify our contributor's claim that both quality and stability are entirely satisfactory.—Editor.

ALTHOUGH there are many who object strongly to the use of VFO's on two metres, there is a lot to be said in their favour, especially in view of the increasing use of the band by Service aircraft, both British and American.

One often hears amateurs transmitting right on the frequency of one of these aircraft, and this may call down the wrath of the authorities unless steps are taken to avoid such interference ; therefore it was thought that it might be wise to experiment with a VFO of a stable and yet simple type.

If such a VFO is used with discretion, there is no need whatever to diverge from the Band Plan—in which, by the way, the author is a firm believer.

General Design

There have been several designs for two-metre VFO's published in recent years, all fairly complicated and involving the use of four or more valves. Great stress was laid on the importance of inter-stage screening and on having the variable oscillator working at a low frequency in order to obtain maximum stability.

A variable oscillator operating at a low frequency necessarily leads to a very small difference between the crystal frequency and the desired output frequency, and this gives difficulty in separating the wanted output frequency from the unwanted unless the design is further complicated by including precautions for effective separation.

Therefore it was decided to experiment with a VFO using only two valves, of the miniature variety, and a variable oscillator of an inherently stable type working at a higher frequency than recommended in previous designs, and to incorporate a simple method of temperature compensation in order to improve the stability of the variable oscillator.

With such a design it was considered that there would be no need for inter-stage screening.

The author's transmitter had an 8 mc crystal oscillator, tripling to 24 mc in the anode of the same valve (EF91), therefore it would be convenient for the VFO to give output at 24 mc so that the EF91 could be used as a straight amplifier at that frequency.

A 20 mc overtone crystal was already available, consequently the variable oscillator would need to operate around 4 mc. These frequencies fitted in with the pre-conceived theory on the ease of separation of wanted from unwanted frequencies.

A Clapp was decided on for the variable oscillator, as it is of a very stable type, with warming-up changes of inter-electrode capacitances well swamped by the two large condensers in series between grid and earth.

Temperature Compensation

In keeping with the general simplicity of design of the VFO, it was not considered desirable to incorporate any elaborate device for this purpose, and it was resolved to make use of a single condenser, of suitable value, and with a negative temperature coefficient.

The drift on warming up is due to two factors. First, there is what may be called the short-term drift caused by heating of the electrodes in the valve of the variable oscillator. Secondly, there is the long-term drift caused by the much more gradual heating of the chassis and other components.

It is not thought to be possible to compensate for both causes of drift by any simple means, therefore no attempt was made to counteract drift due to the first cause ; this drift is very small, in any case, with the Clapp, for the reason stated above.

As regards the crystal oscillator, there should be no appreciable drift if the values in Fig. 2 are adopted. Although one frequently hears

crystal controlled transmissions drifting quite badly, this is due to excessive excitation of the crystal in the endeavour to obtain as much drive as possible. But if a comparatively low value of stabilized HT is used, and if the tapping on the coil is chosen to keep excitation within reasonable bounds the drift is almost negligible.

The crystal used is one specially designed for the Squier circuit, and takes off with no trouble, even with low excitation. Some " surplus " crystals will not take off at all unless a lot of feed-back is used, and this will almost inevitably lead to drift.

As regards the small drift of the Clapp, the negative temperature coefficient (NTC) condenser used is one of several obtained from The Telegraph Condenser Company, and its value has to be found experimentally as it naturally depends on the amount of heat to which it and the other components are subjected. But it will probably be found that it will lie between 10 $\mu\mu$F and 25 $\mu\mu$F, according to individual circumstances.

These condensers are very cheap and it is suggested that values of 10, 15, 20 and 25 $\mu\mu$F be tried in succession. A friend suggested that an exact adjustment might be made by connecting the NTC condenser in series with a 100 $\mu\mu$F air-spaced trimmer, and adjusting the latter until the correct proportion of NTC was obtained.

Although this sounds quite feasible in theory, it does not work out satisfactorily in practice ; as a matter of fact, it was found that, with a NTC condenser of 25 $\mu\mu$F, there was *more* LF drift when the trimmer was fully meshed than when it was only half-meshed ! Yet with the same NTC condenser alone (trimmer disconnected) the drift was HF.

This is clearly because of the positive temperature coefficient (PTC) of the air-spaced trimmer exerting more influence on the combined coefficient at full mesh than at half-mesh.

The series value of 25 $\mu\mu$F and 100 $\mu\mu$F is 20 $\mu\mu$F, and of 25 $\mu\mu$F and 50 $\mu\mu$F it is 16·7 $\mu\mu$F ; so by reducing the trimmer from full to half-mesh one is reducing the influence of the NTC by 16% only, whereas the influence of the PTC trimmer is reduced by 50%.

Consequently it is undoubtedly better to use the NTC condenser *without* any series trimmer, and to try the four values of NTC suggested to ascertain which gives the best compromise.

The actual drift of the author's completed VFO is shown in Fig. 1, and it will be seen that it amounts to about 2·3 kc (measured at 145 mc), which occurs during the first twelve minutes after switching on from cold, at a room temperature of 60°F, and thereafter it remains steady, although the gradual warming up of the chassis continues for an hour or so.

Choice of Valves

Previous designs have included two separate valves as crystal and variable oscillators, but it was not thought to be necessary in this case, particularly as the anode of the Clapp is at earth potential for RF, and therefore acts as a screen between the other electrodes of the Clapp and those of the crystal oscillator if a double-triode is used.

The overtone type of crystal oscillator needs a valve of fairly high mutual conductance ; the 12AU7 fulfils this need and is capable of giving rather more output than the 12AT7.

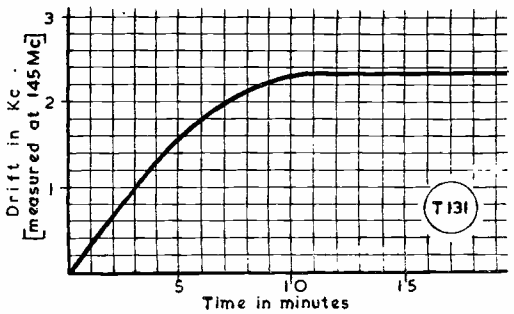


Fig. 1. Showing very convincingly the drift characteristic of the VHF VFO described by G3FYY. As this curve, taken on the 144 mc band, indicates the frequency stability is excellent.

The other designs referred to have incorporated two EL32's as push-pull mixers, but these are rather large valves to be suitable company for a small valve like the 12AU7, so experiments were made with several miniature output pentodes and beam tetrodes.

The EL91 was found to give a quite adequate output in the present case, where the first stage of the transmitter was to be used as a straight amplifier. But if the stage following the mixer is intended to be operated as a doubler or tripler it would be better to use a 6BW6 as the mixer, as this gives a much greater output than the EL91.

Circuitry

Fig. 2 shows the circuit used ; it will be seen that it is perfectly straightforward, with simple capacity coupling between stages ; furthermore, no inter-stage screening was found to be necessary. Although both valves are canned, this is more with a view to physical protection.

Some readers may object to the fact that the

low impedance output from the Clapp is capacity-coupled direct into the high impedance input of the mixer, and that the high impedance output from the latter is taken through low impedance feeder to the first stage of the transmitter !

The author was prepared to go to some trouble to effect correct impedance matching *if this proved to be necessary,* but as the VFO worked perfectly the first time it was put on the air and gave plenty of drive, it was not thought desirable to introduce any further complications such as impedance matching devices.

In addition, it has been found in the past that where a *short* length only of co-axial cable is used for a high impedance output, no appreciable improvement results from endeavouring to secure a theoretically correct match at each end of the coax ; and this type of feeder is *so* convenient for coupling a VFO to the transmitter !

It will be realised that this type of cable has considerable self-capacity, of the order of 20 $\mu\mu$F per foot, and this will of course influence the tuning of the mixer output circuit, possibly needing more or less turns in the coil L3.

In the author's case, the length of cable from VFO to transmitter is one foot, and from the transmitter co-axial socket there is another length of six inches of cable to the grid of the first amplifier.

Construction

Few comments on this point are really necessary, as everything is very simple and straightforward.

The lay-out of components was so arranged that inter-stage screening could be fitted if this proved to be advisable, but, as previously stated, no such screening had to be provided.

Although it has been stated that the author is a firm believer in the Band Plan, the Clapp was designed to cover the whole band, partly for the benefit of any readers in other Zones who might wish to build a similar VFO, and partly because it is sometimes convenient for test purposes to be able to put out a signal at the extreme ends of the band.

As stabilized voltage is required for both oscillators, but not for the mixer, the stabilizing valve and its associated resistor are mounted on the VFO chassis. This resistor is built into a separate compartment which is ventilated by three $\frac{1}{4}$ inch holes drilled in the deck of the chassis immediately above the resistor, and three similar holes at the bottom of the back of the chassis. Failing such precautions, the heat generated in the resistor would seriously affect results.

All components should be of the best make, particularly the high stability grid resistor and the condensers in the Clapp, otherwise it may be found that the note is not rock steady but may waver slightly.

The Clapp tuning condenser used is a very well made component, but the precaution was taken to earth the rotor direct, by means of a pigtail cut from copper foil, to avoid RF circulating through the bearings.

The chassis used is an Eddystone diecast product, measuring $8\frac{1}{2} \times 5\frac{3}{4}$ ins., which is a favourite with the author on account of its extreme rigidity and the ease with which holes are cut in it.

The slow motion knob is a " Utility," which is another favourite, as it is so simple to fit, gives a real slow motion drive of 60-to-1 with absolutely no backlash, and also has a direct drive for speed in moving from one part of the band to another. It will be seen from the photograph that the dial is calibrated direct, in 100 kc steps, from 144 to 146 mc.

It is a fallacy to imagine that a dial calibrated in degrees gives an advantage through each degree representing so many kilocycles, as it is quite impossible, using any standard tuning condenser, for the scale to be absolutely linear from one end of the band to the other ; and there is the additional disadvantage that a complicated mental calculation (or reference to a graph) has to be made before one can set the VFO to a pre-determined frequency.

With the dial made up by the author a frequency can be set up within 10 kc of the required frequency, and if greater accuracy were necessary a larger dial could be fitted and a celluloid cursor made.

Of course, for tuning on to another station's frequency the dial need not be examined, as the VFO itself gives quite a good beat when connected to the transmitter with the valve heaters of the latter (but no HT !) switched on, and one simply tunes the VFO on to the other station's carrier in the usual way.

The switch cuts off the crystal oscillator only, leaving the Clapp running continuously. This switch is of the semi-rotary type with a snap action, as this causes much less physical shock to the chassis than the usual toggle type.

It will be noticed that two 1000 ohm resistors (R1, R4) are incorporated which may appear to be unnecessary at first sight ; this is to enable the current passing to be ascertained by measuring the voltage drop across them ; this

is of considerable assistance in the preliminary adjustments, and gives more accurate results than reading across R2, R5, where the capacity of the meter would affect the reading.

No attempt has been made to provide for keying either oscillator for CW work ; keying the screen of the 72-144 mc doubler stage in the transmitter has always been preferred and has been retained.

It is important to note that *no* decoupling condenser must be fitted to the screen of the mixer.

The coil former, already provided with spacing grooves by the makers, will take only 28 turns unless extra grooves are filed at top and bottom of the former ; this is quite easy to carry out.

The power needed for this VFO is 35 mA at 250 volts, and ·5A at 6·3 volts.

Preliminary Adjustments

If a grid-dip meter is available, this will be very useful in checking the three tuned circuits to ensure that each will come up to its required frequency with something in hand on each side of that frequency ; do not forget that in checking the mixer output circuit, the latter must first be connected to the transmitter by the short length of coax which is intended for actual operation later.

Crystal Oscillator. Connect a voltmeter across R1, using a range of 10 or 20 volts. Set C2 at maximum, switch on the HT, then watch the meter as C2 is trimmed slowly towards minimum. At one point the meter needle will dip suddenly, showing that oscillation has commenced.

As trimming is continued, the meter reading will rise slowly to a maximum and will then fall slowly until oscillation ceases. The trimmer should be set at the point where the reading has fallen *slightly* from maximum ; this will give the greatest output which is consistent with instant starting when the HT is switched on.

Check the note in the station receiver, which should be tuned to 20 mc, and ascertain that

Table of Values

Fig. 2. Circuit of the Simplified VHF VFO

C1 = 500 μμF, silver mica
C2 = 50 μμF air-spaced trimmer
C3 = 25 μμF, silver mica
C4, C5, C6, C9, C14. C15, = 1,000 pF, mica
C18 = .001 μF, mica
C7, C8 = .001 μF, silver mica (5% tolerance)
C10 = 27.5 μμF (Eddystone 588)
C11 = 100 μμF, air-spaced trimmer
C12 = 15 μμF, neg. temp. coeff. (T.C.C. SCT1 — *see text*)
C13 = 3-30 μμF, Philips trimmer
C16 = 50 μμF silver mica
C17 = 25 μμF, air-spaced trimmer
R1, R2, R4, R5, = 1,000 ohms, ½w.
R10 = 1,000 ohms, ½w.
R3 = 4,700 ohms, ½w.
R6 = 24,000 ohms, ½w. (high stability)
R7 = 3,000 ohms, 10w.
R8 = 100,000 ohms, ½w.
R9 = 680 ohms, ½w.
R11 = 39,000 ohms, ½w.
Xtal = QCC 20 mc, Type FO
RFC = RF choke (Eddystone 1010)
S = Rotary switch

Coils

L1 = 20 turns 20 SWG enam., spaced wire diameter, on ½-in. former, tapped 5th turn from grid end.
L2 = 30 turns 18 SWG enam., on Eddystone 1½-in. grooved former, No. 538.
L3 = 7 turns 22 SWG enam., close-wound on ½-in. former (*see text*).

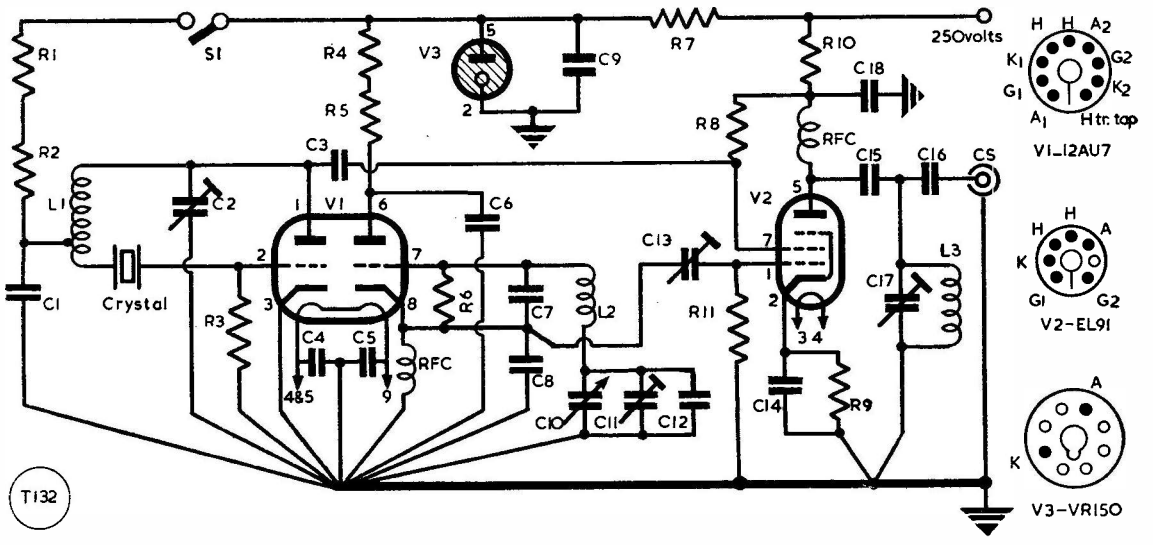


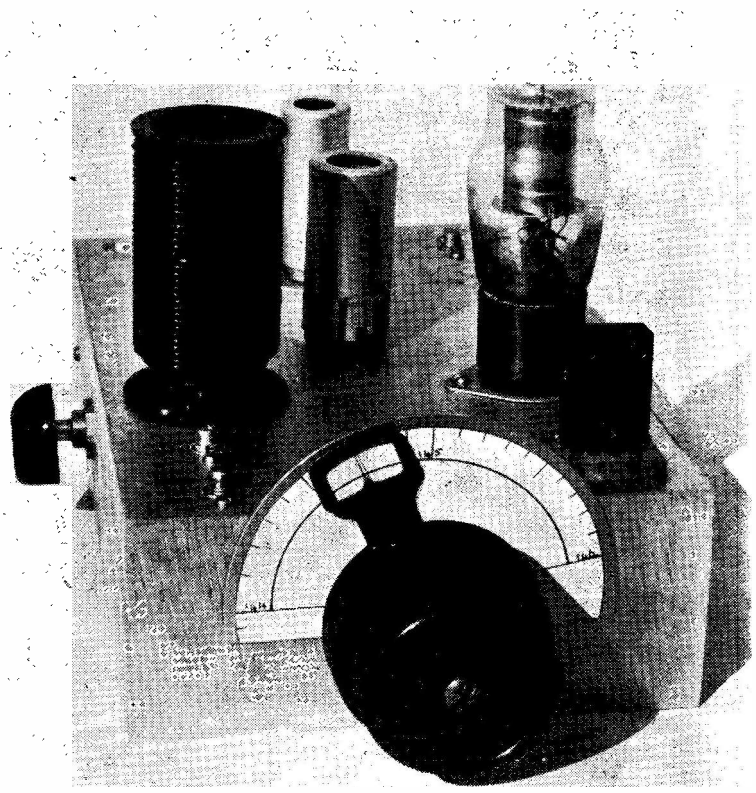
Fig. 2. Circuit of the VHF VFO designed and described by G3FYY in his article. The degree of stability attained, and the freedom from drift after warm-up, makes it entirely acceptable as a driver unit on two metres. The variable oscillator is around 4 mc and the crystal output frequency about 20 mc ; the mixed (24 mc) output is multiplied up in the usual way and, with a good dial on C10, accurate frequency setting in the 144 mc band can easily be obtained.

instant starting is obtained by operating the switch S.

Nothing whatever should be heard from the oscillator either at 6·66 mc or at 13·33 mc.

Clapp Oscillator. Set C10 to maximum and tune the station receiver to 4 mc, using the fourth harmonic of the station 1 mc crystal calibrator for accurate tuning. Set C13 to about half capacity, switch on the HT, and adjust C11 until the Clapp is zero beat with the crystal calibrator. Tune the receiver to 4·33 mc and ascertain that the Clapp will tune to that frequency.

If that point is reached too far from the HF end of the Clapp dial, short circuit the two bottom turns of the coil by soldering on a shorting wire, re-set C11 at 4 mc, and try the HF end again. If the Clapp will not tune up as high as 4·33 mc, either one must be resigned to that fact, or else the coil must be re-wound with an extra turn or two. But it will be seen from the photograph that the author's Clapp tunes to 4·33 mc with a little to spare.



The VHF-VFO complete, as described by G3FYY. Full coverage of the two-metre band is obtained, with ample drive output into the existing 24 mc stage in the transmitter. The large valve on the right is a voltage stabiliser for the Clapp variable oscillator. Mixed frequencies are : Crystal, 20 mc ; variable oscillator, 4 mc.

Mixer. Connect the VFO to the transmitter by means of the coax, tune the station receiver to 24 mc, and the VFO output at this frequency should now be heard in the receiver. Watch the receiver S-meter and adjust C17 until the S-meter shows maximum reading.

The transmitter should now be switched on for a preliminary test ; if the VFO is giving ample drive (as it should do), reduce C13 and examine the drive to the PA again. It must be remembered that the smaller the capacity of C13, the better for the stability and the less the pulling of the Clapp on CW.

It will probably be found that C13 can be set nearly at minimum and yet drive still remains adequate. When this has been finally set, make a further adjustment to C17 to ensure that the mixer is correctly tuned to 24 mc and is giving maximum output.

Final Adjustments

It is unlikely that the PA output is *exactly* 144 to 146 mc at this stage (although it should be very close), as the VFO crystal itself will have some slight inaccuracy, even if only of the order of ·01%.

The 1 mc crystal calibrator in use at G3FYY gives a very strong beat on its 145th harmonic, and this was used for final adjustments. This calibrator has been lined up on WWV by means of a trimmer across the crystal.

With the two-metre converter tuned to 145 mc and connected to the station receiver, the calibrator leads were attached to the converter input, and the station receiver was tuned to the converter IF until the calibrator signal was heard in the receiver.

The VFO tuning condenser was set to half scale, and the Clapp trimmer C11 was carefully adjusted until the sixth harmonic from the mixer was zero beat with the calibrator harmonic at 145 mc. This spot was marked on

the VFO dial.

The converter was then tuned to 144 mc, at which point the calibrator was heard again. The VFO was tuned to the bottom end of the scale until the mixer output again beat with the calibrator signal at 144 mc. This spot was also marked on the dial, and similarly another mark was made at 146 mc.

In carrying out this final calibration, confusion may arise when tuning the VFO, through hearing a number of beats caused by the numerous harmonics of the Clapp, the VFO crystal, the calibrator and the converter oscillator, all beating with each other ! No alarm need be felt on this account, however, as this confusion can easily be avoided by switching on the transmitter, with the receiver BFO on and the RF gain control turned well back, when the PA note will be heard at only *one* point on the converter dial.

The crystal calibrator in question not only produces loud beats at 144, 145 and 146 mc from the 1 mc crystal, but also the 100 kc crystal gives faint but quite audible signals, and by these means the VFO dial was calibrated in 100 kc steps.

Results

As already stated, the VFO worked perfectly even in the first test QSO, and quite justified the hopes of the effectiveness of this simple design.

The first station contacted pronounced the signal to be perfectly stable and necessitating no re-tuning at his end during the QSO, which lasted nearly an hour. The note was judged T9, and though the station in question, only a few miles away, made a careful and slow search throughout the entire band for any spurious emissions while the PA was being well modulated, none was found.

Contact was then made deliberately with a well-known and successful station, the operator of which is notoriously against the use of VFO's on two metres. After giving all his views objecting to their use, he grudgingly admitted that he could not have told from the signal itself that it was VFO controlled !

From these and subsequent tests it was proved that, with the transmitter peaked at 145 mc, it could be operated at any point within Zone J without re-tuning the circuits and the signal was perfectly clean and free from any spurious emissions.

But when a test was made at 144 mc, with the transmitter still peaked at 145 mc, several spurious emissions were reported. But of course this could have occurred even with crystal control, when the drive to the PA is reduced by all the frequency multiplier stages being off tune, and when modulation parasitics are induced in the PA by that stage also being off tune.

This is mentioned as a warning against attempting *large* shifts of frequency without re-tuning all stages of the transmitter and the mixer stage of the VFO. But such extreme shifts will rarely be used, and then only for test purposes.

As a final precaution, a sensitive absorption meter was made up, using a microammeter as the indicator, covering 15 to 250 mc, and with this tightly coupled to the transmitter feeder, not the slightest flicker of the meter needle was noted over the whole of this range except at the correct point, at which the rectifier crystal and/or the meter would have been burned out if the absorption meter had not been moved to a safe distance just for that one reading !

It must be emphasized once again that the effectiveness of this simple design probably holds good only when there is adequate separation between the VFO crystal frequency and the output frequency ; if less than 4 mc is used for the Clapp, trouble would probably result ; but more than 4 mc should be quite in order provided the Clapp frequency is not taken so high that stability is difficult to obtain.

MALAYAN A.R.T.S.

The *Malayan Amateur Newsletter* is published by the Malayan Amateur Radio Transmitters Society, founded in 1951. The president is VS2BD, secretary VS2BS and editor VS2DB. Membership is open to all licensed operators in Malaya, Singapore, Borneo, Sarawak, Brunei and adjacent islands. Recently, 900 QSL cards were sent to 63 countries in one month by the M.A.R.T.S. bureau.

BROADCAST RECEIVING LICENCES

During the month of March, the number of television licences increased by 96,373. A total of 13,980,496 broadcast receiving licences, including 4,503,766 for television, and 267,794 for sets fitted in cars, were current in Great Britain and Northern Ireland at the end of March, 1955.

Random Jottings by the Old Timer

ONE of the things that makes this hobby of ours so interesting is the enormous variety of techniques to choose from. A newly-licensed amateur decides that he is about to "transmit," as we say; he means that he proposes to transmit information of some kind from one place to another without the use of wires. He has the choice of several different frequency-bands on which to do it, all of them with varying characteristics, not only of propagation but of sheer *technique*. For instance, communication on the 160-metre band and on the 25-cm. band might be said to involve him in two completely different hobbies, just about as different as stamp-collecting and the breeding of tropical fish. They have practically nothing in common except the operator and the headphones or loud-speaker through which he hears the incoming signals. Even on one band (take One-Sixty, for example) he can use valves or transistors, CW or telephony, amplitude modulation or narrow-band FM, or even single side-band.

INFINITE VARIETY

So there is no excuse for boredom except the ultimate, which eventually puts people off the air for good. And this is sheer boredom with communication, no matter what the means employed. As a rule, this only comes to those who were never sufficiently interested in the first place, or, perhaps, those who acquired a licence simply because they thought it would be nice to natter, and had no real lasting interest in the means of doing so. Others, of course, have been known to run the thing so hot and strong for a couple of years or so that they practically flog themselves to death; then reaction sets in and they disappear from the bands. These types, however, usually reappear after an interval of a few years, because the basic interest was there all the time. It all comes down to the old truism that you get just as much out of anything as you put into it. When you tire of talking to the U.S.A. on high-speed CW, build yourself an SSB exciter and you will find you have to start learning all over again.

SHRINKAGE

When we compare almost any piece of modern gear with its counterpart of yesteryear, the most obvious difference is that of size. In the amateur world we used to have all sorts of false ideas about the desirable sizes of components (remember those tank coils of ¼-in. copper tubing, for 50 watts?), and practically everything we built was quite unnecessarily large. A complete 150-watt table-topper for phone and CW, fully TVI-proofed and all, is hardly larger than our original PA stage alone! What a pity, in view of all this compression and miniaturisation, that the aerial remains as clumsy a piece of apparatus as it ever was. Whether for TV reception or DX transmission, the aerial system has hardly been compressed at all, and it is difficult, at present, to see how it could be. Many cut-down versions of well-known types have been evolved, but no one pretends that their performance is up to that of the legitimate originals. As a matter of fact, the average amateur aerial is *bigger* than it was in the pre-war years.

UNIT CONSTRUCTION

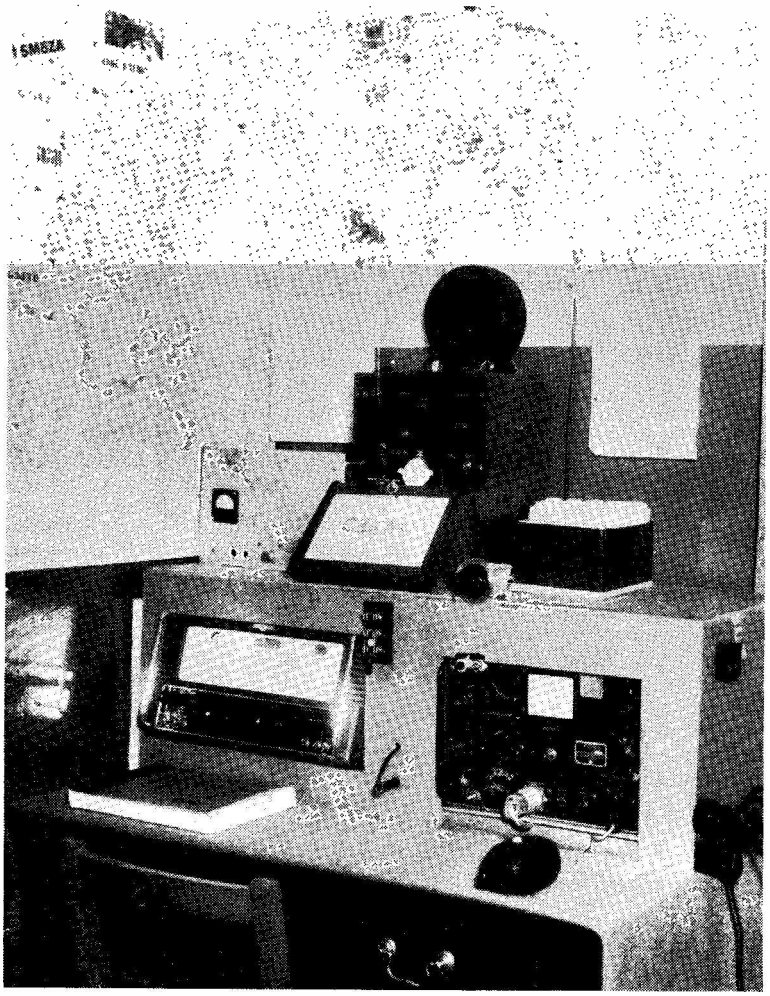
One worth-while system that seems to be neglected nowadays is the building up of gear in small units which can be tied together in a variety of ways to do different jobs. This was very popular in the thirties among home constructors, and still has a lot to recommend it. If you have two transmitters—one for HF and one for VHF, for example—there are several pieces of gear which have nothing in common. On the other hand, there are many which there is no point in duplicating, such as the power supplies, modulator, speech amplifier; and, on the receiving side, the IF and audio amplifiers. In most stations we shall find the whole lot duplicated, and in many others we shall find a kind of make-shift economy practised by means of an amazing system of haywire. A little attention to detail might produce a series of conveniently interchangeable units of the plug-in variety, with considerable economy both in money and space. Such an arrangement simplifies everything in the long run, and makes fault-finding very much easier and quicker.

DX MOBILES

One very interesting development, as the new sunspot cycle proceeds, will be the use of the 10-metre band for mobile work. Its chief attraction is that reasonably efficient aerials can be carried on a car without any danger of electrocution from overhead trolley-bus wires! For short-haul work the band is, and always has been, excellent. When it is in its full DX order again, though, things will be much more exciting, and mobile-to-mobile work across the Atlantic will be easily possible. Those who were not on the 10-metre band in 1947 will not remember how the New York "cop-cars" used to roar through on frequencies above 30 mc; those of us who used to listen to them for an indication of conditions feel convinced that Trans-Atlantic work from a 10-metre mobile will be a piece of cake. Considerable miniaturisation of gear has taken place, even since 1947, and owners of the smallest cars will be able to instal something reasonably potent without killing their batteries. Operation with a small aerial from a high spot in open country will often be as efficient as use of the home aerial system.

THE OTHER MAN'S STATION

G3KAY



STATION G3KAY has been on the air since December 1954, and is operated by R. J. Lang at R.A.F. Bassingbourn, Cambs. Previous to being licensed, the owner had been an enthusiastic SWL since 1945, including a spell of two years as an MD5-SWL.

The station is shown as it is at present, consisting of commercial, ex-Government ("surplus") and home-made items of equipment. The transmitter is a "surplus" Collins 52245, covering 20-160 metres inclusive, the circuit arrangement being: 12A6 CO or VFO into 12A6 BA or doubler, into a pair of 1629's in push-pull as PA, taking an input up to 50 watts on all bands except 160 metres.

Aerial change-over from transmit-to-receive is manually by means of a switch, and the receiver is an Eddystone 680X, with a BC-221 for calibration checking and frequency control. On the aerial side, facilities are somewhat limited, but a 132-ft. long-wire has been worked in and is used on all bands. In the photograph, commencing top left, is the power unit for the transmitter; next comes the BC-221, followed by the QSL card index system; below this is the receiver and aerial change-over, with the transmitter on the right. The equipment, as described and illustrated here, is not TVI-proof, but work is going ahead as rapidly as possible to remedy what G3KAY calls "this unhappy state of affairs."

As can be seen, the gear is built into a stand, constructed (at the cost of a few shillings only) from scrap wood and hardboard, the idea of this being, first, to keep the station compact; and secondly, to keep it tidy, since the space available is only 4 ft. by 4 ft.; as the photograph shows, this has made for a very neat layout, with a comfortable operating position.

At the moment, operation is naturally on CW only, but as soon as the regulations allow it is intended to modify the transmitter for phone working. For the time being, main interest is in county and country chasing on all bands, and the accumulation of American States, but a long rag-chew QSO is nevertheless thoroughly enjoyed. As to future plans at G3KAY, it is hoped to be able to operate portable this summer, and to overcome the problem of TVI so that the station can be put on the air at any time.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Dead-line for July Issue : JUNE 17)

WE are always interested to read of the efforts made by Clubs to bring themselves into the public eye at Hobbies Exhibitions, Trade Fairs, and all such kinds of local undertakings. Amateur Radio is a certain winner at these events, at which, so often, all the stands are purely static except for one or two such as Model Railways and Amateur Radio. Something actually *doing something*—as we heard a member of the public exclaim on one occasion!

After all these years the public is still incredibly hazy on the subject of our hobby. They have no idea what makes us tick, or what kind of people we are, until they meet the local Club boys hard at work in the centre of a hall given up largely to handicrafts of the better-known variety. For example, **Lancaster** recently showed the flag at the Morecambe Rotary Club's Exhibition, which was open for four days between 2 p.m. and 9 p.m. No fewer than 7,000 visitors passed through during that time! Two transmitters were used, on 80 and 160 metres, and operated by G3AEP and G3BAP. Tape recorders were also in evidence (these never fail with the public!) and Hi-Fi gramophone records were played, with the sound wave-forms displayed on an oscilloscope. Home-built equipment was on show, with a QSL display and a certain amount of commercial apparatus and publications. Full marks, Lancaster!

As you read this, **Pontefract** will be in the throes of a similar effort. The Wakefield Rotary Club are holding a Hobbies and Home Safety Exhibition (celebrating their Golden Jubilee, too) at the Wakefield Technical College on June 2, 3 and 4. The Amateur Radio section has a room to itself and a transmitting station (GB3WHE) will be in operation on 80 and 160, and possibly also Two Metres. Amateurs in and around Wakefield are supplying the gear and the effort. QSO's, on the air or in person, will be welcomed.

Photographs

Members of local Clubs, and their hard-working secretaries, are reminded that we are always glad to see photographs with a seasonal flavour, for publication either in this feature or elsewhere in SHORT WAVE MAGAZINE. All those used are paid for on appearance. Please note, however, that prints sent in to us for possible publication must be clear and sharp—blurred impressions of a huddle in a tent, taken in pouring rain with the camera out of focus, can *not* be used, though they are undoubtedly of immense interest to those actually concerned!

It is worth taking some trouble to get a really good photograph on, say, a field day occasion or a Club outing. Prints should be identified on the back in light pencilling only, with full descriptive notes separate; and, very important, please be careful to get all call-signs correct when identifying individuals in a group. This avoids our getting furious letters to the effect that "It wasn't me in that photo on page . . . "!

CLUB REPORTS

Bournemouth recently had a talk from G2HIF on The Application of Electronics to Atomic Energy, and it is hoped to arrange Part Two in the Autumn. Next meeting, on June 3, will be devoted to the construction of the Club's Two-Metre Station, and the Summer Outing (June 19) will be to the Rowridge BBC Television station.

Chester are devoting two meetings (June 14 and 21) to the subject of Radio Control. A Ladies' Night is to be held in July, but they have not yet decided what to do with the ladies! Two "technical" outings are being arranged, and one purely social function, at which the XYL's can take the harmonics for a paddle while the OM's retire elsewhere.

Clacton, despite the absence of reports for a long time, is still in action and meeting fortnightly at Laxfield, Beach Road, Clacton. All the local members are active, and they include G3HSM, 3INU, 3JKT, 3JNI and 3JOK. Radio control has been demonstrated at a recent meeting by Dennis Coe, a local modeller.

The A.G.M. at **Isle of Man** was followed by a social evening, both being very successful events. The Club has obtained a ZC1 Mk II transmitter/receiver, and two or three members have their own, so it is hoped to arrange portable activities during the summer. The President, GD3FBS, has kindly given the Club the use of a building attached to his own house, and it is hoped to instal a permanent shack there for the Club station GD3FLH.

Kingston held two meetings during May, the first being an Avo lecture-demonstration, and the second a demonstration of Pye's Mobile Radio Telephone. All lecture meetings are held, as always, at Penrhyn House, 5 Penrhyn Road, Kingston-on-Thames.

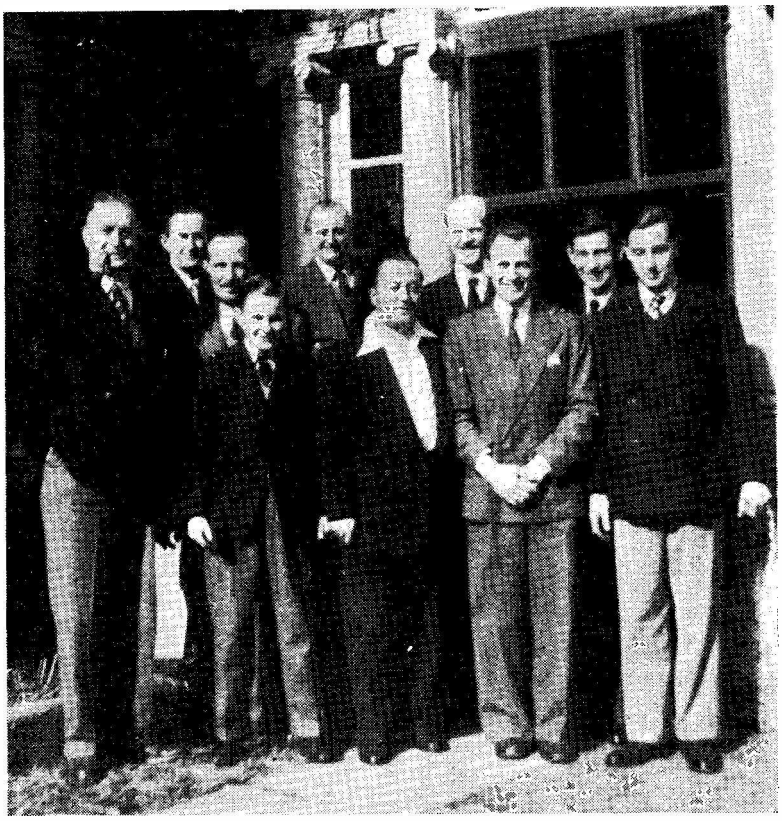
Activity at **Northampton** is reported as slack

during the winter months, but a new compact Two-metre transmitter has been completed and is running with 25 watts. The Club had to miss the Two-metre Field Day on May 1 because of transport and aerial difficulties, but intend to be fully active for the September event. Meanwhile they hope to turn to the LF bands.

Nottingham, a new Club, held their inaugural meeting on April 29. This newcomer, meeting at the Sherwood Community Centre, hopes to keep up a regular programme of varied activities. Meetings will be held on the third Friday at 7.30 p.m., and anyone interested in Amateur Radio is assured of a warm welcome. Refreshments will be available, and meetings will end at 9.30 p.m. (*See* panel for Secretary's QTH).

Purley report the possibility of a Summer Fair being held again this year, and it is probable that the Club will be invited to take part, as they have done previously with such success. Their last two meetings have been devoted to Receiver Problems, and the A.G.M.

Romford report that a workshop for the use of Club members is now available, and that they will be takiug part in NFD and, it is hoped, the next Two-metre Field Day. Meetings are at RAFA House, Carlton Road, Romford, every Tuesday, at 8.15 p.m.



On Easter Monday, an informal meeting of 80-metre phone men who use SSB and A3 was held at Daventry, with the intention of dispelling any impression that the two cannot mix. Supporters were present from London and the Midlands and one of the highlights of the occasion was a tour of the BBC transmitting site, under the guidance of G5NH who, having been there some 15 years, seemed to know every nut and bolt at what is one of the largest of the BBC's stations. In this photograph, left to right, are: G3HVH, SWL, G3HYU, 3HYU Jr., G3JOL, G2CDN, G3AYC, G3EZO, SWL, G3EFP. Hospitality was provided by G3JOL (SSB) of the "Saracen's Head," Daventry.

Shefford, a Club that has not reported to us for a long time, now comes back into the list. It is in its seventh year, and meets every Friday evening at Digswell House, where new members will always be welcome. All aspects of radio and electronics are covered, with films and junk sales a regular feature, and refreshments available. G2DUS/T frequently gives lectures, and recently demonstrated his TV Monascope.

Southend recently heard a talk from Mr. P. Baldwin on Electronic Musical Instruments, with references to at least twelve different types of electric organs.

Stockport report that they have entered G3FYE and G3AUB as "A" and "B" stations for NFD, both operating from Carr Brow, Disley, and about a quarter of a mile apart.

Norwich have now settled into new premises at rooms above The Golden Lion, St. John's Maddermarket, and are meeting there every Friday at 7.30 p.m. Work is under way on the adjoining shack, and G3JGI hopes to be active on the bands shortly. Subscriptions have been reduced to 7s. 6d. per annum.

Mitcham have also changed their meeting place, which is now at The Canons, Madeira Road, Mitcham. Membership is 35 and further expansion is hoped for.

The Chelmsford Group of the British Amateur Television Club meets every month at 10 Baddow Place Avenue, Great Baddow, Essex, the next being on July 14, when the subject is to be Test Gear for Amateur Television. New members and "potentials" are always welcome on the monthly occasions at this address, and the QTH of the new honorary secretary of the B.A.T.C. will be found in the panel.

CLUB NEWS IN BRIEF

BARNSLEY: June 10, Quiz; June 24, Fifty Years of Ham Radio (G8OK).

BRADFORD: June 28, Informal Meeting.

COVENTRY: June 6, Junk Sale; June 20, Talk on VHF (G3BAK).

(*over*)

Dead-line for next month's reports is **Friday, June 17.** They should be addressed to: "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

LEEDS: June 15, A.G.M.; June 22, Social Evening.
MIDLAND: June 21, Mr. H. Buckley on High-Fidelity Equipment; July 2-3, Annual Field Week-End at Barr Beacon, Staffs.
SLADE: June 5, Second Harcourt Trophy Test; June 12 and 19, National D-F Contest Preliminaries; June 10, The Application of Valves for Communication Purposes (G3HKC); June 24, Instruments at VHF (Mr. L. Glew, of Marconi Instruments, Ltd.).
SPEN VALLEY: June 15, Junk Sale; June 29, to be arranged.
WEST KENT: June 17, Junk Sale; July 1, New Trends in VHF Technique (G2UJ).
MITCHAM: June 3, Getting Going on Two (G2DTO); June 17, Oscilloscopes (Mr. D. Arnold); July 1, Outside Visit.
NORWICH: June 10, Discussion on NFD Results; June 17, General Radio Quiz; June 24, Open Night; July 1, Bring and Buy Sale.

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NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

BARNSLEY: P. Carbutt, G2AFV, 33 Woodstock Road, Barnsley.
B.A.T.C.: D. W. Wheele, G3AKJ, 4 Bishop Road, Chelmsford, Essex.
BRADFORD: F. J. Davies, 39 Pullan Avenue, Bradford 2.
CHESTER: N. Richardson, 23 St. Mary's Road. Dodleston, near Chester.
CLACTON: R. J. Appleby, G3INU, 95 Oxford Road, Clacton-on-Sea.
COVENTRY: J. H. Whitby, G3HDB, 24 Thornby Avenue, Kenilworth.
ISLE OF MAN: R. S. Trickey, GD3DRB, 35 Sunningdale Drive, Onchan, I.O.M.
KINGSTON: R. Babbs, B.Sc., G3GVU, 28 Grove Lane, Kingston-on-Thames.
LANCASTER: A. O. Ellefsen, G3FJO, Silver Birches, Manor Lane, Hest Bank, Lancaster.
LEEDS: B. A. Payne, 454 Kirkstall Road, Leeds 4.
MIDLAND: D. Hall, 144 Hill Village Road, Sutton Coldfield.
MITCHAM: D. Tilcock, G3JYV, 16 Taffy's How, Mitcham, Surrey.
NORTHAMPTON: A. J. Kightley, 23 Garrick Road, Northampton.
NORWICH: P. J. Gowen, G3IOR, 71 Links Avenue, Hellesdon, Norwich.
NOTTINGHAM: M. Dransfield, G3JKO, 1 Cavendish Crescent South, The Park, Nottingham.
PONTEFRACT: W. Farrar, G3ESP, Stanton, Hemsworth Road, Ackworth, Pontefract.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
ROMFORD: N. Miller, 55 Kingston Road, Romford.
SHEFFORD: G. R. Cobb, 7 Hitchin Road, Shefford, Beds.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHEND: J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend-on-Sea.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, near Leeds.
STOCKPORT: D. Hall, 13 Hallam Street, Heavily, Stockport.
WEST KENT: H. F. Richards, Culverden House, Culverden Park Road, Tunbridge Wells.

SMALL ADVERTISEMENTS

9d. per word, minimum charge 12/-. No series discount ; all charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1

TRADE

APPOINTMENTS

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

SALE: QRO Phone/CW Tx with AR88 Rx. 348 Rx with speaker. Buyer collects.—65 Woodstock Gardens, Blackpool.

SMALL ADVERTISEMENTS, READERS—*continued*

R 44/ARR5, 14-valve Hallicrafter Aircraft Receiver, 28-145 mc AM/FM, £8; Chapman 3-waveband radio tuner unit, £8 10s.; BC-221 with book, less case, £12 10s.; Navy-type BC-221, complete, £14; Navy-type BC-221, less book, £9; RA1B, new, £10 10s.; SX28, mint, speaker, manual, £45. New boxed Valves: RCA 807, 6C5, 6K7, 6SK7, 6J5, OZ4, 6C4, 5/6 each; 6J6, 6AG5, 6AK5, 6SN7, 6V6, 6X5, 717A, 6SA7, 6N7, 6/6 each; V150/30, 12AX7, 12AU7, 5U4, 7/6 each; 6L6, 6K8, 6Q7, 25L6, 8/6 each; RCA boxed 465 IFT's, 5/- each. Please add postage if requiring one item only.—Lee, 35 Nealdon Street, Stockwell, S.W.9.

EDDYSTONE 640, special late model with chrome handles; only used few hours since new; Eddystone diecast speaker to match. Brand-new spare valves and instruction manual. Carriage paid, £23.—Box 1587, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: CR100, perfect condition, £16. Reason selling: new hobby. Callers preferred.—Mills, 3 Woodland Avenue, Ilkeston, Derbys.

MCR1, perfect, complete with coils, phones, aerial, mains unit, 97-250v. AC/DC, £7 10s. (o.n.o.).—Lofting, 5-H Kingwood Road, S.W.6. (*Fulham 9321*).

EDDYSTONE 750, as new, little used, original carton, £47; Woden UM1, five Labgear WBC's, two 807's, four 6AG7's, six 4 mF 700v. paper, three Tx variables, variable Tx aerial coil, £6; £50 lot. delivered central Southern England.—Box 1588, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AR 88D WANTED; must be in mint condition, unmodified; with original S-meter preferred. Will collect London/Home Counties area.—Richards, AP2CR, The Close, Swineshead, Bedford.

WANTED: Manual and any information for ex-Government Receiver Type R110, 10-60 mc.—Wainwright, 54 Crabtree Lane, Sheffield, 5.

RCA AR77E Receiver, variable crystal filter, variable noise limiter, S-meter, 1.5-30 mc; most valves new and calibration checked; first £20, plus carriage.—GW8NP, 90 Maesycoed Road, Heath, Cardiff.

FOR SALE: Class-D Wavemeter, 85/-; also HRO general coverage coil 7.0-14.40 mc, 30/- (or offers).—Box 1590, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AR 88LF FOR SALE, excellent condition, £50 (o.n.o.); also Canadian 58 Tx/Rx, complete, £10 (o.n.o.).—Henderson, 29 Furlongs, Vange, Basildon, Essex.

TWO MILNES HT UNITS, 120v., perfect condition, filled and charged, £3 each. Buyer collects, London.—Box 1589, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BARGAIN SALE: A number of small SW Receivers; cover all bands, fully calibrated, spread, etc.; and other gear; all excellent condition; in full working order; very cheap. All enquiries welcomed, with s.a.e. for full descriptions. — Box 1572, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Two Modulation Transformers (Part No. P.7761432 from BC-375 transmitters); good condition.—Box 1591, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO SENIOR, 30-1.7 mc, with 14 mc bandspread, £20; DST.100, £25 (both excellent condition). WANTED: AR88D or SX28. Consider exchanges. —Box 1593, Short Wave Magazine. Ltd., 55 Victoria Street. London, S.W.1.

MUST SELL: CR100 Coil Pack, four IF's, BFO and four-gang Condenser, BC-453, and 78 set (both complete). Meters 500 μA, 1 mA, etc. Also hundreds of Valves, Transformers, etc. No reasonable offer refused; s.a.e. for list.—Box 1592, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: BC-348, 230v. AC, 2RF, 3IF, xtal filter, good condition, £14; MCR1 Receiver, power unit, all coil units, phones, £5; DST100 Receiver, as new, handbook, £15.—154 Leaves Spring, Stevenage, Herts.

GANG-TUNED 1.7-3.5 mc, 25-watt, CW Tx; VFO, crystal check, sidetone, netting switch, commercial finish; £25. Frequency standard HT7, £7 10s. Electronic bug, sidetone, compact, £5. Genuine McMurdo Micromatch, £7 10s.—G3EJK, 12 Cobham Terrace, Greenhithe, Kent. (*Tel. 2194*).

FOR SALE OR EXCHANGE for Eddystone 750: Pye Service Workshop Rack, signal gen., resistance capacity bridge, output meter; AR88 cabinet and front end complete; £10.—Bromley, 25 High Street, Wem, Salop.

AR 77E, £27 10s. (o.n.o.); re-aligned and re-valved metal valves; case re-painted; buyer collects.—Hardy, 24 Whippendell Way, St. Paul's Cray, Kent. (*Footscray 5429*).

HRO-MX, nine GC coils, mains power pack, £28 10s. (or near offer); Transformer, Pri. 210/240; Sec. 740-0-740, tapped 710 and 680 at 200 mA; 460-0-460v., tapped 440 and 420 at 480 mA; 4v. at 8 amps CT, twice, with four RG1-240A mercury rects and bases, £3 5s. Another 230v. Pri., 580-0-580v. at 200 mA, 5v. at 2A, 6.3 at 3A, 17/6. Two 10 Henry chokes at 200 mA, 7/6 each. Woden UM3 Mod. Transformer, £3. MCR1, four coils, mains power pack, no phones; works but needs attention; £3. Offers? Q/Max, 150-watt tank unit, 3.5, 7, 14 and 28; also two grid coils and base; £1. Four 6BW6 at 5/6 each. Four polythene valve-holders and cans for 6BW6, 1/6 each. Four others, with smaller cans, 1/- each. Please add for P. & P.—Box 1594, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO SENIOR, as new; absolutely perfect; with four bandspread coils; £25. 21 mc bandspread coil, £3 extra. Matched speaker, £1. P/Pack, £1 15s. 3ft. 6in. cabinet rack, £2 10s. Two-metre gear. S.a.e. for list.—31 Franklin Road, Birmingham, 30.

EDDYSTONE 358X, all coils, 40 kc-31 mc, S-meter, crystal gate; perfect condition. Must sell. Offers? Or will exchange for S640, BC-348, etc. Cash adjustment if necessary.—Chapman, 62 Tagwell Road, Droitwich, Worcs.

SMALL ADVERTISEMENTS, READERS—*continued*

G3IDG needs *CQ*, January, March, April, June 1945; any *Radio* before November 1935; any *R/9* before November 1934; any *QST* before August 1923; *Calling CQ* (de Soto). Overseas Ham magazines. Old or new; any quantity.—95 Ramsden Road, London, S.W.12.

FOR SALE: RME99 Receiver in superb condition, 550 kc to 33 mc in six ranges; S-meter, manual, etc.; £29. Also Taylor 45A valve tester, £11; and three 813's, new, £2 each. WANTED: Eddystone field strength meter.—82 Framingham Road, Sale, Cheshire.

FOR SALE: Eddystone 740, perfect order; matching 8in. speaker and phones; recent overhaul by Eddystone agent (test report available); price £28. Matched pair BTH 230v. AC Selsyn Motors for remote beam rotation. Offers?—Henderson, 21 Ullswater Road, Barnes, London, S.W.13.

BC-696 COMMAND TRANSMITTER, 3-4 mc, £6; Ultrascope Mk. I, £10; TZ40, 15/-; various meters and xtals from 5/-; 1000 valves, radio compass, £1; transformers, 1355's, rotary converter, four 1155's from £2 10s.; CR tubes. Lists free.—G3IDW, 136 Beech Avenue, Swindon.

BC-348 FOR SALE; modified power supply, S-meter, perfect condition; £12. Callers preferred.—Roe, 175 Diamond Avenue, East Kirby, Notts.

BARGAIN: Canadian C43 R/T Transmitter, new and unused, complete with all valves; two 813's in PA, and manual; range 2-12 mc, easily modified to cover 14 mc; requires power supply. Owner sick, unable to cope; quick sale desired. Accept nearest offer to £24. Also R1132 with PU, £5. Buyer to collects.—G2DS, 39 Knoll Road, Bexley, Kent. (*Tel. Bexleyheath 754*).

HRO SENIOR with power pack and two coils, 1.7-4 mc, 14-30 mc; noise limiter fitted; £22 10s.—G. Newton, 3 Mafier Road, Edinburgh.

AR 77E, recently overhauled by trade and complete with speaker and RCA handbook.—Offers to Box 1595, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MCELROY BUG KEY wanted; standard model; good condition.—G2OC, 119 High Road, Beeston, Notts.

RADIOCRAFT-TYPE 45 Transmitter for sale: 25 watts, valves, xtal, power pack. Also TU5B Top Band Tx, power pack. Offers wanted.—Acquier, 107 Brancaster Lane, Purley, Surrey.

WANTED: Good Communication Receiver; American preferred.—Particulars and lowest price, please: Blane, 62 Hewlett Road, Bow, London, E.3.

WANTED: 750, 680/X, AR88, etc. Exchange Rolleiflex Auto De-Luxe outfit, mint, insured, £98, plus cash for FB Receiver. Deliver/Collect London, South-East.—Aston, 7 Diana Gardens, Deal, Kent.

SALE: R1392; valves CV17, 832, 829, HK54, QV04.7, TT15, TU48. Offers?—Box 1598, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS. READERS—*continued*

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COMMUNICATIONS RECEIVER, RME 69, and Pre-amplifier DB20; coverage 10-550 metres; service data. Both in sound condition and appearance. What offers?—Matthews, 71 Kingshill Drive, Kenton, Middx. (*WOR. 9664*).

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We have purchased large quantity of the above "38" Trans/Rec. sets, and can now offer same complete with five valves, 4-VP23 and ATP4, Throat Microphones, Headphones, Junction Box and Collapsible Aerial in absolutely new condition and guaranteed Air Tested. **Freq. range 7.4 to 9 Mc/s. Range approx. 5 miles.**

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RF24 20-30 mc/s	15/- post free
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Ideal for tape recording and amplifiers. No matching transformer required.

PYE 45 Mc/s STRIP, TYPE 3583 UNITS

Size 15in. x 8in. x 2in. Complete with 45 Mc/s Pye Strip, 12 valves, 10 EF50, EB34 and EA50, volume controls and hosts of Resistors and Condensers. Sound and vision can be incorporated on this chassis with minimum space. New condition. Modification data supplied. Price **£5.** Carriage paid.

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(Brand New)

VCR97 (slight cut-off) ...	15/-
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This unit contains VCR517 Cathode Ray 6in. tube, complete with Mu-metal screen, 3 EF50, 4 SP61 and 1 5U4G valves, W/W volume controls, resistors and condensers. Suitable either for basis of T/V or Oscilloscope. "Radio Constructor" 'Scope constructional circuit included. 67/6 (plus 7/6 carr.).

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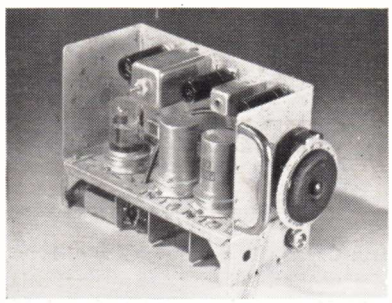

We can now offer this self-contained Unit, comprising 6 valves : 2-6BA6, EB91, VR137, EF54, EF54. Two I.F. stages and separate local oscillator, also Muirhead graduated vernier drive assures easy tuning.

Components offered to complete F.M. Unit.

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ALL ITEMS SOLD SEPARATELY. Postage 3/-

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ALL VALVES NEW AND GUARANTEED

ID8GT	10/-	6V6G	7/6	7H7	8/6	805	35/-	KT61	10/-
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IR5	7/6	6V6M	10/-	7S7	10/-	866A	12/6	KT2	5/-
IS4	7/6	6J6	9/-	8D2	4/-	872A	25/-	PEN25	6/6
IS5	7/6	6AK5	9/-	9D2	4/-	9001/2/3	6/-	PEN46	7/6
ITA	7/6	6U5	7/6	4D1	4/-	9004	6/-	QP25	6/6
IA7GT	12/6	6U5G	7/6	12A6	7/6	9006	5/-	QP21	8/-
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IQ5GT	10/-	6K7GT	6/6	12AH7GT	8/6	ATP4	6/-	TP22	8/-
IC5GT	10/-	6K7M	7/6	12K8GT	8/6	CV66	5/-	TP25	8/-
IL4	7/6	6K6GT	8/6	12Q7GT	8/6	CK510AX	2/-	TH233	10/-
ILN5	7/6	6G6G	6/6	12SA7GT	8/6	DI	5/-	U17	5/-
ILD5	7/6	6H6GT	4/-	12SQ7GT	8/6	D41	5/-	U19	10/-
2X2	5/-	6H6M	5/-	12SG7	8/6	D42	5/-	U22	8/6
3V4	7/6	6K8G	9/-	12SH7GT	7/6	D63	2/-	U52	8/6
3S4	7/6	6K8GT	9/-	12SC7	10/-	EA50	3/-	VP23	6/6
3Q5GT	10/-	6L6G	10/-	12J59T	7/6	EB34	8/6	VP41	7/6
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6A8G	8/6	6SS7M	7/6	35Z5GT	8/6	EF50 Ex-Units)	5/-	VS70 (7475)	7/6
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215SG	4/-	FW4/500	10/-	U10	8/6	PX25	12/6
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Complete with 6SL7GT and 29D7GT, relay condensers and 8 min. plug and socket.

BRAND NEW. 12/6 with Instruction Book. P.P. 2/-.

28-page Catalogue 3d. Open Mon.-Sat. 9—6. Thurs. 1 p.m.

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1A7GT, 1N5GT, 1H5GT, 1A5GT (or 1Q5GT or 1C5GT) 40/- set. 10 EF50 (ex-brand new Units), 5/- each; 45/- set. 10 6AM6 valves, £4 set. 6K8G, GK7G, 6Q7G, 5Z4G, 6V6G, 37/6 set. IR5, IS5, IT4, 154 or (3S4 or 3V4), 27/6 set. TP25, HL23/DD, VP23, PEN25 (or QP25), 25/- set. 6K8G, 6K7G, 6Q7G, 25A6G, 25Z5 (or 25Z6G), 37/6 set. 12K8GT, 12K7GT, 12Q7GT, 35Z4GT, 35L6GT (or 50L6GT), 37/6 set. 12SA7GT, 12SK7GT, 12SQ7GT, 35Z4GT, 35L6GT or 50L6GT, 37/6 set.

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Power Supply Parts to convert to A.C. Mains ... **£1 17 6**

Limited quantity.

£10/10/-. P. & P. 7/6.

VR91A The Selected EF50.

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For facsimile transmission, flying spot, telecine transmission and research, involving low light-levels, 9-stage multiplier. Brand new and guaranteed, only **£2/10.** Special 11-pin base, 2/-. Data sheets supplied. Replacements for Mazda 27MI and 27M2.

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These Units are in absolutely new condition. In black crackle cabinet 14¼in. x 9in. x 9in. Complete with 3 BP1 C/R Tube. Shield and Holder. 2-6SN7GT; 2 6H6GT; 1 6X5GT; 1 2X2; 1 6G6. V/controls, condensers, etc. Ideal for 'scope. **65/-.** Carr. and packing 5/-.

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Record changer. Plays mixed records, cream finish. Brand New in cartons. List price **£16/10/- £9/19/6,** carr. 5/-.

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