3/6

The SHORT WAVE Magazine

VOL. XXIII APRIL, 1965 NUMBER 2

Two-way Radio. A compact V.H.F. Trans./Rec. that can be held in the hand. Size approximately 12" x 3" x 3". Range up to 3 miles under favourable conditions. Utilises three miniature valves and self-contained standard batteries. Easy to operate and economical to run. Ideal for authorised fixed or mobile operation. Limited number left. Price **12 gns.** per pair, post free.

Vibrator Packs. 6V D.C. in., 250V D.C. out. Suitable for powering receivers, etc. Price **12/6**, p/p 3/6.

19 set Instruction Handbook 3/6 each, p/p 6d.
1155 Instruction Handbook 3/6 each, p/p 6d.
H.R.O. Instruction Handbook 3/6 each, p/p 6d.
Frequency Meter, BC 221 Instruction Handbook 3/6 each, p/p 6d.
46 Walkie Talkie Set Circuit and Notes 3/6 each, p/p 6d.
38 set A.F.V. Instruction Handbook 3/6 each, p/p 6d.
R.F. Unit 24 Circuit Diagram and Details Price 1/6, p/p 3d.
R.F. Unit 25 Circuit Diagram and Details Price 1/6, p/p 3d.
R.F. Unit 26 Circuit Diagram and Details Price 1/6, p/p 3d.
Receiver R1355 Circuit Diagram and Details Price 1/6, p/p 3d.
Receiver R1224A Circuit Diagram and Details Price 1/6, p/p 3d.
R.1116/A Circuit Diagram and Details Price 1/9 p/p 3d.
Wave Meter Class D Handbook, Mk. I, II and III Price 3/6, p/p 6d.

SPECIAL BARGAINS

Morse Keys, Condensers. 1 mfd. Metal encased block condensers made to high specifications. Rating 750V. Price 3/6, post free. 8 mfd. Block condensers. Rating 350V. Price 4/11, post free.

Copper Laminate Board. Size : 6" x 7". Price **3/6**, p/p 9d.

Medium Wave Ferrite Slab Aerials. Ideal for transistor radios. Price **3/6**, p/p 6d.

Morse Keys. Morse key assembly. Key with base cover and terminals. Complete with lead, **6/11**, p/p 2/-. 2 Morse Keys for **12/5**, post free.

American Signal Generator V.H.F. Model. A well made instrument with a built-in crystal master oscillator. Exceptionally fine slow motion tuning with easily read scale. Stepped output and adjustable amplitude. Ideal for 2 metres and V.H.F. calibration. Price **49/6**, p/p 5/-.

Multi Voltage Mains Transformer. Primary 200/250 50 c/s. Secondary tapped as follows: 3V, 4V, 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, 20V, 24V and 30V. All at 2 amps. Price **35/-**, p/p 3/6.

Battery Charge Adjuster. Charge Rate Adjuster. Government manufacture. Easily fitted to charging circuit. **3/6** each, 2 for **6/6**, p/p 1/- each.

Resistor Colour Code Indicator. Saves time and money. Gives the value of a resistor at a glance. Price **1/6**, p/p 3d.

Tank Aerials. Fully interlocking copper sections one foot in length. Will make ideal dipoles, car or scooter aerials. Price 6 sections complete with canvas carrying case **3/6**, p/p 1/6. Additional sections 6d. each. Please include sufficient postage.

High quality Paxolin Sheets. Strong high quality Paxolin sheets. Size 10½ x 8½ x 1/10" Three for five shillings, p/p 1/-. Six for **10/-**, post free. Twelve for **18/6**, post free.

Mains Metal Rectifier. Full wave. Approximately rating 250V, 75 m.a. Price **2/6** each, p/p 9d. 2 for **4/6**, p/p 6d.

Test Oscillator, Type 4. Frequency range 20–100 Mc/s. In two bands selected by plugging in the appropriate loop aerial, 2 of which are provided. Operates from an internal 6V D.C. supply unit. This gives an output of 250V. The unit is in good condition and a clear circuit drawing is mounted in the interior of the unit. The equipment contains many useful components including valves, transformers, chokes and resistors. Contained in a grey enamel case size, 17" x 7" x 7", with carrying handle. Price **30/-** each, post free.

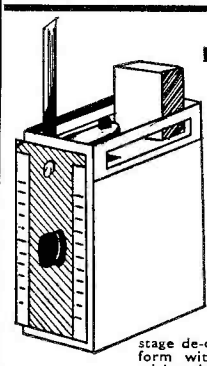
Tx./Rx. No. 38 A.F.V. A lightweight Transmitter/Receiver with transmitting range 3–5 miles. Frequency coverage 7.4 to 9 megs. Operates from 12V. and 120V. supplies. Large clearly numbered tuning control with tuning lock. Price **£4** per pair, post free.

Test Set Type 46. This unit will radiate a continuous note on frequency range 12-24 metres, in 5 switch bands. Contains a pentode valve and has a precision slow motion tuning unit. Contained in grey metal case. Works from standard batteries. Many useful components. Price **30/-** each, p/p 5/-.

Discriminator Unit. This little unit was used as a pulse count demodulator for F.M. Compact and lightweight approximately 4" x 2½" x 1". Containing a IS5 valve, coils, tag boards and miniature capacitors and resistors. Price **5/11**, p/p 1/3.

Handy Power Pack. Housed in compact metal case. 200/250V mains input. Output 250V D.C. 60 m.a. fully smoothed. 6.3V at 2 amps. Can be used for powering almost any preamp or radio tuner. Price **39/6**, p/p 2/6.

Crystal Set Kit. A wonderful educational kit for all children. Provides hours of amusement while following the easy step by step instructions. It is powered entirely by wireless waves, eliminating the expense of batteries. No soldering required. Receives all main stations. Price **25/-**, p/p 2/6.



VEHICLE RADIOTELEPHONE

Originally used by the armed forces for field communication. This compact little unit can be powered by a car battery, and two 60V or 90V H.T. batteries. Communication is possible up to a distance of 3 miles in favourable terrain, and on testing the receiver we were able to receive many continental and maritime stations. Battery drain is less than ¼ of an amp. Output stage de-commissioned to conform with regulations. Full wiring instructions provided. Price **5 gns.** each, carriage free. 2 for £10, carriage free.

19 set Trans/Rec. Mains Power Pack. Operate your 19 set receiver straight off the mains. Ready built power unit, complete with modification and fitting instructions. Price **49/6**, p/p 3/6. Please state Model, MK. 2 or MK. 3.

WANTED

WE WISH TO PURCHASE FOR SPOT CASH, RADIO COMMUNICATION EQUIPMENT: TRANSMITTERS, COMMUNICATION RECEIVERS, TRANSCEIVERS (Government surplus, Commercial and Foreign). WE ARE SURE THAT MANY ENTHUSIASTS HAVE UNWANTED EQUIPMENT TAKING UP SPACE AND COLLECTING DUST. SO LOOK AROUND AND TURN YOUR REDUNDANT EQUIPMENT INTO CASH. OFFERS MADE FOR ANY SUITABLE EQUIPMENT. SEND FULL DETAILS STATING TYPE, MAKE AND CONDITION, WITH S.A.E. FOR QUOTATION TO BUYING DEPT.

Monster Parcel No. 3. Six crocodile clips. One portable mains soldering iron, 6 phono plugs, 6 coils of multi cored solder, 6 valves. 3 T.V. aerial plugs. 12 British octal valve holders. 12 wafers. 3 car aerial plugs, 3 sheets of 10 x 6in. paxolin. 6ft. copper rod aerial. 3 sturdily made panel mounting fuse holders. 24 new resistors. 6 assorted pots, 1 operators unit, a very useful piece of equipment. All this for only **25/-**, p/p 3/6.

Double Throat Mikes. Can be adapted for use with musical instruments, **5/11**, p/p 9d.

100 ohm. W.W. Pots. Standard spindle, **1/6** each, p/p 6d. 2 for **3/-**, post free.

High Impedance Personal Listening Earpiece. Suitable for all types of crystal sets and transistor sets. Complete with lead and plug. Price **4/11**, p/p 6d.

Heavy Duty R.F. Chokes. These well made R.F. chokes are mounted on a stand and are suitable for transmitting and receiving circuits. Ideal for the tank section of a transmitter. Price **3/6**, p/p 1/6. 2 for **6/-**, post free.

Short Wave Receiving Aerial. A specially designed indoor radio receiving aerial. This item is fully adjustable in length and is made of high grade copper wire. Complete with fixing pins and aerial plug. Specially designed for boosting up reception on the medium and short wave bands. Price **4/6** each, p/p 9d.

Whip Aerials. 8' 6". Price **7/6**, p/p 2/6. 5' 0". Price **5/-**, p/p 2/6.

Trawler Band Transistor Receivers. A compact 3 transistor receiver complete with personal listening earpiece that receives amateur and maritime stations. You will be amazed at the stations that can be received on this set. Works from standard batteries. Price **49/6**, p/p 1/6.

Valves. 2/6 each, p/p 6d. 2 for **5/-** post free. 807, 6V6, 6H6, 6K7, EF50, 6B8G.

Matched Mullard Transistors. One OC81D driver. Two OC81 output stage matched pair. Price **9/11** the set, p/p 1/-.

Portable Mains Soldering Iron. 30 watt version. Features removable handle that covers tip and barrel. Complete with lead and plug. Only **10/6**, p/p 1/6.

6 ohm Wire Wound Miniature Potentiometers with Standard Spindle, with many uses. 1/6 each, p/p 6d. 2 for **3/-**, post free.

Postage rates apply U.K. only. S.A.E. with all enquiries

New walk round store open in Lambert's Arcade, Lower Briggate, Leeds 1, next to Halfords Cycle Shop. Open all day Saturday, 48 hr. despatch service, all mail orders to our Briggate House address.

Terms
Cash with order
5/- extra on C.O.D. orders
No C.O.D. under 30/-

SONA

Send 1/- for lists
Trade supplied
Orders from abroad welcomed

SONA ELECTRONIC CO (DEPT SW2) BRIGGATE HOUSE, 13 ALBION PL. LEEDS 1.

INDEX TO ADVERTISERS

SHORT WAVE MAGAZINE

(GB3SWM)

Vol. XXIII APRIL, 1965 No. 258

CONTENTS

Managing Editor: AUSTIN FORSYTH, O.B.E. (G6FO/G3SWM)

Advertising: MARIA GREENWOOD

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

Annual Subscription: Home and Overseas 42s. ($6.00 U.S.) post paid

AUTHORS' MSS

Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap sheets, with diagrams shown separately. Photographs should be clearly identified on the back. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.

E.& O.E.

The SHORT-WAVE Magazine

EDITORIAL

Oscar III *In this issue, there is a good deal of discussion about what is something entirely new in the concept of radio amateur communication. As you read this, an amateur conceived, engineered and provided junior satellite is circling the Earth. It is in a near-circular orbit of 575 miles and is capable of re-transmitting (in the manner of " Telstar ") any amateur signals it can pick up at the LF end of the two-metre band, to give point-to-point coverage of well over 3,000 miles.*

It is now very obvious that there have been some technical hitches: Though the telemetering channel is functioning well, the tracker signal is inaudible; the receiver appears to have become insensitive, perhaps because of the QRO beams headed at it, or due to poisoning of the sensitive transistor front-end by exposure to the intense radiation of outer space ; this is perhaps being confirmed by the high noise-level on the HF return channel, due to the Rx side being driven wide open by cosmic noise. And, in addition to all this, the transit time over any part of the Earth's surface gives only a few minutes for a quick QSO.

These failures and disappointments are minor considerations in face of the fundamental fact of a great technical achievement in the strictly Amateur Radio context.

Out on the West Coast, a devoted band of W6's—including one ex-G who is now domiciled in those parts—has worked hard for years to bring the Oscar concept to fruition. They started with the Oscars that merely circled to make a cheerful noise on the two-metre band. The transposer, or translator, concept involved not only a brilliant idea to be made workable, but involved a great deal of paper-work, test, mock-up, worry, disappointment, frustration and radio engineering know-how to make it possible.

The radio amateur group responsible for Oscar III have brought two-metre contacts between the U.K. and the eastern American seaboard within the limits of reasonable possibility.

Oscar III is not going to last much longer. The Rx is tired and the batteries are fading. But in the Amateur Radio context Oscar III represents a great achievement. It will be long a time before the results can be fully evaluated.

Austin Forsyth, G6FO.

WORLD-WIDE COMMUNICATION

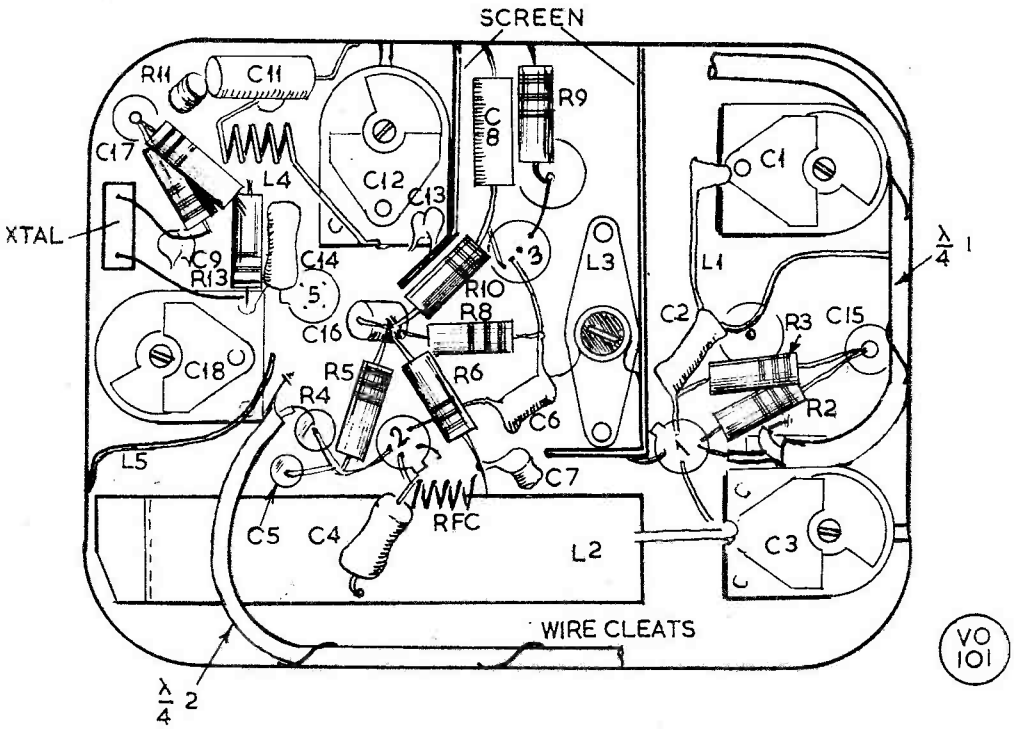


Fig. 1. Once again, our contributor is able to show a "tobacco-tin version" of his converter for the 430 mc band, as built from the circuit of Fig. 2. Because the transistors used are the right type for the job and all couplings are at low impedance, a layout of this sort is entirely satisfactory, and the G3JAM transistor converter for 70 cm. will perform just as well as any comparable valve-type unit.

TRANSISTOR CONVERTER FOR 70 CENTIMETRES

CRYSTAL CONTROLLED—FIVE TRANSISTOR—EXCELLENT NOISE FACTOR—SIMPLE CONSTRUCTION

B. J. P. HOWLETT (G3JAM)

With his latest design, our well-known contributor has now produced practically an anthology on transistor converters—for Top Band, four metres, two metres and now 430 mc.

The latter is probably the first such to be published in the radio amateur literature, and represents the most modern approach to UHF receivers that we have yet seen—it will rank with the G3BKQ valve converter for 70 centimetres, of July 1954, which was then far ahead of its time and so is a design in common use today. The G3JAM transistor converter for the same band embodies a number of original practical ideas about circuitry and construction.
—Editor.

THEY say that if you can make it work in a tobacco tin you can make it work in anything—at least, the writer hopes so. Anyway, the present 70 cm. converter was foreshadowed a long time ago, and though it is always a risk describing 70 cm. converters (they never seem to work properly a second time!), the writer is much encouraged by the fact that the total rebuild necessary after the first mock-up for a 430 mc job resulted once again in satisfactory performance.

Circuit Description

The converter was originally envisaged as having an IF (from 432-434 mc) of 16-18 mc, requiring local oscillator injection at 416 mc, and it was at once realised that the smartest way to get it would be to use two transistors only in a Butler circuit, with a 104 mc crystal.

Three years ago, S.T.C.'s quartz crystal factory were not as confident about the idea as they are today! Anyway, for a price in excess of £6, a

colossally active crystal arrived, intended for fifth overtone operation at 104 mc. The first hookup immediately produced the seventh overtone, giving the writer visions of a "one-lunger" for two metres! However, with much patience, and using the FM broadcast tuner as a wavemeter, the present circuit slowly evolved (Tr4 and Tr5) changing to the present types on the way. In passing, it can be mentioned that other types of overtone oscillator were tried, but only the Butler circuit was found capable of sustaining the fifth overtone securely without "singing," through interaction with the 20·9 mc crystal fundamental frequency.

The tuned circuit L4/C12/C13 is tuned to 104 mc, and it will be noted that the writer has again used a DC coupled pair, as in the 4-metre converter. (March issue, SHORT WAVE MAGAZINE). Since each transistor biases the other one, R11 is really part of the bias circuit of Tr5 and its value is important. L5, C18 is a 2-10 $\mu\mu$F trimmer with a stout shorting bar across it, and, happily, tunes to 416 mc.

Attempts to use harmonic mixing, with L5, C18 tuned to 208 mc revealed an oversight on the part of the writer. I.T.A. Croydon, sound signal from Ch. 9 was banging in right in the middle of the intended IF range! However, the cure, L1, C1, aerial circuit tuning, was added only on the rebuild so need be given only a passing reference.

The Mullard AF186 was chosen for both the

Table of Values

Fig. 2. Circuit of the G3JAM 70-cm. Converter

C1, C3, C12, C18	= 2-10 $\mu\mu$F	R1, R7	= 6,800 ohms
C2	= 10 $\mu\mu$F	R2, R6, R8	= 2,200 ohms
C4, C6	= 56 $\mu\mu$F	R3	= 1,000 ohms
C5, C7, C10, C15,		R4	= 10,000 ohms
C17	= .001 μF	R5	= 4,700 ohms
C8, C11,		R9, R11, R12	= 2,700 ohms
C16	= .01 μF	R10	= 1,200 ohms
C9	= 40 $\mu\mu$F	R13	= 330 ohms, 5%
C13	= 15 $\mu\mu$F	R14	= 1,000 ohms, 5%
C14	= .002 μF		

Notes: For all the higher values of condenser and resistor, tolerances are wide. All resistors are Type 16. Condensers C10, C15 and C17 are ceramic lead-through. C5, C7 are polystyrene, and all other capacitors ceramic. Total consumption, 13 mA. Xtal to give 104 mc, from 20.9 mc fundamental.

TABLE OF COIL VALUES

L1 — Single piece 22g. tinned copper, across C1 and to wall of chassis.

L3 — 25 turns 36g. enam. wire, close-wound on ¼-in. former with dust-iron slug.

L4 — 4 turns 22g. tinned copper, pre-formed on 0.BA studding and screwed off; space out slightly. Leave one end ⅜-in. to C12, other end ¼-in. to C10.

L2, L5 — *See* sketches Fig. 3, p.78.

Quarter-wave Elements, 1 and 2 — 3½-in. of small bore 50-ohm coax.

RFC — 5 turns as L4, pre-formed on 2.BA studding.

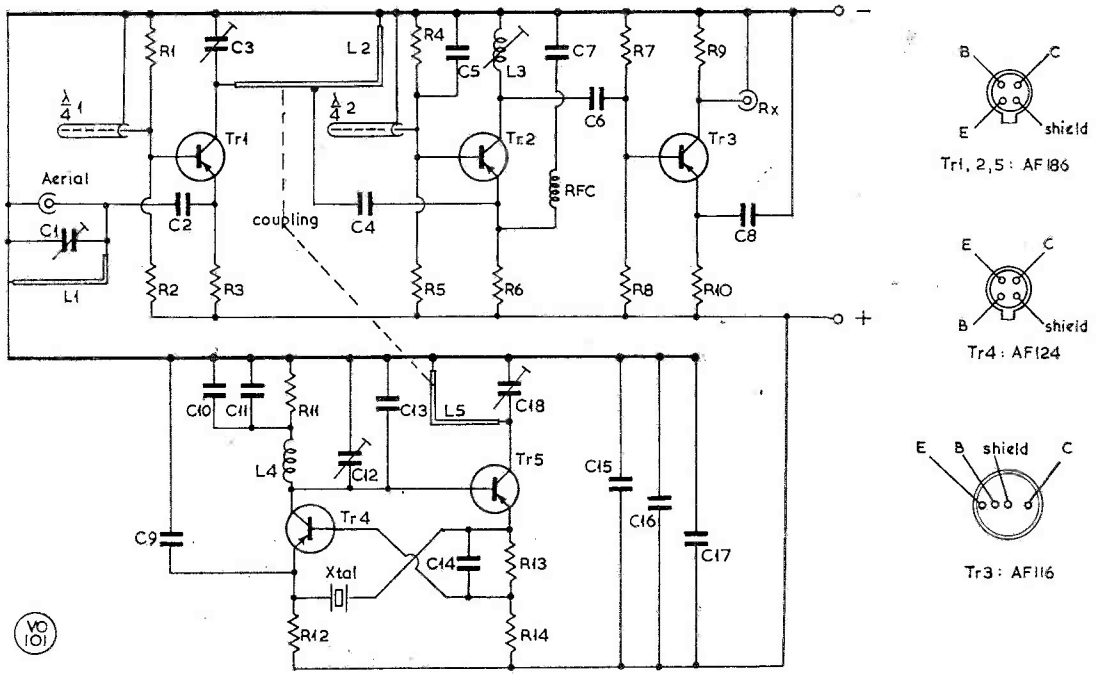


Fig. 2. Circuit complete of the G3JAM 430 mc transistor converter, with base connections for the transistors used. A physical representation of this circuit appears at Fig. 1. Since the prototype was completed, two slight modifications have been incorporated to improve frequency stability: A small coil similar to L4 but with twice as many turns and with a 200 $\mu\mu$F condenser in series has been connected across the crystal to neutralise its self-capacity; when this is done, C14 can be put in parallel with R14, or between the junction of R13/R14 and chassis. All values are given in the table, and the shapes for coils L2, L5 in Fig. 3.

grounded base RF stage, Tr1, and the grounded base mixer, Tr2, mainly because, like the AF124, its rimmed capsule can be pressed firmly into a hole in the chassis. In fact, violent self oscillation at Heaven only knows what UHF occurs if the case is not securely grounded! Note also that quarter-wave open-circuit coaxial decoupling lines are used on the bases of Tr1 and Tr2, and are distinctly better than the best of the writer's condensers.

Tr1 collector tuning consists of a plate line, L2 tuned by C3. A certain amount of length was necessary to transfer the RF to a point half-way along the chassis for injection into the mixer. Only this type of line had an impedance of the right order to get the mixer tap in the correct position to suit the layout.

L2 picks up plenty of oscillator energy from L5 by simple inductive coupling—so only a single capacitor is needed into the emitter of the mixer. Its base is already decoupled for UHF and C5, of ·001 μF, is added to keep the gain up at IF when it is produced. For a similar reason, the emitter is decoupled against IF degeneration by C7, also ·001 μF, but here, in order not to short out the two UHF's, a small RF choke is placed in series.

The mixer collector coil, L3, tunes with C6 coupling capacitor to the IF stage, over the required range 16-18 mc, and the IF stage itself amplifies and feeds the main station receiver.

One point of interest is the way a grounded collector supply line enables direct coupling out to the main receiver to be achieved, and it is actually the main receiver aerial input coil which carries the main current of the last transistor.

With a CR-100 as main Rx, quite good gain is obtained on every waveband, showing that, with an aerial cut to the LF end of 70 cm., a 420 mc signal could be read quite easily, coming in on the dial at 4 mc, before readjusting L3, the IF coil. In fact, the aerial has been found to be the most selective part of the whole system, and, judging by the RF stage tuning behaviour, is only about 8 mc wide.

Construction

Very little can be said about construction that has not been mentioned already, but there are one or two points that might need airing. It goes without saying that the components to be screwed down are best located first, together with the three lead-through capacitors, soldered rapidly with a big iron, preferably, before they fall to pieces.

L2 comes next, the end tinned first and trimmed to fit the well which runs round every tobacco tin and soldered using the big iron. Then L5, a simple job. The grounded end of the trimmers C1, C3, C12, C18 are firmly soldered where they touch.

The crystal can be had in two case sizes, with pins or wire ended, the one shown being an inter-Services style K, with wire ends. A little tinplate clip has to be made for it and soldered in position, the crystal unit being a push fit.

The oscillator section can now be wired up,

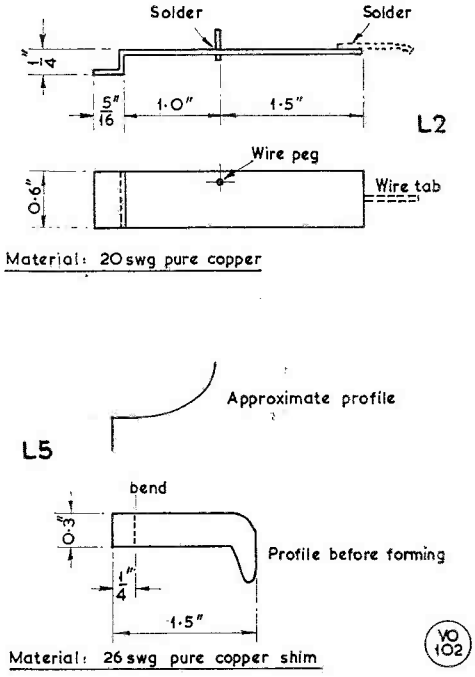


Fig. 3. Making the coils L2 and L5 for the G3JAM converter. All other inductance data are given with the table of values.

and the impatient can test it, using a full coverage FM set as a wavemeter if necessary. However, at G3JAM the GB3GEC beacon cannot be heard unless the RF stage is working, possibly because of a bad path, and he imagines that others will have to bide their time until the whole job is completed. The third harmonic of a two-metre transmitter is an enormous comfort while still in "transit," but no attempt at actual injection should be made, the leakage signal being guaranteed S99+ + even from the mixer plus IF stage only. It enables preliminary adjustments to be made to L2 and L5.

Actual aerial noise, car ignition interference, etc., will be a good guide to initial antenna circuit tuning, though best adjustment will be possible only on an incoming signal.

Tests

The writer has, as yet, had only cross-band contacts from two metres, and not very many of those! However, where the path is good, signals, using a ten-element long-Yagi at 38ft. from a site 38ft. a.s.l, are comparable with the two-metre equivalent. Particular note has been made of "carrier hiss," the only guide the writer has of gauging the noise factor, and this does not sound much different from a normal transistorised two-metre converter. Comparisons with 70 cm. valve converters might have been possible with the aid of a local station, but such co-operation was not possible. The writer

has never built a valve converter for the band.

This is not to say that an ordinary tungsten filament diode noise generator suitable for up to 250 mc was not tried; indeed, the figure obtained was so absurdly favourable that it must be wrong!

Conclusion

As mentioned, this converter has been a long time coming, and many other transistors were tried on the way. For instance the Philco 2N1742. These are very disappointing at 430 mc, the gain being very small, unless heavy positive feedback is used. Naturally, the bandwidth goes for a chop when this is done, and one at once understands the meaning of that mysterious term "Gain Bandwidth Factor," much used by TV designers.

Alternatively, the writer got reckless at one point and used an AF186 for everything! This operation was equally unsuccessful because the IF stage and the local oscillator went tearing off at three frequencies at once and flatly refused to be comforted.

There is at least one other transistor which can be used in the Tr1, Tr2 and Tr5 positions—the *Siemens* AF139. Though slightly smaller the connections are the same as for the AF186 and on test in the RF stage position it might just have the edge for noise factor. Only two samples were tried so one cannot be definite about this.

The writer has not mentioned how the three main positive points in the converter get their battery supply. Actually this was found unimportant; just join them up with hookup wire and take it through any convenient hole in the box. The negative, of course, *is* the box.

It might be mentioned also that both L2 and L5 can be touched without losing above 6 dB of gain. This is some indication of the merit of using high-capacity low impedance tuned circuits whenever a good match can be obtained, which is more frequently with transistors than with valves. While on this subject, L2 was deliberately covered with solder one day just to see what would happen. The writer can now confirm that a metallic surface looking like a range of mountains is just not on at 430 mc! However, thin silver, applied using one of those "stroke on" mixtures at least did not degrade the performance, and gives a slightly more interesting finish.

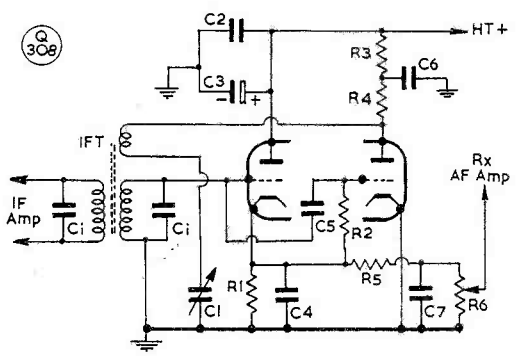
And, of course, the writer wishes everyone embarking on a transistorised 70 cm. converter the best of luck; there are no guarantees, just patience —and luck.

NOVEL Q-MULTIPLIER AND DETECTOR CIRCUIT

COMBINING THE INFINITE IMPEDANCE AND REGENERATIVE DETECTORS

C. W. HARLOW

IN the search for an efficient, yet simple, circuit which would combine detection, Q-Multiplication and a BFO, the arrangement shown here was devised from two well-tried old favourites — the infinite-impedance detector and the regenerative detector. These were combined to form the circuit herewith. In this, V1 is a normal infinite-impedence detector and V2 is a normal regenerative detector. V1 and V2 can be the two halves of an ECC81 or a 6SN7, or two L63 valves can be used; RF pentodes *i.e.* EF91's connected as triodes, are also a possibility. It is advisable to screen the valve or valves and the wiring also if it is not kept very compact and as short as is conveniently practicable. Circuit values, provided common sense is used, are not at all critical, and the feed-back coil L1 on the IFT can easily be wound adjacent to and in the same sense as the grid winding on the detector IF transformer *see* circuit. Some 25 to 30 turns of 32g. enamelled wire has been found to be satisfactory when a 465 kc, IF is used, with a 25 $\mu\mu$F air-spaced trimmer C1 for control of the feed back. This should be brought out to the front panel and be provided with a slow-motion drive (an epicyclic one is ideal).



Q-Multiplier and Detector circuit using a combination of the infinite impedance and regenerative detectors. Values: Ci, as fitted to IFT; C1, 25 $\mu\mu$F, regen. control; C2, .005 μF; C3, 8 μF elect.; C4, C7 300 $\mu\mu$F; C5, 33 $\mu\mu$F; C6, 0.5 μF; R1, 150K; R2, 2 megohm; R3, R4, 10K; R5, 100K; R6, 0.5 megohm vol. control; L1, tertiary winding on IFT, see text; IFT, standard type for frequency. Valves V1, V2 can be a twin-triode, or two triodes.

Voltage stabilisation improves the stability and usefulness at the threshold point when the HT feed to V1 and V2 is held very stable. AVC can be taken from the anode of the preceding IF valve.

If a very high gain amplifier is used outstanding results can be obtained. A TRF receiver can be produced with results better than any average superhet, if two RF stages are used, particularly if a high-gain AF amplifier follows. Signals which would normally not be audible can be easily read and held.

The basic principle of the circuit has very many applications and uses, and will give outstanding results for those who may like to experiment with it.

PRINTED CIRCUITS FOR AMATEUR EQUIPMENT

ETCHING TECHNIQUE—AND DESIGNING THE BOARDS

C. E. DEAMER, Grad.I.E.R.E. (G3NDC)

This is a most useful and interesting practical article, which shows that with a little patience, very neat and economical printed-circuit layouts can be produced. The solution recommended should be handled with care.—Editor.

A NUMBER of articles have appeared on the do-it-yourself aspect of etching cooper-clad laminate, but to the best of the writer's knowledge none have been published in the periodicals which are produced specially for the amateur. It is hoped that this article will serve to bring to the notice of *Magazine* readers the simplicity of this technique, now so widely used in commercial equipment.

The advantages of construction using printed-circuit boards are numerous, but probably the most obvious is in the building of transistor equipment, where the small components involved do not lend themselves to easy miniaturisation when using standard wiring techniques.

Process

Etching is carried out by using a solution made up by dissolving ferric chloride, obtainable from most large chemists, in water. A typical solution, used commercially, has a specific gravity of 1·45 and is produced by dissolving 610·4 grams of ferric chloride crystals in one litre of water—rather a large quantity for amateur requirements, but approximately the same concentration would result by taking 6 ounces of ferric chloride to half-a-pint of water. Total cost, less than 2s.

This solution will dissolve most metals at a very rapid rate, and must, therefore, be used and stored in a plastic or glass vessel and handled carefully.

The copper clad laminate, which is the basic printed-board material, may be purchased in small quantities quite cheaply and is usually a paxolin or similar insulating base, coated on one or both sides with copper to a thickness of approximately ·002 inch.

Making the Pattern

Many circuit designs appearing in technical publications include a printed-circuit layout, and this can easily be transferred on to the copper by placing a sheet of carbon paper under the page from which the diagram is to be copied, and going around the outlines with a ballpoint pen or hard pencil.

Those areas of copper which are to remain must be protected in some way from the action of the ferric chloride, and although various writers have their own ideas, a very satisfactory method is to paint these areas with cellulose; this also is easily obtained, applied, and removed when the etching is complete, and dries quickly.

Application of the cellulose can be by small brush, and it is at this stage that the appearance of the final product is determined. It is a case of practice making perfect, and it is quite surprising the excellent results which can be obtained even if you are not an artist—but you do need a steady hand.

After the cellulose paint has dried the board is simply immersed in the etching solution and can be left to itself. The rate at which the copper is dissolved may be accelerated by raising the temperature or by agitating the solution, but even if left at normal room temperature the process should be complete in one hour.

After taking the board carefully out of the etching solution, and ensuring that all unwanted copper has been removed, the board should be thoroughly rinsed under a running tap, dried, and the paint peeled off. The cellulose can be removed by sticking *Sellotape* on to the board which, when pulled off, will bring the paint with it. More than one application may be necessary, but it should be possible to remove all traces of paint by this method. An alternative, however, is to use cellulose thinners and wash off the cellulose. When the paint has all been got rid of it is advisable to repeat the rinsing process, since small quantities of ferric chloride may have penetrated under the paint, and if left will continue to work on the copper. A good scrubbing with *Vim*, or similar mild abrasive cleaner, at this stage ensures not only that no ferric chloride remains, but also that the print is perfectly clean to aid soldering.

The holes can now be drilled to take the component leads, and it is generally preferable to do this from the print side, since it is easier to ensure that the hole passes through the copper print and there is less likelihood of pushing the print off the board should the adhesive give way. This latter defect is unlikely to occur in material obtained from a reputable source, but may be encountered in commercial reject copper clad laminate.

That just about sums up the how-to-do-it, but what about the snags? Well, there are quite a few pitfalls for the unwary, but these are easily avoided.

Points to Watch

First, consider the case of a printed circuit diagram in a technical article. This will have been designed for a certain size and shape of component, and it is very unlikely that those to be used will all be identical with the originals—so obtain the components first and check that they will fit before commencing the etching operation. You may find that it is necessary to change the circuit a little to fit available components, but since this only entails

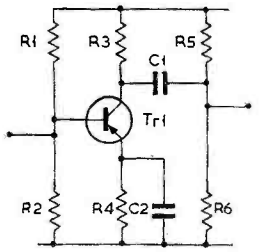


Fig. 1

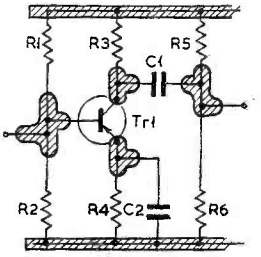


Fig. 2

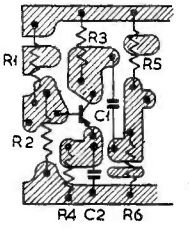


Fig. 3

X 307

How to design your own printed circuit, as discussed by G3NDC in his article. On left, is the representation of a diagram to be translated into printed terms. The next sketch, Fig. 2, shows a simple, but rather uneconomical, version of Fig. 1. A better layout, which saves space, is shown at Fig. 3. When designing one's own printed-circuit boards, it will soon be found that there are several possible layouts, all equally good, for the same electrical configuration, especially where relatively complicated circuitry is involved.

a couple of strokes with a paint brush, it should certainly not pose any major problem.

As bought, the copper is fixed to the board material with an adhesive, and with prolonged application of the soldering iron this may break down. This results in what is generally termed a "lift" where the copper leaves the board, and the best possible way around this trouble is to prevent it happening. If you are designing your own printed circuit layout, prevention of, or at least a reduction in, the risk of lifts can be achieved by ensuring that solder connections only occur where there is a relatively large area of copper print, and even if you are copying someone else's print diagram, an increase in the area of print at a solder point not only serves this purpose, but also reduces the amount of copper your solution has to dissolve.

With use the ferric chloride solution becomes less effective, and the etching process takes longer. There is also a tendency with prolonged immersion for the solution to penetrate under the paint to a considerable extent, often completely removing areas where the print is required, and it soon becomes apparent that the solution is no longer practically useful. Although it is possible to reclaim the ferric chloride, this is not an economic proposition. Where small quantities are involved, and since quite a number of circuits can be done for each 2s.-worth of material, it is worthwhile to dispose of the solution as soon as it shows signs of deterioration.

Making Your Own Circuits

To give a practical example how to design a printed circuit, Fig. 1 shows a transistor amplifier, while Fig. 2 is a possible print layout developed from this. The method is to draw the circuit full-size so that component configurations are indicated by the drawing, and to leave only that copper which occurs where connections are to be made. But this wastes space, and Fig. 3 shows a layout which is far more compact. It should be noted that adequate copper print has been left, and even some small areas which serve no purpose, although apart from conserving etching solution they may well come in handy for later alterations to the circuit.

It is hoped that this will stimulate interest in this valuable method of construction, the simplicity of which must be tried to be believed. You will inevitably make a few "boss shots" when attempting your first few circuits, but you will soon get the hang of it.

The new Vitavox M100 is a dynamic microphone giving four alternative impedances — 25 ohms, 200 ohms, 10K and high — in the one instrument, quickly selected and set on the tapped ratio line transformer incorporated in the housing. A frequency response of 50-15,000 c/s is claimed, and it comes with 9ft. of screened cable.

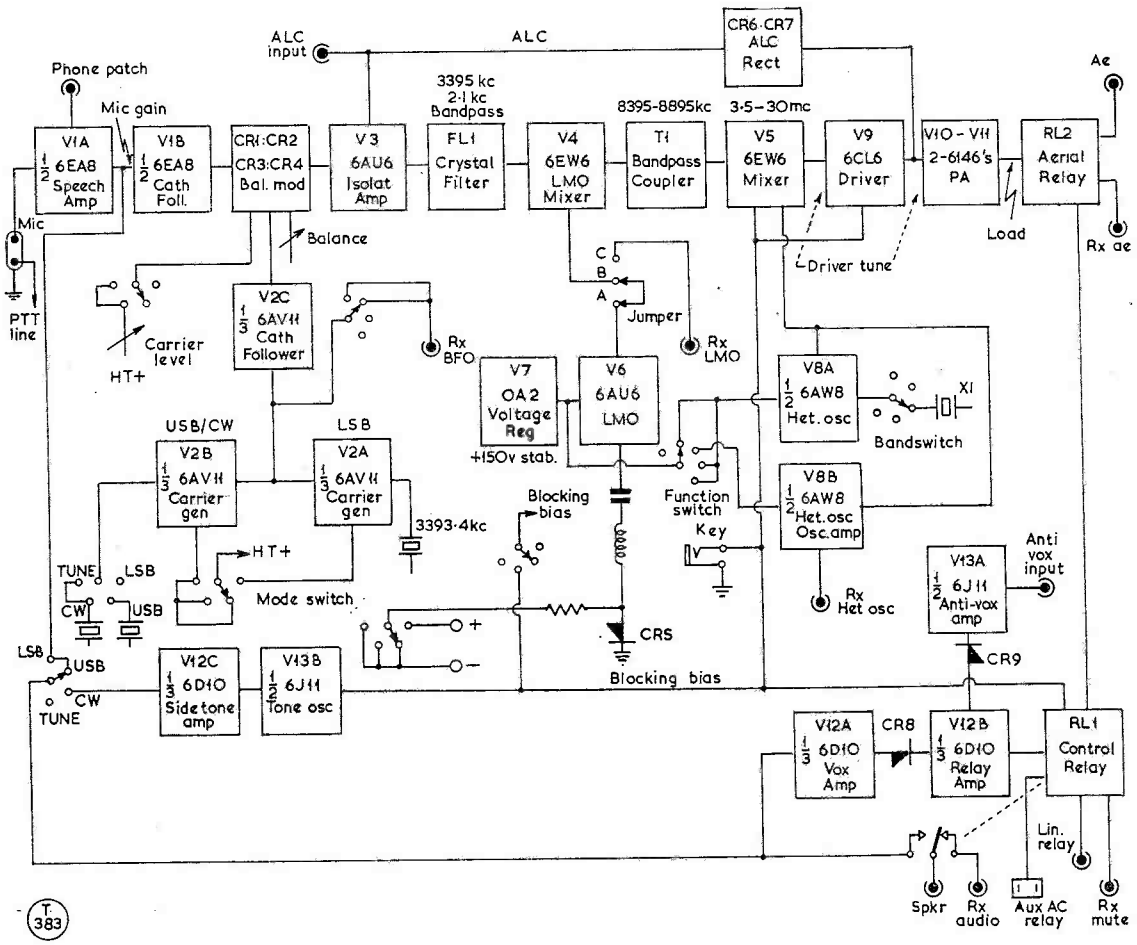


Fig. 1. Complete block diagram of the SB-400 transmitter. Carrier generation is by the crystal oscillators V2A and V2B, at frequencies centred round 3395 kc; after passing through the crystal filter at this frequency, the SSB signal is mixed with the VFO (5-5.5 mc) and passed through a bandpass coupler at 8395-8895 kc, after which the heterodyne mixer (V5) adds the frequency of one of eight crystals for the eight 500-kc wavebands available, taken from the output of the heterodyne oscillator and amplifier (V8A and V8B). Driver and final stages are conventional, with a 6CL6 and a pair of 6146's. The tone oscillator (V13B) keys the Vox circuits and also supplies a 1000-cycle sidetone to the receiver speaker.

THE HEATHKIT SB-400

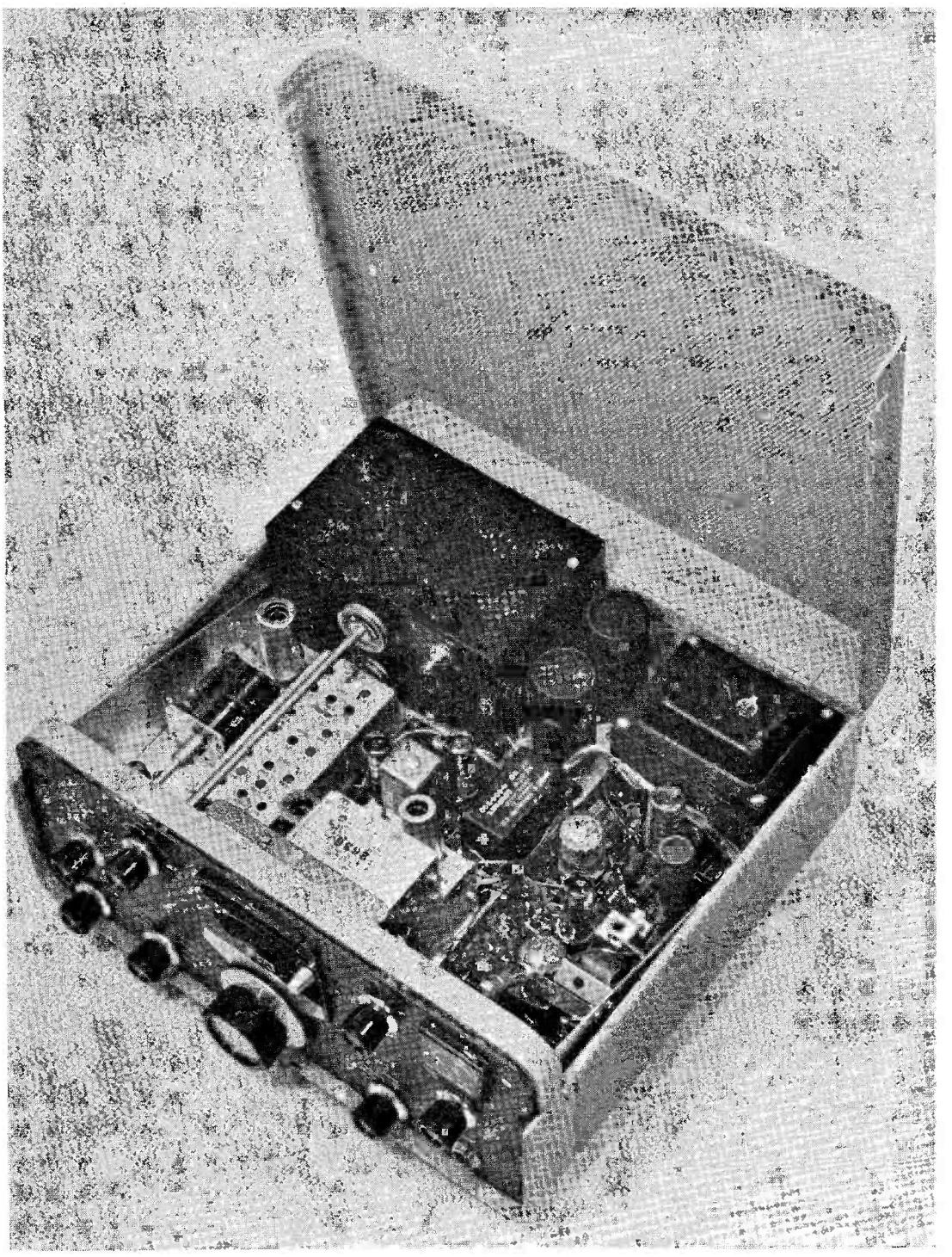
TEST REPORT

COMPACT SIDEBAND TRANSMITTER FOR 10-80 METRES —BUILT FROM THE KIT

THE SB-400 SSB Transmitter kit is quite the most complex of the well-known Heathkit series, but the rewards of some 50 hours of painstaking assembly are considerable. As with all these kits, if one follows the instructions meticulously, the end-product will operate strictly to the maker's specification, and one can be quite confident that any small fault is due to the constructor's own shortcomings.

When this kit, submitted for test, had been completely assembled and was put through the preliminary pre-operating checks, two such faults were discovered and quickly righted. One was an accidental short-circuit between a piece of bare wire and a metal cover; the other was a misplacing of one lead. These having been rectified, it was not long before the transmitter was operating on all bands, all modes, without the slightest sign of trouble.

The SB-400 packs a lot of transmitter into a very small space—15in. wide, 13⅜in. deep and 6⅝in. high, and weighing only 26lbs. Its output, from a pair of 6146's, is 100 watts (80 watts on 28 mc) from



The popular "wrap-around" styling is much improved by a neatly-designed hinged lid, which makes it unnecessary to slide the transmitter out of its cabinet for small adjustments of trimmers and other controls. The 6CL6 driver is on the left, between the driver tuning condenser and the PA box. Trimmers for all the tuned circuits are in the box below the PA tuning condenser spindle.

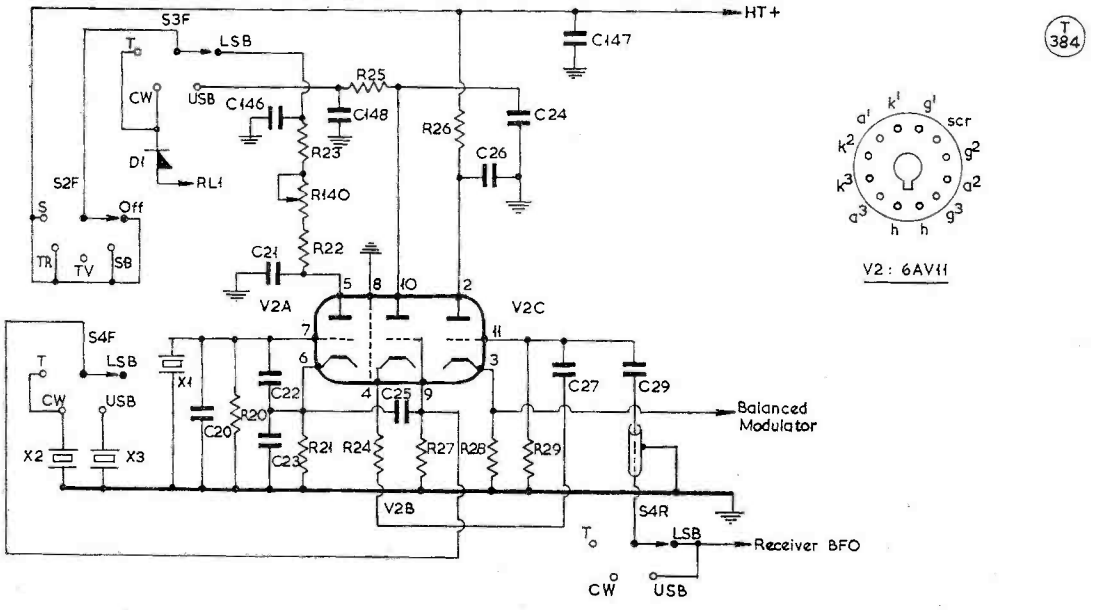


Fig. 2. A triple-troide (6AV11) is used for carrier generation, one section for LSB, one for USB and CW, and the third as a cathode follower. Three separate crystals are used, and the anode circuit of V2A includes a sideband amplitude balance control. All the components for this stage, and several others, are on a printed circuit board and very compactly mounted.

an input of 150 watts on CW or 180 watts p.e.p. on SSB.

Circuit Line-Up

The circuitry, while being more or less conventional-SSB, has some pleasing features not found in other comparable transmitters. The carrier is generated in the region of 3395 kc, with crystals centred on this frequency for upper or lower sideband; this meets the audio in a balanced modulator and passes through a sealed crystal filter, after which it is mixed with the VFO output (5-5·5 mc) and passed through a bandpass coupler covering 8395 to 8895 kc. Thereafter it is heterodyned by a series of crystals, all on the HF side of this frequency, to operate the driver stage and the final on eight bands (the 28 mc band is divided into four slices of 500 kc each).

The VFO, which the makers call the LMO (linear master oscillator) is an extremely stable unit controlled by an excellent drive mechanism, the dial of which is calibrated in divisions of 1 kc—and very accurate it is. The tuning can, in fact, be set to an accuracy of 200 cycles on all bands, and this is combined with a 4 : 1 reduction on the main tuning knob.

The extreme compactness of the transmitter is largely made possible by the use of two printed-circuit boards which take the components and valves for some fourteen stages in all. Three "Compactron" multi-unit valves are used. There is a 6AV11 (triple-triode) serving as LSB generator, USB and CW generator and cathode follower; a 6D10 (also a triple-triode) as Vox Amplifier, Sidetone Amplifier and Relay Amplifier; and a 6J11 (double-pentode) as Anti-Vox Amplifier and Tone Oscillator.

The latter is a 1,000-cycle oscillator, used only when the Mode Switch is in the CW position. It keys the Vox amplifier and also supplies a monitoring tone to the receiver loudspeaker, if desired; full break-in with a nicely-adjustable delay is available, so that one does not have to endure the more usual clacking relays. This is easily set to break only between words, or even longer pauses if required.

The balanced modulator involves four crystal diodes and there are two controls for producing a really effective carrier *null*. The makers claim "55 dB down" for the carrier, and measurements suggest that

Table of Values

Fig. 2. Carrier Generator circuit in the SB-400

C20	= 7.5 μμF	R25	= 6,800 ohms
C21, C24,		R26, R28	= 1,000 ohms
C29	= .001 μF	R140	= 5,000 ohms, SB amplitude balance
C22, C25	= 30 μμF		
C23, C27	= 50 μμF	X1	= 3393.4 kc (LSB)
C26	= .005 μF	X2	= 3395.4 kc (CW)
C146,		X3	= 3396.4 kc (USB)
C148	= .02 μF	V2A-C	= 6AV11 triple triode
C147	= 20 μF		
R20, R27,		V2A	= LSB carrier generator
R29	= 47 000 ohms	V2B	= USB/CW carrier generator
R21	= 2,700 ohms		
R22	= 10 ohms	V2C	= Cathode follower
R23	= 470 ohms		
R24	= 2,000 ohms		

NOTE: Circuit-element nomenclature as in Heathkit SB-400 Manual.

this figure is by no means an overestimate.

The LMO itself, which is preassembled, prealigned and sealed, is one of the most "solid" yet encountered. No change in note results when the transmitter is pounded vigorously, or any part of the LMO box tapped quite sharply with the handle of a screwdriver. The LMO frequency is shifted when sidebands are switched, and this is done by a change in bias on a varicap diode. The frequency is shifted by some 2·5 kc, to keep it within the passband. Incidentally, some of the RTTY enthusiasts in the U.S.A. have discovered that it is an easy matter to alter the bias voltage so that the standard frequency-shift of 850 kc for RTTY purposes may be produced. Instead of switching, as at present, from approximately 43v. positive to 43v. negative, a change of some 6v., applied from an external source, will give the required frequency-shift for radio T/P operation.

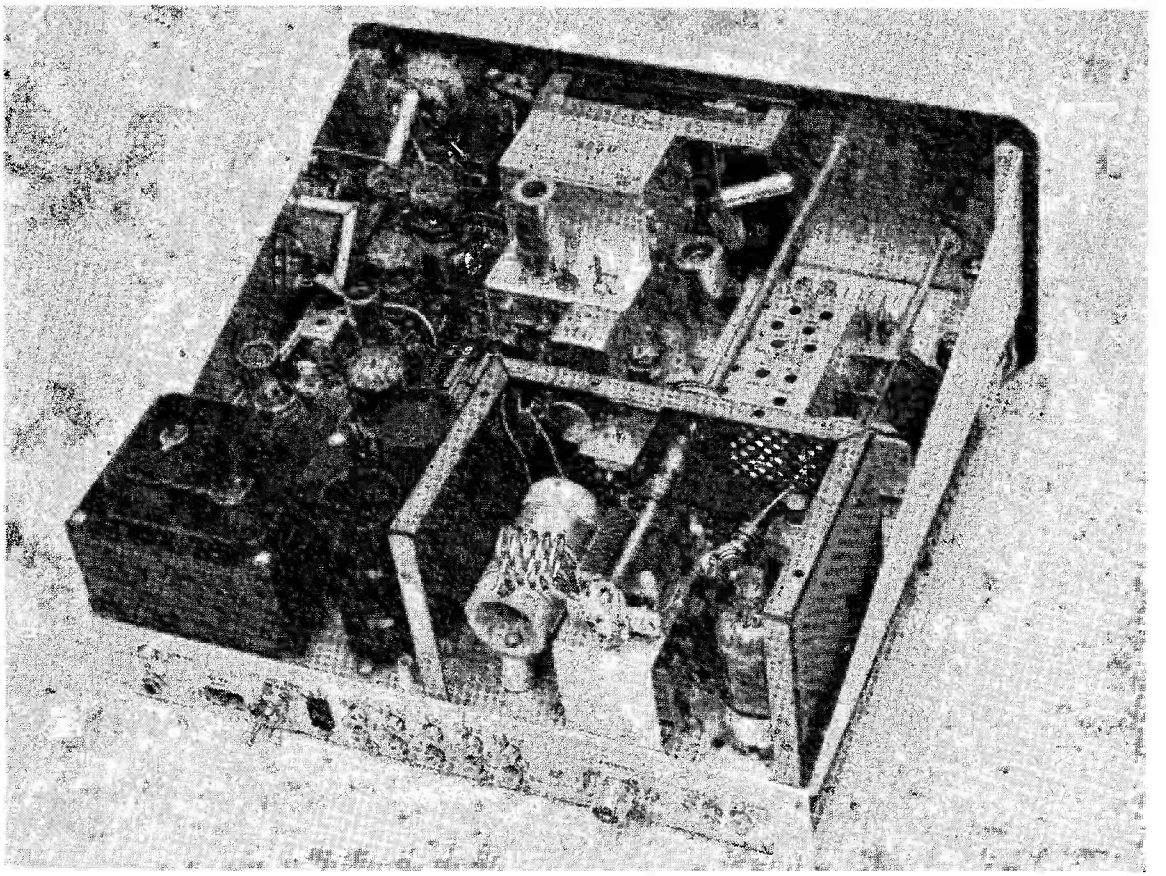
Controls

The Function Switch has five positions—Off, Standby, Transceive, Transmit and Spot (the latter for netting). The Mode Switch gives LSB, USB, CW and Tune (the latter being merely CW with the key shorted). And the Meter Switch gives readings, all on the one meter, for PA Grid, PA Anode Current, ALC, HT volts and Relative Output (RF).

Apart from these there is the 8-position bandswitch; a control marked "Level," which is two ganged but electrically separate potentiometers controlling the RF drive and the Audio Gain; Driver Tuning; PA Tuning and Loading (two concentric knobs, and very convenient) and, of course, the main tuning dial on the LMO, which gives 5 feet of bandspread for the 500 kc coverage on each range. It is directly calibrated, with 0-100 kc for each of its five revolutions, and also has a sliding pointer which merely counts the revolutions and displays them on a horizontal scale.

Operation as Transceiver

The SB-400 is designed for use either as a straight transmitter or as a transceiver in conjunction with the SB-300 receiver. The latter has an identical LMO, and rearrangement of plugs makes it possible to use this for controlling the transmitter. Automatic com-



Just in front of the power supply is the printed-circuit board with all components for the carrier generator and following circuits. The LMO is in the sealed box behind the centre of the front panel, and the eight crystals for the various bands may be seen at the right, between the trimmers and the front panel. The PA compartment, in the foreground, is normally completely boxed in.

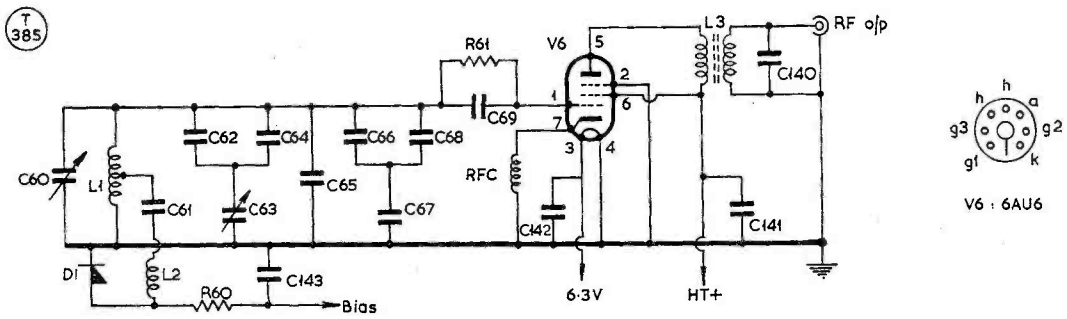


Fig. 3. The extremely stable VFO has a linear calibration over its entire range of 500 kc (5-5.5 mc). By the extensive use of negative temperature-coefficient condensers, balanced against positive types, the frequency is independent of temperature over a wide range. It is also unaffected by 10 per cent changes in mains voltage. The RF output, after leaving the sealed box containing the oscillator components, is shunted by a 100-ohm resistor. The diode D1 is a varicap type whose bias is changed for sideband switching, simultaneously with the change of crystals in the carrier generator.

pensation is made for the 1 kc frequency shift which is employed in the CW mode, so that the receiver calibration and the netting function remain accurate.

All power supplies use silicon rectifiers, and a surprisingly small transformer gives 750v. at 200 mA, to the final 6146's (as well as all the other requirements) without the slightest sign of running unusually warm.

The grid-block keying, applied to a mixer and the driver stage, together with the very high oscillator stability, results in an excellent CW note which, in on-the-air tests, attracted many favourable comments. The main multi-contact relay, operated by the Vox circuitry, is in parallel with an internal aerial change-over relay to which the same adjustable delay is applied. (This can be varied from "instantaneous" to a matter of two seconds or thereabouts.)

Construction

In addition to the two printed-circuit boards, construction is also simplified by the provision of two preassembled cable-forms which fit snugly in position and present short and quickly-identified leads in all the right places. There is no electrical difficulty in the assembly—the soldering is really almost a pleasure. Such slight snags as arose were concerned purely with the mechanical difficulties of getting small components into the right places, while holding nuts, bolts and washers with the number of hands available. A pair of good long-nosed pliers is an essential, and it was found that a pair of surgical forceps which could be locked on to nuts or washers, was also a great help.

After the assembly, the alignment. The makers state that a valve voltmeter is essential, and indeed one *was* used. But it could have been done without, provided that a general-coverage receiver with an S-meter was available. There are so many frequencies to check, to see if crystals are oscillating, and so on, that either the one or the other is very necessary.

Alignment tools are provided, and every tuned circuit does cover the precise range needed, with a

Table of Values

Fig. 3. Linear Master Oscillator (VFO) for SB-400

C60	= 2-10 μμF, var.	C140	= .001 μF
C61	= .0022 μF	C141,	
C62	= .0025 μF	C142,	
C63	= 45 μμF, var.	C143	= .005 μF
C64	= .0021 μF	R60	= 10,000 ohms
C65	= 12 μμF	R61	= 330,000 ohms
C66	= 10 μμF	L1, L2,	
C67	= 350 μμF	L3	= Coils as supplied
C68	= 300 μμF	V6	= 6AU6
C69	= 10 μμF		

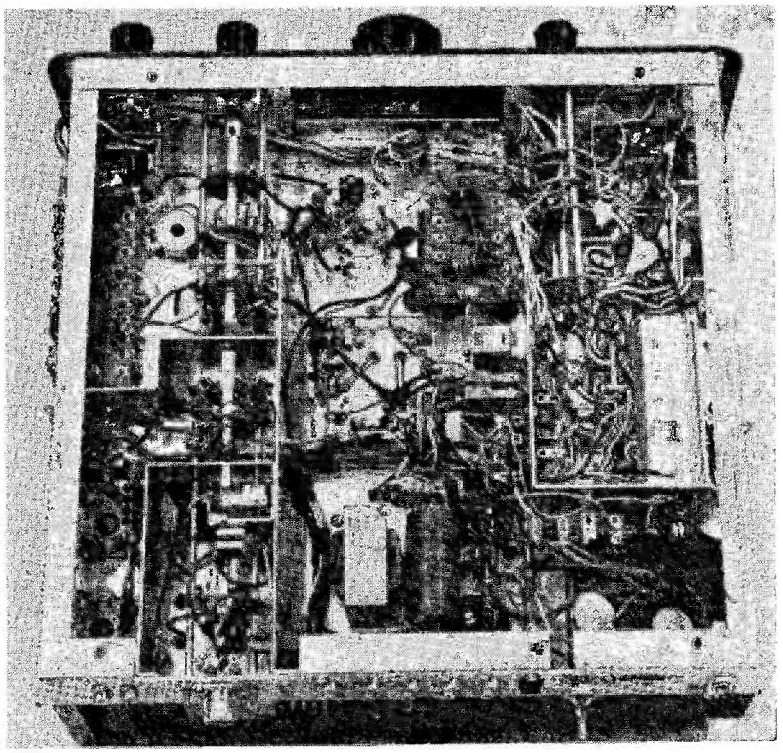
NOTE: Circuit-element nomenclature as in Heathkit SB-400 Manual.

certain amount of latitude. As a matter of interest, after the alignment was completed, the SB-400 received its first air-test on 3500 kc. The LMO dial was set to this frequency and checked against the crystal calibrator of a Drake 2B receiver, and it was within 100 cycles without any further adjustment! Good luck, possibly, but a master adjustment is available; also the scale cursor is movable to compensate for small differences in calibration on different bands.

The assembly manual, which runs to 120 pages, contains 64 pages of actual step-by-step instructions, interleaved with pictorial diagrams for progressive checking. In addition there are several pages of instructions on operating and trouble-shooting; a complete circuit diagram; and several stage-by-stage drawings which make the mode of operation very easy to follow through.

All components (including valves) are supplied, with the sole exceptions of key and microphone. There are enough "phono plugs" (miniature coax plugs) to make up all required connections to a matching receiver, including the usual muting and anti-vox circuits. Provision is also made for controlling a linear amplifier if one is used. The amount of shielded cable supplied, however, is insufficient to run to all the possible external connections.

It is not possible to switch quickly from normal



The wiring may appear complex, but it all fits into place in orderly sequence. The carrier generator printed-circuit board (the electrical version of which is shown in Fig. 2) can be seen at top right, and the mains transformer in the bottom right-hand corner. The wave-change switch runs the whole depth of the chassis, at the left, with its end just above the aerial socket with the section switching the PA coil. The two 6146 sockets are in the bottom left-hand corner.

independent transmission to transceiver-type operation, as certain jumper cables have to be re-arranged; and as no SB-300 receiver was available, it was not possible to test the transceive capabilities. However, so high was the stability figure that once the transmitter was netted with a really stable receiver, one never lost the zero-beat condition.

Although the price is naturally higher in this country than in the U.S.A., the SB-400 appears to be a worthy addition to the number of SSB transmitters at present available.

THE G3RKK HF-BAND TRANSMITTER

FURTHER NOTES, DEALING WITH QUERIES AND SOME POSSIBLE MODIFICATIONS

A. J. SHEPHERD (G3RKK)

The original article appeared in three parts, in our issues for June-July-August 1964, and covered in detail the design and construction of a 10-80m. CW/AM phone transmitter running 50 watts. Here, the author deals with some queries and suggests possible improvements in the VFO-driver sections.—Editor.

FIRST of all, it is regretted that an error occurred in the power pack circuit Fig. 5 on p.287 of the July 1964 issue. The connection between Ch1 and Ch2 should be deleted. Also, L3 and L4 were reversed in the table of values for Fig. 2 on p.219 of the June issue.

It should be pointed out, however, that if it is wished to economise, the circuit of Fig. 5 may be simplified with little loss of performance. In the circuit as printed, *i.e.* Ch1 and Ch2 joined, the 5U4G valve can be removed completely and D1-6 replaced by 500 mA rectifiers, *e.g.* BY100. The series resistors R1 and R2 should also not be necessary with choke input filter. Provided that the mains transformer is of good quality, and silicon diodes (not valves or metal rectifiers) are used, interaction should not be a problem.

If the exciter HT supply with two stabilisers is used, it is recommended that V3 be changed to a VR105/30 and R13A increased to 2·2K 5w. The degree of regulation obtained was reduced by the small value of series feed resistor recommended. If the single stabiliser is used, a 350-0-350v. secondary will be adequate.

Since publication of the original article, *Electroniques* have introduced a new range of VFO coils. These were designed to include Top Band, but it is recommended that this arrangement be used even if 160m. is not required.

There were good reasons for operating the VFO on 80m. in the original design, but the advantages were reduced when it proved necessary to include a tuned circuit in V1 anode to give sufficient drive on 10m.

Some Modification Notes

The new arrangement uses a 1·75-2·0 mc VFO unit for 80m. and Top band; a 7-7·2 mc one for

40, 20 and 15m., while on 10m. the VFO covers 7-7·45 mc. This requires three units, but if reduced bandspread on 40, 20, 15 or incomplete coverage of 10m. can be tolerated then one of the latter units could be eliminated. In the writer's opinion, this is a worthwhile economy, in view of the shortage of space in the VFO compartment, and the difficulty of arranging three coils around the band switch with really short leads. Under some conditions the temperature compensation provided by the polystyrene capacitors in these units may be thought excessive, in which case the fixed condensers in parallel with the tuning condenser sections may be removed and replaced by ceramic and silver mica types in parallel. The correct proportion of silver mica to ceramic must be found by experiment.

With this arrangement, the tuned circuit and associated switching in the anode of V1, (which materially affected the stability in the previous version) may be removed completely and replaced by an RF choke, or if plenty of drive is available, a 10K resistor. The tuned circuit and switching should not be required at all, but if conditions in the particular unit make it necessary, they may replace RFC4 in the anode of V2. If this is done, it will certainly be satisfactory to use a 10K resistor in the anode of V1. This arrangement was not possible before as it would have been necessary to drive V2 into grid current to persuade it to operate as a doubler. It should be emphasised that if a 7 mc VFO unit is used, the 7 mc tuned circuit L14/C70 must either be removed completely or transferred to V2, or its effect upon stability is likely to be disastrous.

The driver load coils L5-9, particularly L8 and L9, should be well spaced from one another and from the chassis sides, or loss of drive and an increase in spurious outputs may result; a spacing of several coil diameters is suggested; that shown in the photograph (which seems to have been copied by some constructors) was, through lack of space, considerably less than is desirable. The best solution is to use fully screened coils mounted above the chassis, but they take up a great deal of room.

There are many possible arrangements of the tuned circuits in V3 anode; the arrangement shown is among the simplest, and proved most satisfactory The only modification necessary with the new VFO is to wire the 40m. contacts of S1b to the 80m. ones rather than to the WBC L3. If Top Band coverage is required, the 160m. contacts of S1 are all wired parallel with the 80m. ones—except for S1d, which should either switch in a load tuned to 160m. or a 10K 2w. resistor.

From the TV1 point of view, it would be better to replace the 7 mc WBC by a 21 mc type for use on 15m., the 14 mc WBC then being used on 10m. and 20m. With this arrangement the driver stage would be straight through double tuned on 20m. and 15m., and great care would be needed to prevent instability. For this reason, the original circuit is to be preferred where TV1 is not likely to be a severe problem.

No mention was made of grid block keying in the original article. This system is very satisfactory and has the advantage that no choke is required for click filtering, and the cathode can be firmly grounded, eliminating a common cause of instability. The necessary negative bias supply may be obtained from one half of the exciter HT transformer secondary, with a half-wave circuit using a pair of 800 p.i.v. silicon diodes in series, a capacitor input filter and the usual equalising resistors. The circuit for grid block keying is given in all the handbooks.

SIMPLE NOISE GENERATOR

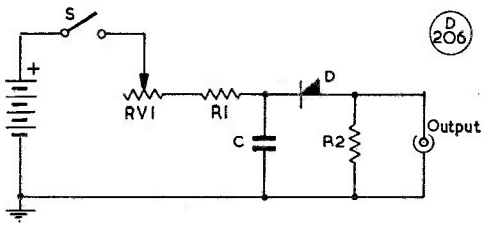
FOR COMPARISON AND TUNE-UP PURPOSES

N. E. READ (G6US)

HAVING recently completed the construction of a 2-metre receiver, it soon became obvious that in order to get the best out of the converter section, it would be a distinct advantage to have a noise generator. As this was not readily available, it was decided to construct one. All the necessary parts were available, with the exception of some neat form of metal box in which to fit up the components. Things like *Oxo* and tobacco tins were considered, but they never "look right" even when painted. This minor snag was easily overcome—very cheaply indeed—by employing an ordinary electrical sunk switch-box (of the type manufactured by *M. K. Electrical Co. Ltd.*, and generally available through any electrical contractor, *e.g.* the sales counter of the local Electricity Authority office).

These small steel boxes come in various sizes, and are enamelled in an attractive shade of grey. They have the added advantage of having "knock outs" consisting of circular metal discs on all five sides of the box which can easily be removed by a sharp tap from a ball-pen hammer, thereby saving a lot of drilling. Most boxes have two sizes of knock-outs, three-quarter inch and five-eighth inch. The larger size hole is just right for a B9G valve holder and the smaller one for a B7G base or TV type coax outlet sockets. What could be more convenient! The boxes are ideal for building small pieces of equipment such as Grid Dip Meters, Field Strength Meters, SWR indicators—and in fact any radio application which calls for a small metal box. For closing the open side it is only necessary to cut a lid from aluminium or sheet steel. The boxes are very conveniently provided with lugs tapped 4 BA which can be used for securing the lid.

That selected for the noise generator and shown in the photograph measures 2¾in. x 2¾in. x 1½in.



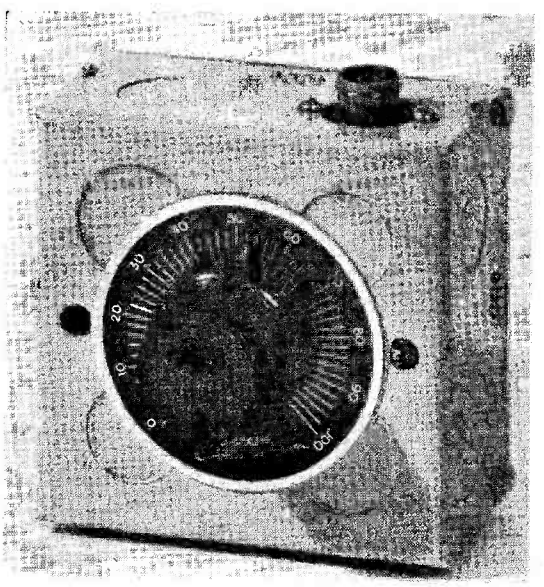
Circuit of the simplified noise generator described by G6US. Values are: C, 470 $\mu\mu$F; R1, 10K, ½w.; R2, 75 ohms, ½w.; RV1, 50K variable, with switch; and the diode D is a type 1N21 silicon. *Note: 50K resistor RV1 in diagram should be marked VR1*

deep, which is quite large enough to accommodate the components and the *Ever Ready* PP3 battery.

Putting it Together

Construction of this most useful little piece of equipment is extremely simple, but if it is to be used on VHF, care should be taken to keep all wiring as short as possible. R2 should be mounted right on the coax socket, the resistor leads being cut to a minimum.

For those who are not conversant in the use of a noise generator, the procedure is as follows: Take the output of the noise generator to the input of the receiver or converter under test, by a short length of coax cable. Connect a low reading AC voltmeter across the receiver output transformer. Switch off AVC and BFO. Switch on receiver, advance the gain controls of the receiver until the AC output meter shows a reading of, say, quarter fullscale. Switch on noise generator and advance control VR1 until the reading on the output meter rises to about twice the value shown previously. Make a note of the setting of VR1 and also the reading of the output meter.



The simplified noise generator as constructed by G6US, circuit of which is shown in the diagram. It will perform basic noise-generator functions quite adequately — see text.

Adjustments may now be commenced on the convertor or front-end of the receiver with the aim of increasing the noise reading as shown on the output meter, meanwhile decreasing the current through the diode by backing off VR1. The object of the exercise is to show the same noise figure as noted originally, with the maximum amount of resistance in circuit—this would mean, in effect, that one was getting more output for less input, and hence a more sensitive convertor. A previous article (by G8AFL, in the March issue of SHORT WAVE MAGAZINE) explained the calibration of a rather more sophisticated type of noise generator. Here, we have a simpler design intended for comparison and tune-up only.

This small and inexpensive instrument will amply repay the time in making it up, and will certainly save many hours which would normally be spent in getting that VHF converter going really well. Furthermore, providing that the battery voltage is checked occasionally, it will be found a useful device for comparing different receivers and converters.

G9BF CALLING

Still Right On Beam !

G9BF now much concerned about his incomes policy. Having stolidly believed hitherto that every worker—whether tycoon running show or clock-knocker on factory floor—ought to be on knees every morning thanking Great Operator for opportunity earn wages at all, G9BF astonished find *anyone* carrying out *any* sort job only doing it as favour for somebody else.

G9BF puzzled as trade gap goes on widening, too many people still using QRP on job es on air, with nobody worrying about Afro-Asian menace on DX bands. These A-A boys busily crowding-in es working gain DXCC in terms "Me done DX with all black countries only." If certificate not issued *instanter,* huge fuss created es atmosphere poisoned on grounds colour discrimination, lack support for emergent countries, no EU's trying help emergents, is prejudice shown because applicant wears *dhoti,* what is United Nations going to do about it all.

G9BF worried, but continues try resolve such unhappy es conflicting issues by maintaining full RF urge at base ant. es handing out S9++ reports every QSO all es sundry, whether EU or Afro-Asian —black, brown, yellow, off-white, or curry-coloured.

G9BF back on personal income policy problem. Editor stone-faced es gritty-minded about money, with off-hand cracks like "Don't expect us *pay* you for space we *give* you."

And so we leave him, hoping that he will not intrude again (for the time being, anyway). Never mind—he has had a few ideas, even if not to everybody's liking.—*Editor.*

RTTY Topics

SWEEPSTAKES COMPETITION—MODERN EQUIPMENT AS SURPLUS—NOTES ON TELETYPE CORPORATION MACHINES, WITH PICTURES

W. M. BRENNAN (G3CQE)

With the re-organisation and re-equipping of U.S. Bases now going on in the U.K. and Europe, a quantity of modern Teletype Corporation teleprinter equipment is appearing as surplus. Most of this should be in good working order and is suitable for amateur RTTY operation. Our contributor discusses the more likely items in some detail—and also draws attention to a few snags that may be encountered. "RTTY Topics" is a regular SHORT WAVE MAGAZINE *feature and appears every other month. All aspects of amateur RTTY working are covered.—Editor.*

RESULTS of the World-Wide RTTY Sweepstakes competition are to hand and it is interesting to note that the first three in this tussle are all European stations. Not many will be surprised to learn that the leading station was I1RIF—this is now the third year in succession that he has taken the board. He put up the record score of 58,840 points by making use of all five HF bands. His combination of first-class operating with first-class equipment certainly seems to be unbeatable at present. DL1VR was second with some 50,840 points which also represents a very fine effort. The third place was taken by I1AHN who chalked up 40,690 points.

The first North American station was K8DKC with 38,444 points and here readers are reminded that the rules for this Contest deliberately load the scoring against North American stations. In this particular contest the bands failed to produce an opening to either VK or ZL for the W/VE boys; one such QSO would have increased the North American scores by several thousand points due to the extra continent multiplier. Other leading U.S.A. stations were W2RIU (34,110 points), W4EGY (29,876), K8MYF (28,734), and W7VKO with 28,656 points. K8DKC has been responsible for the design of several pieces of RTTY gear such as T.U.'s and so forth. These contest results prove that he can effectively use the gear he designs and builds!

By the time you read this the B.A.R.T.G. RTTY Contest will be over and as this contest has no loading against the W and VE stations, it will be interesting to see just who lands at the top of the next list!

Teletype Corporation Equipment

A number of American T/P's and associated gear, all made by the Teletype Corporation, have recently been finding their way on to the surplus market over here. No doubt some of this is because of the running-down of certain U.S. Bases in this country and some to the normal replacement procedure since, as visitors to "Open Days" at such bases will know, some of the old RTTY gear is being replaced by the later Kliensmidt apparatus. Much of the American equipment now becoming available will be new to U.K. amateurs and this seems the right time to take a closer look at the gear which is in use by RTTY'ers across the Pond and could be appearing in more U.K. stations, too.

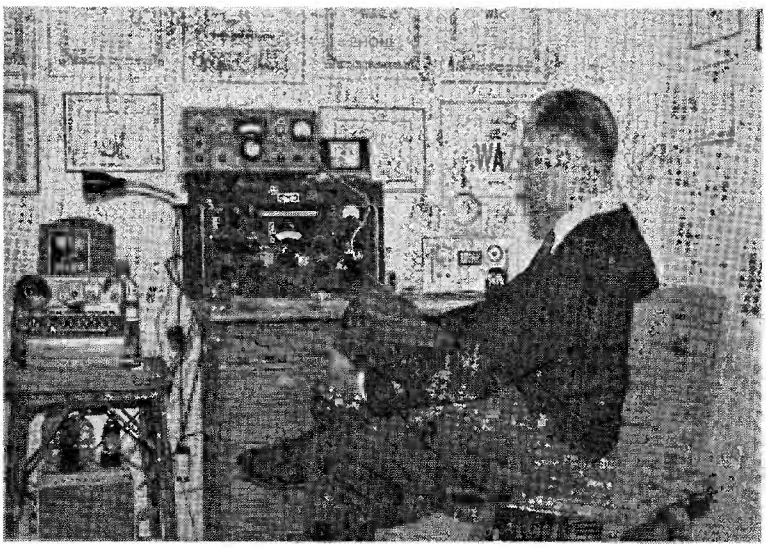
Model 12: The Teletype Model 12 was the first T/P to be used by amateurs. It is a very heavy machine and by all accounts a very noisy one, too. It was unusual in that each of the five code elements were selected by individual electromagnets—with a further magnet for the "start" and "stop" pulses. Each of the electromagnets was connected to the incoming line sequentially by a distributor—similar in fact to the distributor of a car. The make and break of these seven contacts at the rate of 60 times per minute produced a serious hash problem for operators on the HF bands! Eventually, this was beaten by the use of keyer valves. The Model 12 was a page printer and had a type basket and carriage rather like that of a typewriter. It is not very likely that any of these machines will be around in this country. They should be looked at a bit askance.

The Model 26: This is a machine that is still in use by U.S.A. stations and it was the next to become available to amateurs after the Model 12. It was used by commercial organisations in the U.S.A. and most of the motors fitted were of the 60-cycle synchronous type, though some had AC governed ones. The 26 is smaller and quieter than the 12. The selecting mechanism employs a single electromagnet which sequentially sets up the five code elements. It is a page printer and the carriage moves past a typewheel in which the type is set in the edge of the wheel and not radially on the typewheel as in the Creed Model 7. As with most of the Teletype machines, the 26 came with its own table and the paper roll was carried on brackets actually at the rear of the table, the paper moving up through a slit in the top of the desk towards the platten roller.

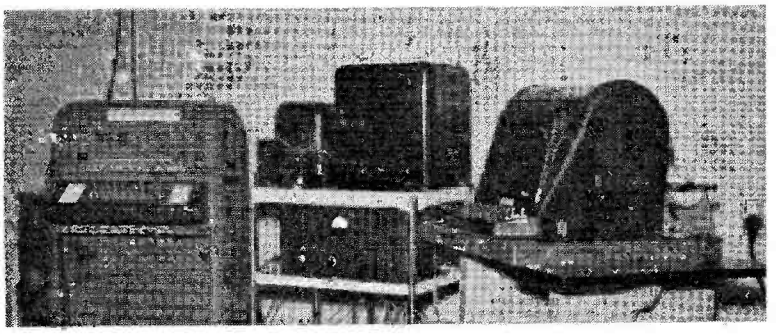
Newer Equipment

Model 14 Series: The Teletype Model 14 series covers a number of different models ranging from a tape printer to a typing reperforator and all these items are or will be available from time to time in this country.

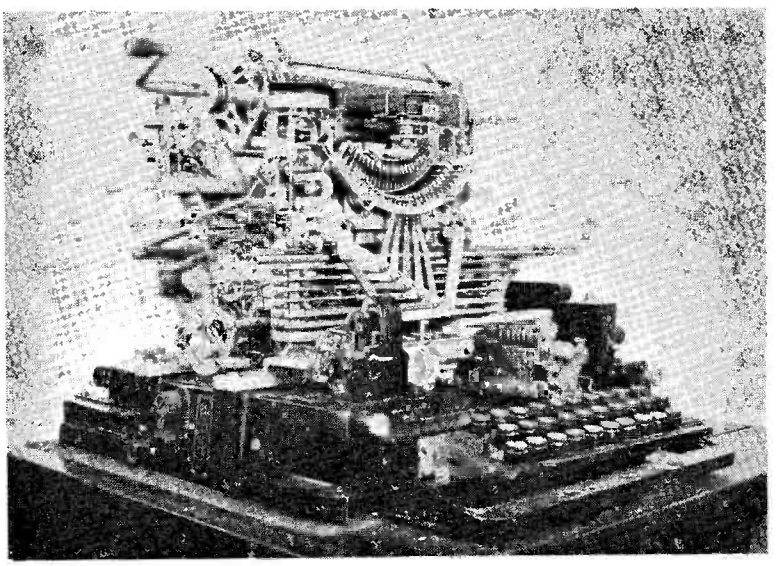
The first item to look at is a non-typing reperforator, in appearance more or less a square black box with rounded corners, measuring about 13½in. x 13½in. x 15in. It produces fully perforated tape and it is a reasonably compact machine. It can be seen in the centre of Picture A. There is no provision for adding a keyboard to this machine, nevertheless it is a most useful item of gear and is



DL1VR, Herbert Alfke, Dahlienstrasse 10, 8033 Krailling/Post Planegg, came second in the recent World-Wide RTTY Sweepstakes Competition, making 50,840 points — this was just 8,000 points (or about one continental multiplier) behind the winner, who was again I1RIF. DL1VR's station is hall-marked by its neatness and lack of complication.



(A) At centre is the Teletype Model 14 Reperforator, producing fully perforated tape, somewhat similar to the Creed 7TR reperforator. The machine on the left is the Model 28KSR (keyboard-send-receive) as at present in use by the Royal Navy.



(C) The Teletype Model 15 Teleprinter without its cover — a somewhat complicated piece of apparatus mechanically, with numerous small parts involving delicate adjustment. It can also be encountered under its military (U.S. Forces) designation TG7A or TG7B, to operate from a 110v. AC/DC line. Now coming off as surplus, ex-U.S. Forces, the Model 15 is an excellent machine for amateur RTTY operation.

the American equivalent of the more familiar Creed 7TR Reperforator.

The Model 14 *Typing* Reperforator is an entirely different machine, and is used to produce semi-perforated tape with the encoded character also typed on to the tape. In this, it is similar to the Creed Model 85R. Some versions of this machine are fitted with a keyboard so that tape may be punched up from the keyboard—or of course a message sent to line from the keyboard whilst the machine produces a copy tape. Picture B shows a model 14 Typing Reperf. without keyboard. Again, the typing mechanism is like that of a typewriter and the "works" can be seen through the glass window in the front panel. The character is typed and punched out at the same time but the typed character is positioned some six characters ahead of the corresponding perforation on the tape.

Very similar in appearance to the Typing Reperf. is the Model 14 T/P. It is a tape (or strip) printer which has a lot in common with the mechanism of the reperf. This machine can also be found with and without a keyboard but most are in fact sending-receiving machines and therefore do have a keyboard. A few RTTY stations in this country are at present using this machine.

Next is the Model 14 Transmitter Distributor, a machine which is a tape transmitter and although it performs the same functions as the Creed Auto Tx, the actual operation is quite different. The Model 14 T.D. can be seen on the left in Picture B. Each code element in the tape sets up an electrical circuit and a distributor scans each electrical circuit in turn, registering the appropriate signal and automatically adding the "start" and "stop" pulses.

All this series of RTTY equipment is still in widespread amateur use in the U.S.A. and is in commercial operation in many countries.

Model 15 Teleprinters

It is probable that this machine is at present the one most widely used by American and other RTTY stations. The Model 15 and its military counterpart the TG7A and TG7B were produced in large numbers during and after the last war. It is rugged and reliable, and a nice machine to operate. Those provided for the American Forces in Europe were usually fitted with governed motors mostly operating from 110 volts, both AC and DC. It is keyed by a single electromagnet pulling against a spring (in other words it is "on/off keyed" and not polar keyed as is much of the Creed equipment). The carriage of the Model 15 does not move—instead the type basket moves along the carriage, and watching this mechanism working its way along the paper with type levers flying can be an absorbing business! The Model 15 is pictured (C) without its cover; the type basket and selecting mechanism can be clearly seen. The machine is often fitted with automatic line-feed and carriage return mechanism and another feature is the optional "unshift on space" facility whereby the downshift from figures to letters can be brought about either by the normal "letters shift" signal or by the space signal. Thus, if the letters signal is missed due to QRM the machine will revert to letters at the next space between words. The Model 15 is an excellent machine for amateur RTTY and is used by many European stations.

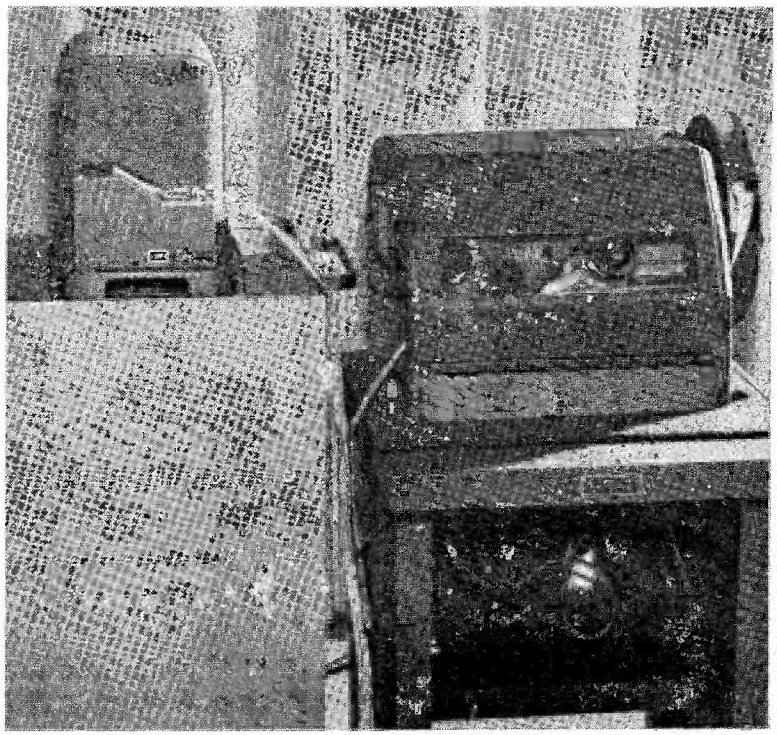
The Model 19

This is a combination of a Model 15 with some Model 14 features to produce a complete teleprinter and tape outfit mounted on one desk. It consists of a Model 15 with a perforating attachment added; this is operated from the '15 keyboard. The attachment includes a counting mechanism with a dial to indicate the number of characters typed on a line and a warning light which comes on after 66 characters have been perforated. The light is extinguished and the counting gear reset by the operation of the carriage return key on the keyboard, and the whole counting operation starts again. In addition to this modified '15, the Model 19 also possesses a Model 14 Transmitter-Distributor transmitting the taped message. The whole Model 19 is a neat, relatively compact and complete RTTY machine set-up, with all the inter-machine wiring, polar relays and so on built into the desk. The owner of a Model 19 has almost all the machinery facilities that could be desired for amateur RTTY operation. This gear is still in use by the American Forces and the military version has the code number TT-7/FG or TT-8/FG, the difference being that the latter has a keyboard and type pallets with weather symbols for the upper case characters, instead of the usual communications upper case characters. The lower case characters are of course the same in both instances. As can be seen from Picture D, the Model 19 is a neat and business-like assembly.

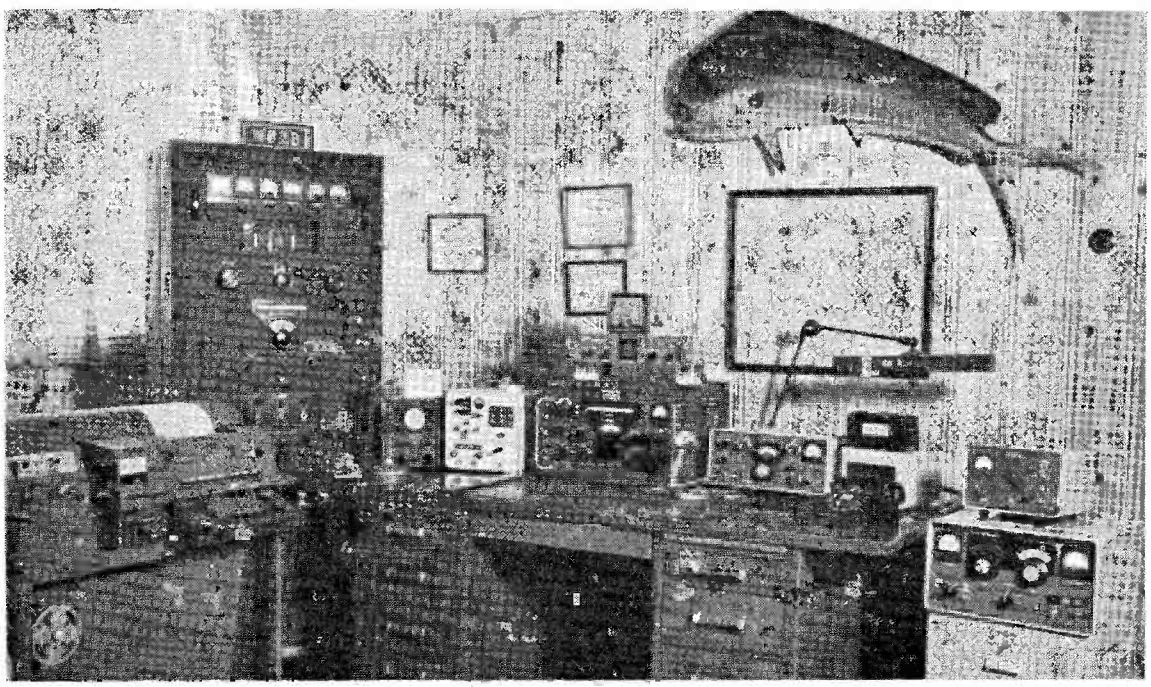
Model 28

This is a very much later and improved type of RTTY apparatus. It is in current use not only by the U.S. Forces but in many of the N.A.T.O. countries. It is in operation with the Royal Navy and was seen on the Navy Stand at the Amateur Radio Exhibition a couple of years ago. The basis of this gear is the 28KSR (Keyboard Send-Receive) and is shown at the left in Picture A, complete with its desk. This machinery is capable of operating at 60, 66, 75 or 100 words per minute. There is a wide range of motors that may be fitted, including AC-governed types suitable for use in this country. All models which employ governed motors are fitted with built-in stroboscopes for speed adjustment. The version which also provides tape facilities is the Model 28ASR (Automatic Send-Receive). This equipment is also built into a desk. There are a number of variations of the tape facilities which can be provided and these include a Perforator, a Typing Perforator, a Non-Typing Reperforator and a Typing Reperforator. The tape transmitter that can be supplied also comes in a number of different models which give different electrical outputs suitable for automation or computor use. In the case of some of these machines in-

Pictures of the American teleprinter equipment in this article by the courtesy and co-operation of W6AEE, Arcadia, Calif.

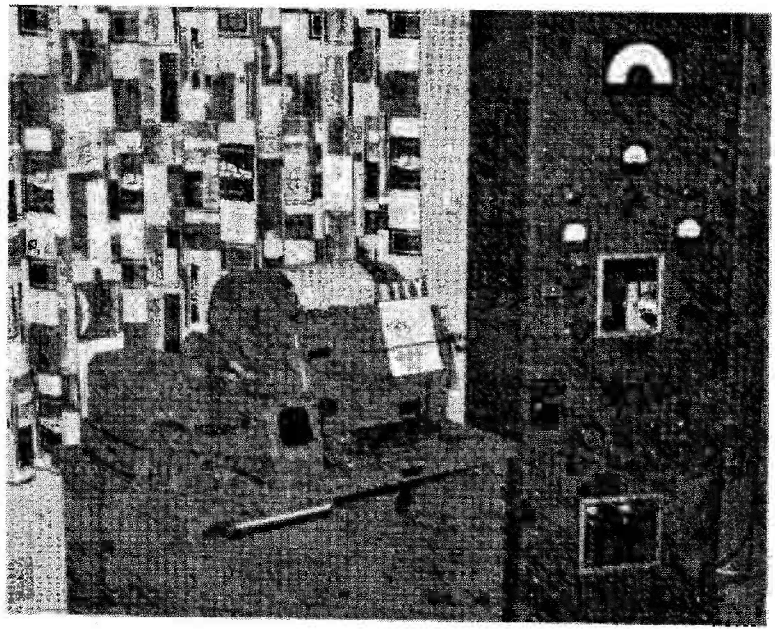


(B) At right, Teletype Model 14 Typing Reperforator, having a function similar to the Creed 85R—see text. The neat machine on the left is the Model 14 Transmitter-Distributor (T.D.).



(E) The Teletype Corporation Model 28 ASR (automatic-send-receive) is highly sophisticated RTTY gear, particularly for amateur operation. Here we see it complete on the console to the left in this picture. The station is that of WØZB, Lester Benson, 4 Williamsburg, Creve Coeur 41, Mo., who has very fine equipment. And judging by that trophy on the wall, he does not fish only for DX.

tended for communications work, there is a built-in automatic "Quick Brown Fox" by means of which some of the better known test signals can be mechanically reproduced. Clearly, then, this is quite modern gear and is very versatile. It is, of course, very much in demand by the W stations. There is a surprisingly large number of them using this gear, too. One such is WØZB, of St. Louis, Mo. If you see one of these machines offered at less than £100—pinch yourself, you must be dreaming!



(D) The Model 19 RTTY set-up is complete on the table at left in this picture — which is of the station of W5CSN, Bob Bradshaw, 5218 Berry Creek, Houston 17, Texas. As explained by G3CQE in the article, the Model 19 equipment is in effect a combination of the Model 15 T/P with the Model 14 T.D.

Some Practical Considerations

These then are some of the Teletype Corporation machines that are in use by amateurs in many countries including a few over here. It is equipment that might well become much more common in this country in the near future. As with most types of RTTY gear it is as well if, before buying it out of hand, the would-be owner spends a little time finding out just what motor supplies are required, since it would be of little use buying a machine fitted with a synchronous motor for 60-cycle mains. Such a machine could be used on 50 c/s mains but only after fitting special gears which are very difficult indeed to obtain. There is also the problem of obtaining spares for such machines—and the probable cost of importing such spares. In general, the spares situation for Teletype machines is not too bad in this country —more still on the Continent, and in the U.S.A. there are some amateur organisations which would no doubt help out with small spares as a last resort.

Another factor that must be considered when buying this modern American equipment is the method of keying. It is almost all single-current (non-polar) keyed, whereas most Creed gear is used with polar or double-current signals. This is not a major obstacle, since a Creed 7B can be converted to single-current operation by the fitting of a special spring—or by using polar relays some of the gear can be operated from a double-current supply and some from single-current. But it does tend to add complications to the set-up! In the main, it would be best to keep the DC loop all double- or all single-current operation. This Teletype gear is very nicely engineered and extremely reliable. A Model 19 complete should satisfy practically all amateur needs, while the Model 28 might even get the XYL interested!

Finally, even if you made just one contact only in the March B.A.R.T.G. Contest, don't forget to send in the information to the Contests Manager G2HIO (QTHR), since every log helps, not only to sort out the winners but also in the assessment of whether or not the rules are producing the required results. So just as soon as the corns on your fore-fingers stop aching, get the station log out and tally up your points! See you in June with the *post mortem*. *73 de G3CQE.*

INTERNATIONAL RADIO AND TELEVISION EXHIBITION — 1965

What used to be known as the Radio Show — the British trade and commercial exhibition covering radio and television broadcasting — has now been widened in scope to make it international in the field of entertainment by radio and television, including hi-fi, tape recording, record players and all aspects of audio. For the first time, overseas exhibitors will be appearing alongside the home product. What is to be known as The '65 Show will take place at Earls Court, London, during August 25-September 4.

GOING OUT OF BUSINESS

Many readers will be sorry to hear that the old-established business of Webbs Radio, Soho Street, London, W.1 has now been closed down. First under the management of H. R. Adams, G2NO, and in the post-war years directed by E. J. Pickard, G6VA, for more than 30 years Webbs have been well known to generations of radio amateurs, with a high reputation for quality and service. The firm was one of the regular retail outlets for Eddystone equipment, and was closely connected with Stratton & Co. Ltd., there being at one time another shop in Birmingham.

PASSING THE R.A.E.

APPROACH, PREPARATION AND EXAMINATION TECHNIQUE

E. P. ESSERY (G3KFE)

In a few weeks' time, several hundred anxious candidates will be taking the Radio Amateur's Examination, their first hurdle to a transmitting licence—the opening to a great new world, with all the interest and excitement that it holds. Though the R.A.E. is a pass-only test and therefore not in any way competitive, it does require that candidates should be properly prepared within the scope of the syllabus—which in itself demands merely a basic knowledge of radio and mathematics up to what has been defined as "fifth form standards." Our contributor does not attempt to deal with the technicalities of Subject No. 55—that is a matter for the candidate —but he does make some very useful practical suggestions as to how the R.A.E. should be tackled. We can only hope that those who take seriously the advice given in his article will come up with a pass slip and—in due time—another callsign/address to be entered on our New QTH page.—Editor.

SOME people find the passing of the R.A.E. is a difficulty even though they may be well prepared technically; it is therefore proposed in these few notes to try and show how the technical knowledge one has may be used to the best advantage in the matter of gaining the maximum number of marks.

In the first place, let it be said once and for all that the City & Guilds examination for radio amateurs is utterly fair and above board. If you hear people complaining about the "unfairness" of the examination they will always prove to be either those who failed, or those who have taken the R.A.E. and found it rather different from the paper they were expecting. If you are properly prepared and have at least some examination experience, you can hardly fail.

In the second place, it can be said that a majority of the people who appear from the talk at the Club to be sure passes and then upset the odds, fail because they did not write down what they meant to write.

In the third place, a lot of the "near-passes" would have made the grade had they spent just a few minutes in preparing themselves for the task in hand, in the essential matter of obtaining the most marks possible for a given amount of knowledge. For all hopeful aspirants to a pass-slip, these notes may be of some service.

First off, obtain some back copies of the examination papers by applying to the City & Guilds people (Subject No. 55) and spend an evening looking through them and analysing the pattern of the questions to find a theme. Some things will become immediately obvious—for instance, always Question One is "Licence Conditions" and Question Two some aspect of "Interference." Depending on how many papers are to hand a good idea can be obtained of the "certain" questions and a reasonable guess made in the matter of "probable" and "possible" ones. Out of all this research will come a very good idea of the areas in which one should apply most effort in the pre-examination revision. In other words, we do not waste time revising much on the sort of questions that are not going to appear on the paper, but we use the time so gained to make sure we know what we *need* to know. Most R.A.E. papers can be relied on to produce one question a bit out of the usual run of things, but in general, one can predict what is going to appear on the paper at any given exam. (The prize in this context was taken by a friend of the writer's who successfully predicted *all* the questions set in a certain professional final exam., and contrived to pass with the absolute minimum of effort!)

Expressing Yourself

Some folk have the knack of being able always to produce good readable English in their answers; others, equally well qualified, seem to sit down and write gibberish whether they know the subject or not. The most fair-minded examiner in the world cannot be expected to try and translate a load of twaddle into full marks even though he may *sense* that the candidate is *trying* to say the right thing.

The R.A.E. candidate who is determined to pass must try to find out which class he falls into, and the following method is suggested: Take an exam. question on which you feel fairly knowledgeable and sit down and answer it on a bit of paper as though you were in the exam.; allow twenty minutes, no peeps in the text-book, draw any diagrams called for, and when it is done fold it up and put it away. The following evening, take it out and, with the help of the text-book, mark it. All bits that are not absolutely right mark off and also all the bits which could be clearer. In doing this marking try and imagine that the Examiner may just have had a row with his XYL, has kicked the cat and run out of baccy, so his ulcers are playing him up. Then to make sure, assume he has a personal score to pay off and he is quite definite that you are to fail; this should ensure you do not favour yourself too much! If your check shows one point that seems a bit unclear compared with what you meant, then you need to practice writing out examination model answers, and comparing them against what you meant and then against a model answer. A very good friend of the writer's once perpetrated the following: "An R-C coupled stage requires an anode load and a decoupling circuit. The anode load is to decouple the signal from the HT line." If that sort of thing can occur in a homework answer, how much more

likely is it to happen to the chap in the tension of the exam.-room?

Some practical suggestions for people who are inclined to write like this are (*a*) Read the question through and stop to make sure exactly what the man is driving at, (*b*) Never write more than a sentence before reading it through again and then get the next sentence clear in your mind before you write the first word of it, and (*c*) Practice and yet more *practice*.

Homework

Now to the matter of Revision. If you are one of those who insist on swotting the night before, then do so by learning by heart the terms of the licence. Question One is a gift insofar as it is always best answered by quoting the terms of the licence word for word; there can be no more perfect answer to the first question than this and any attempt to amplify the wording of the licence is more likely to lose marks than to gain them. As far as the rest of your revision is concerned there is not much to say about a process which is best left to the individual concerned.

On the day of the Examination it is definitely a bad thing to spend the time in last-minute attempts at revision; it is far better to take the day off and have a lie-in for the morning. After a good lunch find something to do as far removed from Amateur Radio as can possibly be. The writer is firmly convinced that a good soak in a hot bath with a Good Book (*not* the *Handbook*) is as good a way of keeping the tension down as any. The object of the exercise is to ensure that you get to the examination centre as cool, calm and collected as possible, so that when the tension rises, as it surely will just as soon as you get to work, your mind will respond by working better than usual, and not by seizing up.

Tackling the Exam.

When the time comes to set off for the Centre, make sure you have your examination entry card; secondly, a pen and some spare ink supplies, or a ball point and spare refill, ready "run-in;" a pencil and sharpener, ruler, set-square, a rubber, and if you can lay hands on one, one of those little celluloid stencils of circuit symbols; also you need a watch. Give yourself time to arrive at least twenty minutes before the battle. Then attend to the needs of nature.

When the exam. room is ready to open find your seat and lay out your paraphernalia. Fill in the front page of the answer book as required. Take great care over your name and address and double check to see all is correct so that the posted result slip will find its way to the right letter-box. Sit back and relax until they say you can start. Look round and note that the others look as green as you feel!

When you get the word to start, commence by reading through the paper completely; then read it through a second time and lightly tick in pencil the questions you propose to answer. The pattern of the paper in recent years has been as follows: Two compulsory questions in Part 1, and any six out of eight in Part 2. This means a total of eight questions to be attempted.

You must, of course, answer the ones in the compulsory part, but in the second part you can choose whichever six you like. You can work through the questions in any order you prefer, but you must mark clearly the number of the question you are answering; this is a nice idea anyway because it saves you the trouble of writing in the question before you can answer it.

All the organisation at the beginning will take up about ten minutes before you start actually answering the first question in your answer book; you will need about ten minutes also at the end, to give you time for checking your work, before you have to hand it in. Hence, if you have eight questions, in all, to answer, you have a time of twenty minutes per answer. It is of the utmost importance that you do not exceed this allocated time on *any* question. Even if the answer is not complete, at the end of the set period which you have allowed, *i.e.*, 20 minutes in our example, then draw a line, and make a start on the next one. This may seem stupid, but the fact is that you should have sucked out of any R.A.E. question all the marks you are going to get in ten minutes, and therefore you can be certain that if you are over the limit on time you are either capable of writing a book on the question or you are just waffling. If the former, you need to control yourself; if the latter, you may as well make the most of the next one as waste time. If you end up with a few minutes in hand you can always go back to the question, write across the bottom of it "for remainder of answer see page - -" and then mark the start of the tailpiece in a similar manner.

General Guidance

In the matter of writing and clear sketches there is no intent to dock marks for bad writing—on the other hand if you cannot be read you can't get a mark, so you may as well face the fact that the legibility of the writing *is* of importance, and drawings are subject to the same consideration. It may as well be mentioned that "flannel" in the wording of an answer is as good a way af obscuring the point and therefore of losing marks as any, so keep to the point. It has been already hinted that if you look closely enough at the old papers you should be able to predict a very large proportion of the likely questions and this being the case you have no need to be "windy" (on paper) to hide a lack of knowledge.

If you have proceeded as suggested here you should be complete ten minutes before time, and you have now the problem of checking your paper. You would be well advised to spend the time in reading through—putting in the missed words, and clarifying the obscure letters in the text—rather than in a futile attempt to rewrite a question on which you have doubts. For better or worse, it will be too late to change, and you will do more good by cleaning up the manuscript.

A final point: If you are studying on your own, you should write to the Radio Services Department (Radio Branch), General Post Office, Headquarters Building, St. Martin's-le-Grand, London, E.C.1, for a copy of their leaflet *How to Become a Radio Amateur*. This contains, among other things, a replica of the licence, and a copy of the syllabus, to help you cover the subject as far as you need and no further. For text book the writer would recommend either the British or American *Handbooks*, used in conjunction with the *Guide to Amateur Radio* and the *Radio Amateur Examination Manual*—all of which may be obtained very easily through the SHORT WAVE MAGAZINE Publications Dept.* These should be supplemented by attending an R.A.E. course if at all possible; and, probably most important of all, you should get in touch with local Club. If you can listen on Top Band you will soon know who are your locals, and you can then approach them by letter for an introduction to the Club, if there is one. You will receive a warm welcome, but more important, you will meet people who can help you in all sorts of ways to get through the Exam., will immediately realise that you are trying, and go out of their way to help. You should be able to find someone to criticise your work and to put you right when you are in difficulties. In fact, in being a member of an active local Amateur Radio club, you are half-way to getting through the R.A.E.

* *These books are available as advertised on p.66 in this issue, with immediate delivery from stock.*

DO WE SUFFER FROM OUR IMAGE?

RESULTS OF A SURVEY

H. N. KIRK (G3JDK)

RECENTLY, whilst talking to a member of an electronics organisation who had been engaged in interviewing prospective candidates for a research post, he mentioned one applicant who met the requirements and continued—"the only thing I have against him is that he is a 'ham'."

This was quite a serious statement, and when I asked his reason for this, his reply was that "most of the 'hams' he had met were rather talkative, fanatical fellows who never knew when to stop 'hamming' and start working."

Compared with the American electronics companies who are proud to publish lists of licensed amateur employees with their advertisements (see *QST*, for example), this attitude was somewhat startling and so to find out what people in the vicinity thought about us, the writer made the following survey taking 20 average members of the public and asking them: "What do you think of radio amateurs?"

(*a*) Nine blamed us for all BCI and TVI,
(*b*) Three thought we were "nut-cases,"
(*c*) Five thought we were "odd fellows, but harmless,"
(*d*) Three did not know of our existence.

On soliciting the opinions of five leading members of the electronics engineering world, *i.e.* Ph.D's, company heads, research leaders, etc.:

(*a*) Two would not employ radio amateurs in their organisations (no reasons given),
(*b*) One had listened on his BC set (80m?) and had the opinion we talked a lot of tripe. He had doubts about offering technical employment,
(*c*) One said he thought most technical blokes talked a lot of tripe anyway, so he would risk employing an amateur,
(*d*) One said it would depend entirely on his qualifications.

Not a very bright picture—and, incidentally, so that no blame can be laid at the door of G3JDK, the people questioned were not aware that he holds a transmitting licence.

Since this survey covered people in a 50-mile radius of the writer's QTH, and couldn't be called a local opinion, it is indeed food for thought—perhaps the time has come for us to take a good look at ourselves and our activities.

Obviously, since the time spent on the air is in effect our "shop window," we must give some thought to our topics of conversation if we are to dispel this somewhat weird opinion of our activities. We know we're not *all* nut-cases, and have other things to talk about apart from the weather (one wonders how much of this we can blame on Hancock!) However, taking a listen round on 160/80/40 recently did raise the problem of how to dispel criticism! We *do* hear a lot of tripe, you know, and whilst it would be wrong to wish that every station would start being frightfully technical, there's an awful lot of cleaning up to be done.

To sum up the situation, we do not present a very good picture to the eavesdropping layman. It is, one agrees, just a hobby, just as woodwork or bowls is to others. But one *can* perfect even a hobby, and be proud of the way it is presented.

So there it is—whether we know it or not, we have a large audience of laymen who on the performance or behaviour of one amateur, form an opinion of us all as a group. Who cares? Well, the writer does, for one. One would like to hear of an amateur being employed because he *is* a "ham," and not being dismissed from mind for that very reason!

COMMUNICATION and DX NEWS

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

WHEN the present title of this feature was substituted for the old "DX Commentary"—going back many years—it was hoped that more and more amateurs who were not *basically* keen on DX would use it as a forum for their views on operating in general. This has worked out pretty well, and the accent has certainly been shifted from DX, in the sense of merely chasing "new ones" and those many awards.

But the truth of the matter is that *everyone* is interested in DX, at some level or other. The habitual Top Band natterer, running his non-stop Sunday morning phone schedule with someone not more than twenty miles away, must confess to a mild thrill when a new station calls in from four or five times that distance. The fellow who works on Twenty or Fifteen, but is quite happy with pages and pages of logged European QSO's, is just as pleased at a surprise call from a W2 as any hardened DX type would be with a piece of *exotica* from ZQ9, or whatever.

DX, in fact, is a very important component of the machinery that makes all us communicators tick. A pity, really, that the meaning of DX is so vague as to be practically non-existent. After all, no one has yet come up with a satisfactory answer to the query "What is DX?"

What your conductor is steadfastly trying to keep out of these columns is the tendency to regard "new ones," expeditions, contests and ladders as the be-all and end-all of Amateur Radio—which has so much more to it than that sort of business.

We are all communicators now, like it or not. Even the Old Timers who held an *experimental* licence for several years depended on communication to justify their experiments; and the brilliant younger generation who really do carry out advanced experimental work can usually only check its success by establishing some sort of communication. (*Query:* Is the current excitement over *Oscar III* correctly described as Communication, or DX?)

All this thinking-aloud leads on to the point that we have several different methods of communication available to us, and if we are to appear as well-adjusted individuals, we should make the best use of each of them. Last month a correspondent sent in a diatribe against CW . . . he is duly dealt with, further on, by a number of readers. On the air, one can always hear extremely prejudiced remarks against SSB by the old-established AM brigade; and equally biased comments about AM by the Sidebanders.

One cannot truthfully come out with the platitude "There's room for them all," because simply there isn't! How nice it would be if there were! But by mutual co-operation we can still make the remnants of some of our bands worth using.

At present the way they are used doesn't seem to make sense. If those who decry CW were to persuade every CW user to go on to phone, what a shambles that would be! If every sideband were to take note of caustic comments about "monkey-chatter" and "the splash merchants" and so on, and insert a carrier forthwith, how popular *that* move would become.

The division of our HF communication bands seems to be all wrong in terms of modern conditions. The allocation on Eighty is unrealistic: CW on 3·5-3·6 mc and Phone on 3·6 to 3·8 mc may look all right on paper—but everyone knows that the phone stations now work down to 3550 kc and are even encroaching below that. It would be more realistic to make the CW band 3·5 to 3·55 mc, these days — very few CW operators are ever heard above 3·55 mc, anyway.

On Forty the official division is, of course, 7·0-7·05, CW only; 7·05-7·1, CW and Phone. Why, then, is 98 per cent of the CW activity between 7000 and 7015 kc?

As for Top Band — there never has been any set plan, so we have the arrangement that has just grown on its own — *mostly* phone from about 1860 to 2000 kc, and *mostly* CW from 1800 to 1860 kc.

FIVE-BAND DX TABLE

Station	21 mc	28 mc	14 mc	7 mc	3.5 mc	Countries Worked
GW3AHN	294	151	322	71	21	332
G2DC	279	169	305	165	110	319
G3DO	223	183	312	86	83	318
G6QB	190	143	281	116	56	305
G3NOF	190	132	252	32	39	275
G3IGW	128	123	150	113	67	189
G3KMQ	83	3	201	95	53	226
G3IDG	66	55	53	27	17	94
G3MDW	41	43	46	7	6	81
G3TJD	36	0	44	47	18	94
G3RJB	19	0	105	46	1	112

Then comes a fly-in-the-ointment, with the Japanese stations being licensed for a single spot-frequency of 1880 kc. And anyone who hopes to work *them* on 10 watts of phone had better re-think.

And all the time, over and above, all round, on both sides and below, we have all the other users of these bands. Broadcasting stations that shouldn't be there anyway, coastal phone, trawler phone, commercial super-QRO RTTY, ionospheric scanners and all the strange noises that one can only guess about.

The only fair comment on all this is that we who use the HF bands are either a regiment of heroes or (to quote a now-hallowed phrase) we are "stark, raving bonkers." The interesting fact is that — in spite of it all — DX continues to be worked !

Station of Keith Winnard, G3TKH, 15 Barley Croft, Westbury-on-Trym, Bristol, who is not yet 19 and still at school. His neat and efficient layout incorporates an HRO-MX as Rx, with a home-built 50w. transmitter operating over 10-80 metres ; for Top Band he has a 10w. rig, EL41 PA/6BW6 mod., all built from various "Short Wave Magazine" circuits. Aerials at G3TKH are a long-wire and a 40m. dipole. He was one of those representing the Bristol group, on 40m. CW, during the recent BARS-CARS-MARS inter-Club contest.

Fair Comment from Readers

A letter from G3NWT (Derby) has some bearing on the foregoing. He asks "Why is SSB still regarded as a separate phone mode, to be fenced off in discreet and limited sectors of the bands ? Prejudice arises if it ventures out of these (SSB-AM contacts are limited because of this prejudice). In due course this will produce a ridiculous situation where a third to a half of each band is practically empty because all the AM boys who used to populate it are now on SSB and have dutifully migrated to the correct 50-kc pen . . . what possible source of prejudice can there be if a chap, having forsaken one form of transmission for another which occupies less than half the bandwidth, should re-establish himself on his former pitch? " In case you have not followed this, he means coming up with SSB in the AM sector.

G2DC (Ringwood) brings up a problem that concerns us all more and more :—" It's about time we started a real blitz against stations emitting raucous T7 signals, by giving them a QSO and a correct report. One of these merchants with a T7c note and hefty key-clicks to boot called me all the time the other afternoon while I was working a 9M6. After I finished the QSO I took a check on this character and in twelve subsequent QSO's that he had, *eleven* stations (*three* of them G's) gave him T9. The odd man out was a UA, who gave him a proper report of 597. We *must* give these stations their true reports, especially those Klub stations; I presume that their logs are checked by some responsible person occasionally, and a whole string of T7 reports should produce some action." (Also a fat wodge of QSL cards with T6 or T7 conspicuously in red ink.)

Now, in all fairness, something on the other side of the balance sheet. SP5AFL (Warsaw) writes "Speaking as one of those 'Mittel-European' characters said to make DX'ing impossible in G-land, I'm just sitting at my AR88 with the Tx standing by, trying to get CR4AG through the QRM. What do I hear ? A GW3 calls him, doesn't get reply, so calls CQ on the frequency. A G3P — tunes exactly to the centre of the pile-up and starts 'CQ DX' (14 times CQ, once DX, twice his call, and the whole sequence repeated four times). He finally signs KN and ignores all info sent by the CR4AG-watchers. I'm not depreciating the work of G ops., many of whom I know as very good. But, G6QB, put yourself for awhile in this Mittel Europa and you will find that *both* sides aren't innocent; and don't forget that not only G's want to work DX. *P.S.* I am now hearing a G3K — who calls CQ with a nice T7 ! . . . maybe he's in Mittel Europa, some place." *Pheeor !*

Well, on the HF bands we hear less of the G operators than we do of those 1000 miles away — but it's not pleasant to learn that we, too, have our Klots. They should be the *first* to be dealt with, novices or old hands. Don't spare them if you hear them ! If as G's we affect to project an image, then our operating must be above reproach.

News from Overseas

VP8IB (Box 87, Port Stanley, Falklands) is G3PWR, now active on 14010 kc CW with 20 watts into a 50-ft. wire strung across the garden fence. Things might not look too good, he says, but he can work into the States almost

any evening around 2300. He would be delighted to raise a G or two and would also appreciate SWL reports.

VE2UQ (Quebec) wrote to SWL V. Lindgren (Hull), saying that his "QSL for Top Band concerned a pirate." VE2UQ has had several such cards, says the pirate also uses VE2UQ/2, but is on our side of the Atlantic.

G3IJU (formerly ZB1EB, VS1EB, 9M2EB) is stuck at El-Adem and unable to get any action on a licence for use during his two-year tour of duty there. He says there's no difficulty in Tripolitania, 5A3T . . . but there's no joy in Cyrenaica, 5A3C . . . although both are part of the Kingdom of Libya. As an enforced SWL — though we hope his patience will eventually be rewarded by a ticket, as he is a very keen HF-band operator, with lots of experience — he listens to G's on *Ten Metres*, telling each other that the band isn't open, while engaged in cross-town nattering. He says it *is* open very frequently, but there just isn't enough activity to indicate whether or not this is so. Moral — get cracking on Ten.

Not overseas yet, but due almost immediately in the Bahamas is G3TA (Iver Heath). He is with the "007 Unit" making the film of *Thunderball*, and has his B.2 with him, in hopes of handing out a few VP7 contacts. Look for him on CW, low end of 7 and 14 mc (although with great optimism he has taken the 3·5 mc coil as well!) Callsign, he hopes, will be VP7TA.

Direct from Ascension Island, and also from three separate home sources, we hear that there are now *fifteen* licensed amateurs there, mostly awaiting gear. Mainly, they seem to be W's, but ZD8TV is G3RPV of Honiton (a regular visitor, when at home, to mobile rallies, and so fairly well-known).

VS9SJF, fresh from his very successful operation on Socotra, is now back again in the U.K. No G call issued yet, but he can be reached, for QSL purposes, at Delamar, St. Hilary, Goldsithney, Penzance; cards for VS9SJF will be going out as soon as they arrive from the printers.

Not strictly overseas but definitely "on the seas" is G3PLQ (m.s. *Kumba*), who continues his intensive Top-Band listening from various positions off West Africa. His list of stations heard between Tilbury (February 11) and Lagos (March 3) is a small call book on its own! It includes not only G's and other Europeans, but also numerous VE's, W's (including W6), 9L1, VP2, VP3, ZB2 and a JA. John wonders who is now the leading G station in the DXCC chase on One-Sixty, and what the score is? He himself has heard 70 countries on the band.

TOP BAND LADDER

(G3S-- and G3T-- stations only)

(Starting Date, January 1st, 1965)

Station	Counties	Countries
G3SED	60	19
G3SWH	56	11
G3SJJ	54	8
G3SYS	47	9
G3TIK	45	12
G3TTK	45	9
G3TBJ	44	10
G3SVL	37	9
G3TON	37	8
G3TSS	33	7
G3SHY	33	6
G3SQX	24	6
G3SVW	6	3

Ten Metres

G3OAD (Dudley) says conditions are on the way up. During the weekend of March 6-7 ("a weekend of frenzied activity on Ten") he heard or worked 9J2, ZS, CX, ZE, 9L1, CR4, CR7, LU and numerous Europeans. He also passes on 9J2DT"s new score — 85 countries since last June, and hoping to make DXCC on Ten in the twelve-month period!

G2CDI (Stokenchurch) sent an interesting log which just missed last month's deadline. His DX contacts have included PX, 5X5, 7X2, 5H3 and most of those worked by G3OAD.

G3IDG (Basingstoke) confirms that March 7 was a good day, with several Africans logged between 1040 and 1110. On the other hand G3NOF (Yeovil) says he has listened *daily* but has not heard a *sound* on the band, which just shows how unlucky you can be by picking on the wrong times!

Ten-Metre Activity Test

All of this leads your conductor to suspect that we are now due for another **Ten-Metre Activity Sunday.** To give all overseas readers time to note this, it is being fixed for **May 23,** between the hours of 1000 and 1700 GMT. No formalities of any kind — just *use the band* on that day and report your results, to this feature, before June 11 — which means airmail for the chaps overseas. And dare one suggest that a little CW activity might liven things up? Enter **May 23** in your diary, or chalk it up on the wall.

Top Band DX

W1BB asks that it be made clear that the special IQSY effort is intended to go on right through the summer. It would be sad if 160m. went the way of Ten, with so many assuming that the band was closed for DX (and thereby keeping others off through sheer lack of activity). Here are some of the highlights from the latest W1BB reports:

The tests on January 3 and 17 were pretty good, although January 10, the "non-Test" morning, was best of all! The *CQ* Contest weekend (January 30-31) was good, but noticeably down on last year. During the daylight hours lots of 800-1000 mile contacts were made inside the States; G3PU was hearing W1BB at 0930, and worked VO1FB at 1950! VO1FB, by the way, points to the fact that daylight DX contacts have increased in a spectacular way this year. In other respects, though, it seems undoubted that the band has *not* been up to last year's standard.

9M4LP (Singapore) confirms this in a letter — he describes Top Band as "a big disappointment" and suggests that there is a time-lag between the sunspot cycle and the communications cycle. He says "any apparent improvement in Top Band this year was probably due to increased activity, sparked

off by the good conditions of last year." (He even found 80 and 40 metres very much down on the 1962-63 winter.)

On the last two Trans-Atlantic tests, poor conditions prevailed. February 7 was practically washed out on the other side by heavy QRN, and on February 21 the East Coast W's found European signals very poor but were hearing stations out West of them much better than usual. However, among those making Trans-Atlantic QSO's were HP1IE, HI8XAL and VP3CZ — so things were not *too* bad.

Saturation — When ?

G3JKV (East Grinstead), who has access to an up-to-date *Berne List,* has been good enough to send along an abstract of the occupancy of the 1800-2000 kc of our 160-metre band. Needless to say, it is calculated to frighten anyone off Top Band for good, and makes the note here (last month) concerning Coastal Stations every 7 kc read like the understatement of the age. The G3JKV list shows 114 fixed stations actually within the 200-kc band, to say nothing of channels allotted to ships and low-powered stations.

The Hi-Fix beacon frequencies are as follows: *Elbe,* 1826, 1829, 1832, 1896 and 1899 kc; *Hamburg* 1899 kc; *Manchester* (!) 1899·4 kc; *Dover* 1900·8 kc; *Liverpool* 1901 kc, and *Gothenburg* 1919·19 kc.

The Loran chains are centred on 1950, 1900 and 1950 kc, with the pulse spectrum extending (officially) for 25 kc on either side; the rattles around 1950 kc come from the Hebrides, Faeroes and Iceland . . . just the 5 megawatts peak pulse.

We were wrong about the American Loran — the one usually heard around 1950 kc is on the West Coast of Greenland, and the "DX" one (on the coast of the Gulf of Mexico) is centred on 1900 kc.

Final note — the carriers with very low-pitched modulation (actually two carriers beating) are a French navigational system. Like the Hi-Fix beacons, these are liable to transmit for a few weeks and then disappear.

G3JKV's list, as he says, only covers stations within a 500-mile radius; a world-wide list would be at least five times as long and the Japanese list alone is as long as the European ! (And hence the JA Top Band spot frequency of 1880 kc.)

After that little lot, one hardly likes to refer to amateur activity on the 160m. band except under the title of "No Hiding Place" or some-such. However, the amateur achievements speak for themselves and all undoubtedly go to prove something-or-other . . . either his "indomitable will to succeed" or his "blind, ignorant pig-headedness," according to your point of view. And, of course, what makes the band workable from our point of view is the fact that the commercial occupancy only becomes really evident after dark — and the long evenings are coming !

Thanks for further notes on Top-Band activity to G3TSS, G3SED, G3TIK, G3RFS, GM3IAA and SWL F. W. Parkhurst (Yeovil).

The Comeback

It was rather thought that G3SIL's letter (last month) about CW as a primitive means of communication might produce a violent reaction, but we didn't quite anticipate the furies that

This picture proves that there is a genuine (and active) station in the distant hill kingdom of Nepal — 9N1BG, in Dharan, operated by Bijaising Gurung, who learnt his radio with the famous Gurkha Signal Regt., commanded by Col. J. C. Clinch, 9M2ER. With 9N1BG here are Sgt. Copeland and Lieut. Kent, of Gurkha Signals. The QSL address is: Hq. British Gurkha L. of C., P.O. Jogbani, Dist. Purnea, Bihar, India.

have been unleashed. From the pile of foolscap and quarto devoted to tearing him apart there is space only for some short quotes, but we'll try to give everyone a word or two.

"I say to him—pursue your phone, and let others work the modes they choose to enjoy without having to put up with this kind of immature outburst" (*G3SED*) . . . " The CW boys are not trying to prove anything—but one thing they are *not* doing is filling the band even fuller with splash and duck noises . . . if he can't exist without his precious phone QSO's I suggest he might migrate to four metres, where his presence might even be welcomed" (*G3IDG*) . . . "Thought the OM was fooling until I saw it was the March, not April issue I was reading. Anyone has as much right to attempt a super-DX QSO on CW as G3SIL and I had the other night to attempt a 200-mile contact on phone. If all the CW chaps on the band at that time had been bashing out phone instead, I doubt if we would have made it" (*G3IGW*).

"Such profundity! Is this the voice of experience? He must have had his licence quite a few months now. One rather suspects that he is a member of the 'foot in mouth' brigade, whose followers can be heard living up to their title on all phone bands" (*G2VV*) . . . "The CW boys simply find a nice CW QSO with good ops. at both ends is far more satisfying than squawking into a mike, which can be done by anyone with enough sense to use a telephone" (*G3TYK*) . . . "From his comments it's pretty obvious that he's never even listened to CW QSO's" (*G3SWH*) . . . "I always thought the idea of CW was to make possible weak-signal contacts through heavy QRM—also to contact overseas stations who do not speak English well" (*G3TTK*) . . . "G3SIL says 'let the CW boys try the *far more difficult* task of working DX by phone' and thereby admits that CW is more efficient. Which, then, is the electric light and which the candle? And if CW users butcher the English language, why do the phone kings talk almost entirely in CW abbreviations and aberrations?" (*G3ING*).

Regretfully, we must leave it there . . . there are many more letters, but not one single supporter for G3SIL's point of view. Vitriolic argument gets one nowhere, but we *should* really like to see (and print) a cool-headed, reasoned and knowledgeable summary of the relative advantages and disadvantages of the two methods under varying conditions and circumstances.

TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
Phone and CW		
GM3KLA	98	98
G3REA	98	98
G3NPB	98	98
G2NJ	98	98
GM3IKD	97	98
G2CUZ	96	98
G3SED	81	91
G3NOW	76	82
G3RTU	67	67
G3PPE	62	74
G3OJE	58	68
G3SWH	52	72
G3IDG	52	57
G3SVL	47	55
G3SJJ	42	81
G3SHY	41	60
GW3TLW	41	55
GW3PMR	39	69
G3TMZ	37	43
G3RJB	34	37
G3SVW	33	61
G3SXW	32	45
G3TJD	29	37
G3SQX	23	58
G3ING	16	41
Phone only		
G3NPB	88	88
G3REA	56	67
G2NJ	54	54
G3MDW	43	62

(Failure to report for three months entails removal from this Table. New claims can be made at any time.)

The HF Bands

Not a great amount of exotic DX this month, but plenty of good, solid communication over long distances (which no longer means quite the same thing!) *Fifteen* is opening more and more often on the East-West path, and during contests (especially such as BERU) shows up the most interesting DX of all. *Twenty* just keeps rolling, and is now open quite late at night. (Just after this is written we go on to BST, which should mean that Twenty is usable after midnight.)

G2DC says the pre-breakfast period on Twenty is still disappointing—fewer VK/ZL signals and the Pacific islands very scarce. A CQ over the long path will sometimes bring back a host of JA's, but not much else. But afternoons are excellent for the Far East, the latest DX signal being 9M8EB with S9 SSB (1430). VK2EO says his son has had his home destroyed by the bush fires, and Dave himself is in a dangerous position still.

G3NOF found Twenty the best band, with conditions similar to last month. Good ones on SSB included FG7XL, FY7YL, HL9TM, KW6EJ, VU2NRA, XW8AL, YA3TNC, ZD8's and 4W1A.

GM3JDR (Golspie) has a new QTH, where he is at sea level (100 yards from the sea) and at present limited to a sloping dipole (35ft. one end, only 5ft. the other). He is amazed at the DX that is workable on this, on Twenty, and even managed to collect four new countries (CEØ, VU2NRA and VQ8AM on SSB, CR4 on CW). Other DX included HM, HS, TG9, VS9, YA, ZD5 and 8, 9M2 and 4, and many others.

G3MWV (Cromer) writes in after a change in QTH, which involved planning permission for a tower and so on. We are glad to note that the local council were "most helpful"—so he's now active with home-built SSB rig (240 watts p.e.p.), Drake 2B and a 14 mc Quad at 40 feet. This lot brought him plenty of DX on Twenty—more in a few weeks than from his former QTH in four years.

G2FUU (Waltham Abbey)

TEN-METRE ACTIVITY TABLE

(Starting Date: June 1st 1964)

Station	U.K. Counties Worked	Countries Worked
9J2DT	27	85
G2CDI	19	29
G3OAD	17	27
G3HCU	13	19
G2DC	2	14
G3IDG	4	12
G3EHL	8	9
G3SQX	2	2

reports AM contacts on Fifteen with CR7, 9G1, PJ2, 9J2, ZS8, VP8, PZ1, 5N2 and "loads of W's"—mostly in the afternoon periods. FR7ZD was also heard at 1600.

GW3AHN comments on the goodness of the Far East path on Twenty, and has also raised some Pacific stations on SSB, such as FK8AU, VK9JK and 9TG, KG6SB and KX6DR. From the Far East, VU2NRA, 9M8EB, CR9AK, HS1S, 9M2 and 4 and XW8AZ. On Fifteen, too, he raised FB8WW, 9M4LP, VS9MG and 9PGM, HK3AVK and sundry Africans.

G3RDC is now one of the operators of the club station G3SXN, at RAF Newton (Notts.). They have a Viceroy, KW-500, KW-77 and a 3-el. beam and have raised 87 countries in 32 Zones in a fairly short time. Many of the stations already mentioned have been worked.

The LF Bands

G2DC has been enjoying the excellent conditions on *Eighty*, and in the first leg of the ARRL Contest he worked 104 W's in all districts. He has also raised ZL1-4, VE1-4, 9M4LP and 6Y5XG—all with his base-loaded 44-ft. vertical. Forty, he reports, has been on the poor side with "very little apart from well-known DX stations." To work W's on Forty, Jack finds you have to start early (2100), as they are very difficult to raise after midnight, although they can be heard well (presumably local QRM trouble).

G3KMQ (Shaftesbury) favours Forty, where he put in some late nights and raised VP6BW, HK7BE, PY7BALØ, 6Y5XG, 9J2VB, 5N2AAF and plenty of VE and W. But he wonders how *anyone* copes with the "rabble from mid-Europe"—which he finds even worse than on Eighty.

General Chat

G3TPW (Oldham) reports for the very first time. His main interest is Top Band (especially in daylight). He comments that a lot of DX stations have such good CW signals that if they switched in the modulator their Phone should be really good. (Maybe some of them haven't got a modulator? We could name a few!)

G3TRO (Spalding) is another new recruit whose favourite band at present is Forty ("in spite of the racket"). He mentions that there are now six licences in the neighbourhood, plus two R.A.E. passes and a bunch of keen SWL's, so they are trying to form a club.

G3NWT comments on the fact that zero scores (in one column) are now being admitted to the Five-Band Table. A few years ago he failed to make it for this reason. (The set-up was changed so as not to deter newcomers from sending in their scores, even if they are not yet equipped for all bands.) He also remarks that of the 15 amateurs now active from ZD8-land the distribution is five on CW, 10 on SSB and *none* on AM. Small but progressive!

SWL M. J. Fisher (64 Caldene Avenue, Mytholmroyd, Halifax) has in his possession some 30 QSL's from W9WNV's DXpeditions to Cambodia and South Vietnam—all for SWL's. Those who are expecting these QSL's should send an s.a.e. to him.

G3RFS should by now be in Kingston, Jamaica for a long vacation, and hopes to operate thence as 6Y5FS. Look for him, Ten to One-Sixty, according to prevailing conditions.

9M4LP heard "some joker" signing TM5AA/Indonesia, on 14075 kc CW, 599. He wonders . . . He also comments on "a tremendous 10-metre opening" for about six hours on February 21, with VK's, 9J2 and ZC4 stronger than on Twenty or Fifteen. He worked OZ3Y and G3FPQ, and on the next day raised 5H3JJ at midnight.

GM3IAA worked G3OLE on Eighty and found that their last QSO, under the respective calls of VS1AA and VU2AE, was just 30 years ago!

DX Gossip

CR8AE is on AM Phone; FB8WW on 21210 kc Phone (1430); VK4TE (Willis Is.) on 14060 kc CW (0600); VP5SG (Turks Is.) on 14030 kc CW, 2330. (Tnx to *SWL A. D. Jones,* Chertsey).

Heard on 21 mc Phone—FH8CD, 5R8's, CR5SP, ZD8WR, FR7ZD, FB8WW and PJ2MI. Also (Sunday mornings) XW8, VS9 and VK1-6 (Tnx *SWL L. Margolis,* Ilford).

Coming shortly: Expedition to San Felix Is., brand new for DXCC, CEØXA will be activated by W4QVJ, W9EVI and W8FGX, April 20 for about seven days (Tnx *GW3AHN* and others).

G3SZC operated in 1951 signing VS9MA from the Sheikdom of Mukulla—now being plugged as a possible "new one" (Tnx *G3NOF*).

Currently or recently active have been VU2NRA (Andamans), sometimes with two operators simultaneously on the air, SSB and CW . . . Gus Browning has been signing AC8H from Bhutan, and hopes to be on from AC7 and AC9 before returning to AC3 . . . ZB2B, recently heard, appears to be a phoney—QSL's have been returned.

HZ3TYQ's projected expedition to the 8Z5 Neutral Zone has been abandoned—no transport . . . KB6EPN is the only active station on Canton Island (14300 kc SSB) . . . UA's ØEH, ØER, ØFM

Reporting the HF Bands

and UWØFL are all on Sakhalin Island (good for IOTA).

G3FPQ has worked VK3BM on Top Band, but this is only through hearsay—no direct news from him . . . New prefix for Cayman Is., ZF1, will come into force in April . . . PY7BAL/Ø is on Fernando de Noronha . . . A whole welter of YA stations congregate in the East Asia Net (14320 kc SSB at 1200) before QSY'ing to their individual frequencies.

CR4AJ causes pile-ups on 14250 kc SSB almost daily—also reported on 14112 kc . . . HKØQA is on San Andres Is. . . . ZL4JF still active from Campbell Is., 14245 kc SSB at 0800 . . . 9M4LX will be operating 9M6LX, last two weeks of March and also early April.

5N2AAF has been standing by every Sunday on 28100 and 28600 kc, listening on the hour (but due for U.K. leave shortly) . . . KH6EDY is active again from Kure Is., also KC6BU, every weekend, from Western Carolines.

VQ8AM, signing VQ8AMR from Rodriguez, made 2732 QSO's. A really interesting phenomenon, in this connection, is that some people claim to have received VQ8AMR QSL's before he himself received them from the printers. Please?

Though 9H1 has been breezed around as Malta's new prefix, they are still using ZB1 . . . and if 4S9 becomes the new one for the Maldives, it seems that the boys on Gan will continue to use VS9.

Sign-Off

All of which brings us to closing time, and the reminder that next month's deadline (thanks to the calendar and the inevitable postal disorders at the Easter weekend) must be **first post on Wednesday, April 14.** This still gives you plenty of time—so don't be a minute late or you will assuredly miss the boat for May.

Thanks, as always, to all our correspondents, who are now rallying round very nicely—but how about some more entries for the Five-Band Table and perhaps some of the others? Address everything for next month, as usual, to "Communication and DX News," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And *don't be late*—there's not latitude this time. Good Hunting, 73 and—BCNU.

Late Flash: G3PU (Weymouth) worked ZL3RB on Top Band AM Phone at 0630 on March 22; reports RS-35 in and RS-36 out, with QRN both ends. Congratulations — and G3PU now has 48C confirmed on 160 metres!

The honorary president for 1964 of the International Amateur Radio Club, based at Geneva, was HB9AEQ, here seen addressing a recent meeting. Others, left to right, are: Dr. R. L. Smith-Rose (who, since his retirement as Director of the Radio Research Station, now holds an I.T.U. appointment), then OK1FY and HB9LA with, at right, OK1WI, who is this year's president of the I.A.R.C.

LONDON SIDEBAND CONVENTION

As already announced, the London SSB convention, to be followed by a dinner and cabaret, is being held at Waldorf Hotel, Aldwych, London, W.C.2, on Saturday, May 29. We are informed that among those to be present will be John Gayer, HB9AEQ, past-president of the International Amateur Radio Club, Geneva, and a member of the I.T.U. organisation, also Stuart Meyer, W2GHK, president of the Hammarlund Manufacturing Co. of America. The exhibition, for which good trade support is promised, will open at the Waldorf at 3.30 p.m. and the festivities for the evening will start at 6.30 p.m. Tickets at 3 gns. each (dress informal) can be obtained from N. A. S. Fitch, G3FPK, *QTHR*.

MODULATED CALIBRATION OSCILLATOR

USING TWO TRANSISTORS

From Notes by **G2ATD**

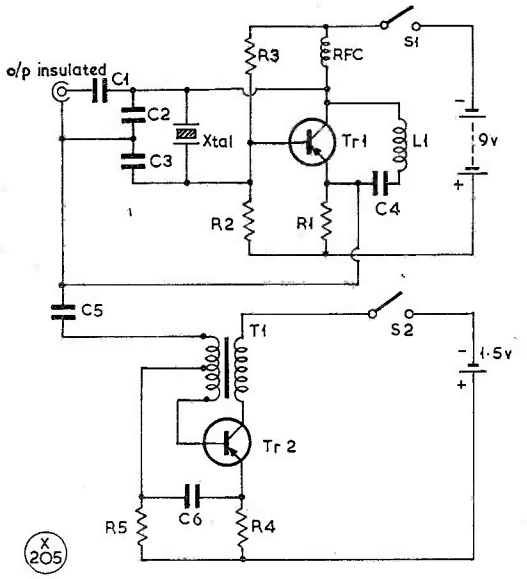
THE oscillator unit shown here will give 1-megacycle marker beats up to 30 mc and—to assist in identification at the higher frequencies—the note can be modulated by closing switch S2. The modulation frequency is about 1,000 cycles, and can be changed by altering the value of C5.

Coupling into the receiver is through the small capacity C1, *via* a coax socket, to the aerial terminal of the Rx. At the lower frequencies the beat will be very strong, and it may be that inductive coupling will be sufficient—but on the 15m. and 10m. bands at least, the direct connection will be necessary. While the unit is intended for band-edge marking, and to give calibration points through the whole tuning range on the HF bands, other crystal frequencies could be used, in which case L1 would have to be adjusted accordingly.

Construction can be on a small chassis, size 5½in. by 3½in. or thereabouts, which will provide enough space for everything, including the two batteries. Alternatively, the unit could be built right into the receiver.

Values are: C1, 20 $\mu\mu$F; C2, C3, 22 $\mu\mu$F, silver mica; C4, 250 $\mu\mu$F, s/m; C5, 0·1-0·5 μF, as required for modulation tone; C6, ·01 μF; R1, 15K; R2, 82K; R3, 39K; R4, 820 ohms; R5, 4·7K; RFC, 2·5 mH RF choke; T1, driver transformer, 3:1; Tr1, OC45; Tr2, OC81; Xtal, 1 mc bar; and coil L1, 82 turns 32g. enamelled wire pile-wound on ¼in. diameter former, for one megacycle.

If the modulator refuses to oscillate, reverse the connections on one side of the audio transformer. It should be added that various transistors have been tried, other than those specified, including the "red" and "white spot" variety, and all have functioned quite well.



The circuit discussed in the article, for band-edge marking and modulated to give a distinctive note.

MOBILE RALLY PROGRAMME

Rallies now scheduled just about fill the calendar for the season, and in general plans envisage not only talk-in facilities on Top Band and two metres, but also a variety of events intended to keep visitors interested.

For instance, for the big Midlands Rally at *Trentham Gardens,* near Stoke-on-Trent, on **Sunday, April 11,** there will be a large exhibition consisting of stands covering local Club activities, as well as trade interests; the Army and the R.A.F. will also have exhibits. The British Amateur Television Club will be laying on a live demonstration—the sort of show at which they are now adept—and there will be a model aircraft display. Trentham is always worth a visit for its own sake—there are delightful gardens and walks, full catering facilities (restaurant and cafeteria), and a number of "permanent family attractions." On the strictly radio /M side, there will be one main control station, signing G3GBU on 1920 kc, with four out-stations on other Top Band frequencies—G4QD (1880 kc). G3HVI (1900 kc), G3STM (1940 kc) and G3COY (1960 kc). These stations will search the whole of 160m. for incoming mobiles, who will thus not need to net, as operation can be cross-frequency. Similarly on two metres, the main control will be G3MAR on 145·3 mc, with out-stations G3SMD on 145·4 and G3LLJ/P on 145·8 mc. All talk-in stations are being supplied with AA road-maps to give reliable route assistance, and will be on the air from 10.0 a.m. until 2.30 p.m., re-opening at 6.0 p.m. to work mobiles on the return journey. It is also hoped to have a station on 80m. SSB working from Trentham. As can be realised, all this involves a good deal of organisation, the clubs involved being the Burslem Radio Society, the Midland Amateur Radio Society, the Stoke-on-Trent Amateur Radio Society, and the University of Keele Radio Society, backed up by cadets of 235 and 238 A.T.C. Squadrons, under F/O V. J. Reynolds, RAFVR(T), G3COY. All they need now is a fine, sunny afternoon—the support for the Trentham Mobile Rally on Sunday week, 11th, is already assured.

On Sunday next, 4th (assuming you get your copy in time), there is the RSGB event at the factory of Texas Instruments, Ltd., Bedford, for which talk-in

will be provided on both bands—beyond that, we have no details.

A.R.M.S. Rally

Looking a bit later on, to May 23, the Amateur Radio Mobile Society will be holding their sixth annual Rally to coincide with the open-day at R.A.F. Station, Croughton, Northants., at which a great crowd is expected—thus, in effect, the A.R.M.S. Rally will be just another of the public attractions ! Croughton, which is actually a U.S. Air Force Signals Base (and is R.A.F. only in the care-and-maintenance sense) exhibits a very large area of antennae of every description. If you take the A.43 Oxford-Brackley/Northampton, or the A.41 Aylesbury-Banbury, or the B.4031 Buckingham/Finmere to Aynho, you can hardly miss it. The main entrance is about one mile west of the A.43/B.4031 intersection—and a very nice part of the country it is on a fine afternoon. There will be talk-in on Top Band (G3NMS) and on two metres (G3NMR) and it is also hoped to have an international station signing GB3NMS on the DX bands, available for operation by licensed foreign amateurs (where reciprocity has been agreed), on the same lines as last year at Barford.

Those who may be starting out with a mobile rig, or being already /M are looking for ways to improve the operating efficiency of the gear, can be recommended to a handy little booklet, *Aids for the Mobile Operator*, which is informative, practical, down-to-earth and full of the gen. born of experience. It has been produced, as a private venture, by Bob Palmer, G5PP, well known for his long record of achievement in the /P and /M fields. The cost is but 2s. 9d. post free, and G5PP is *QTHR*.

The Calendar of Mobile Rally Events now reads as follows:

April 4 : RSGB National Rally, Texas Instruments Ltd., Bedford *(as last year).*

April 11 : Midland Amateur Societies annual event at Trentham Gardens, Stoke-on-Trent, Staffs.

May 2 : Medway A.R.T.S., at the works of British Uralite Ltd., Higham, near Rochester, Kent. Talk-in on 160m. by G2FJA/A; on 4m. by G3TVH/A; and on two metres by G3OHP/A. Details G3OHP, *QTHR*.

May 9 : Thanet Mobile Rally, Pegwell Bay, Ramsgate, Kent *(as last year).*

May 23 : A.R.M.S. Rally, R.A.F. (U.S.A.F.) Station, Croughton, Northants.

May 30 : Royal Naval A.R.S., Petersfield, Hants.

May 30 : Northern Ireland Mobile Rally, Butts Corner Airfield, Belfast.

June 6 : RSGB Rally, R.A.F. (U.S.A.F.) Station, Wethersfield, Essex.

June 7 : *(Whit Monday),* Saltash & District Amateur Radio Club Rally, at Calstock, near Callington, Cornwall. *(Details later.)*

June 20 : Hunstanton Rally, Norfolk *(as last year).*

June 26 : *(Saturday),* Loughton & District Radio Society Rally at Loughton Hall, Epping Forest.

July 11 : Tenth Anniversary Mobile Rally, Oxford, at the College of Technology.

July 11 : South Shields & District R.S., at Shields.

July 25 : Cornish A.R.C. Rally, Newquay, Cornwall *(as last year).*

August 15 : Derby & District A.R.S., at Derby *(as last year).*

August 30 : *(Bank Holiday),* Peterborough Rally.

September 12 : U.B.A. (Belgian) International Rally for which temporary licences for /M working will be issued to foreign visitors—general arrangements as last year. *(More details later.)*

September 12 : RSGB Rally, Woburn Abbey, Beds. *(as last year).*

September 26 : Harlow A.R.S., at Magdalen Laver, Essex.

* * *

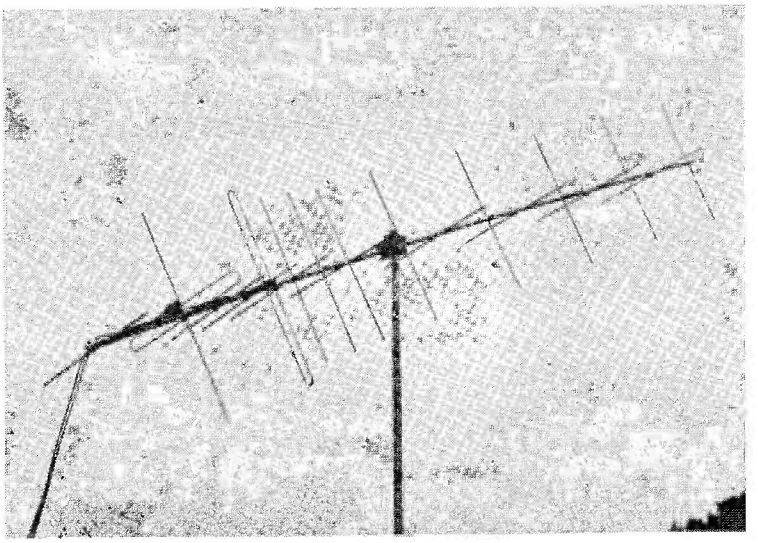
Those undertaking the responsibility for organising a Mobile Rally open to all comers, and wishing to have their plans given the necessary advance publicity, are reminded that for adequate coverage in SHORT WAVE MAGAZINE, we must have full details by *April 21* for May and early-June events; by *May 19* for late June and early July; and by *June 16* for the July issue. These are definite closing dates. We cannot undertake to print any information received after these dates for the issues mentioned.

And as a *Footnote:* Quite properly, much is being, and will be, made of the Tenth Anniversary Rally being laid on by the Oxford boys on July 11, to commemorate the first-ever Mobile Rally held in the U.K. This was fully reported in SHORT WAVE MAGAZINE for November 1955—years before many people got round to the significance of Mobile or A.R.M.S. was ever formed. As a matter of fact, one of the best Rallies held in those early days was at Overstone, Northampton, on April 8, 1956, when there were 45 /M's in the car park—*see* SHORT WAVE MAGAZINE, May 1956. It can fairly be said that /M working in the U.K. really started at about that time.

SMALL ADVERTISEMENT — REMARKABLE RESULT

A reader booked a Small Advertisement for this issue of the *Magazine* and then, a week or two later, wrote to cancel the insertion, as the equipment had in the meantime been sold. He remarked: " Such is the efficiency and pulling power of your advertising that I sold the gear before my advertisement had even appeared! " Well, that's what he said, and we have his letter to prove it!

While we do not, of course, claim results like this ourselves, what we do say is that if you have anything worth selling at a fair price; or there is something you want; or you would like to do an exchange, you cannot do better than use the Small Advertisement section of SHORT WAVE MAGAZINE. A glance through pp.120-128 of this issue will show literally hundreds of bargains, in radio amateur equipment of every sort and description.



The J-Beam 20-element crossed Yagi array ("Skybeam") described in the text. It consists of two 10-element long-Yagi units mounted at right angles on the same boom. Performance, and the method of switching, are discussed in the article — and see Fig. 1 and Fig. 2. It was with this array that, in June of last year, G2HCG worked KP4BPZ on two metres by moon reflection.

TWENTY-ELEMENT CROSSED YAGI ARRAY

THE J-BEAM "SKYBEAM" FOR CIRCULAR POLARISATION IN SPACE COMMUNICATION

THIS system consists of two 10-element Skybeam Yagis mounted at right angles on a common boom and spaced linearly a quarter-wave. The performance of each section is identical to a single 10-element Skybeam, as shown in Fig. 1.

Circular Polarisation is a necessity in most Space Communication projects whether use is made of Moon Reflection or a Satellite. Unfortunately the direction of rotation is seldom known and some means of switching polarisation at the operating position is essential. Helix antennae are not amenable to switching, but horizontal and vertical Yagis can be mounted on the same boom to produce circular polarisation, the direction of which is controllable by varying the phase between the two feeders. Normally the two Yagis are mounted as close together as possible on the common boom and circular polarisation is achieved by quadrature feed, *i.e.*, 90° phase shift, necessitating the length of one feeder being a quarter-wave different from that of the other. Direction of polarisation is then controllable by switching the quarter-wave into

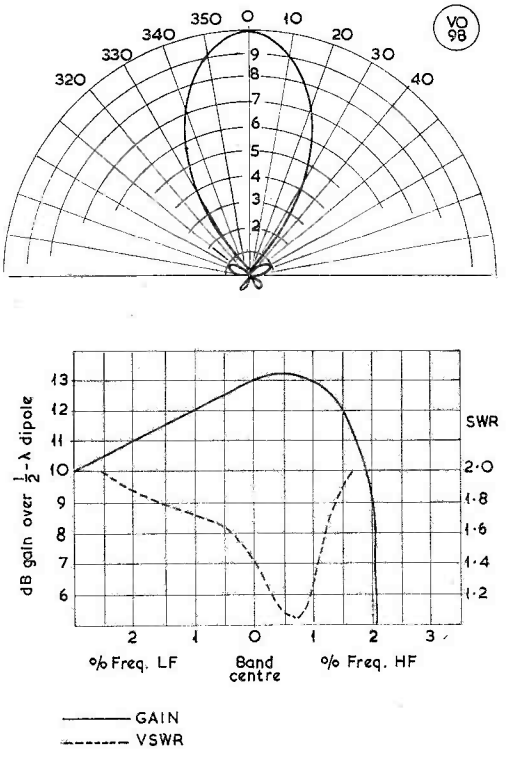


Fig. 1. The horizontal polar diagram and gain/SWR curves for a standard 2m. 10-element Yagi "Skybeam" as manufactured by J-Beam Aerials, Ltd., Northampton. These figures are taken from their Technical Data Manual.

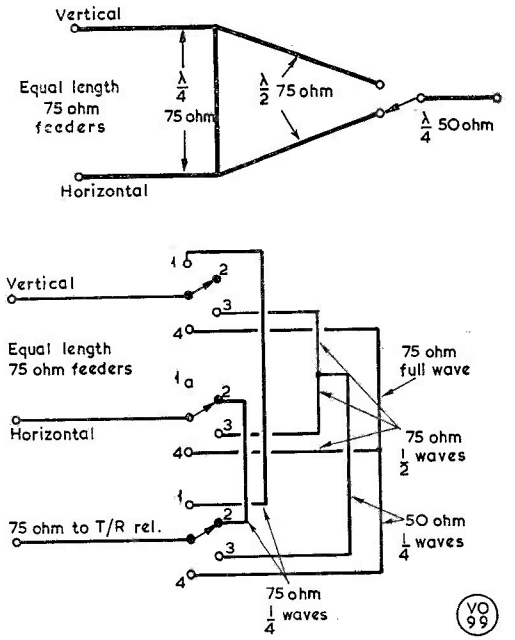


Fig. 2. Switching for reversing polarisation using a standard coax change-over relay (above), in which correct matching of the two sections is ensured by the quarter-wave of 50-ohm cable in the main feeder. Below is a more complicated system, by which the vertical and horizontal sections can be used individually, viz., posn. 1, vertical; posn. 2, horizontal; posn. 3, clockwise; and posn. 4, anti-clockwise.

either feeder. Unfortunately, aerial matching can never be perfect and this quarter-wave accentuates the effect of any mismatch, resulting in severely oval polarisation due to power differences in the two Yagis. This problem may conveniently be overcome by spacing the Yagis a quarter-wavelength on the common boom to give an automatic quadrature feed when the antennae are fed in phase. Direction of polarisation is then reversed by a 180° phase shift *i.e.*, switching a half-wave into either feeder. This method is used exclusively in the J-Beam system and ensures true circularity of polarisation. The switching is shown in Fig. 2.

RECIPROCAL LICENSING AGREED

We are informed that the G.P.O. has now accepted the principle of reciprocal licensing with foreign (as distinct from Colonial and Commonwealth) administrations, where the foreign authority concerned also extends the same facility to U.K. licensed amateurs. That is to say, it is strictly a *quid pro quo* arrangement. Since the U.S. Government is also making the same concession, it means that, as a start, W/K's in this country can now obtain a G licence, and G's staying in America can likewise obtain a local W/K permit. Of course, full reciprocity has always existed between Britain and her Colonies and Commonwealth, and there have also been special arrangements in respect of U.K. amateurs wishing to operate from West Germany. The new moves are very much in the right direction. In terms of actual numbers there will not be a great many who will qualify. The number of U.S. amateurs in this country — almost entirely Forces personnel on comparatively short postings — has been variously estimated at from 100 to 300. But probably nobody really knows.

MORSE PRACTICE NOTE

We are asked to remind SWL's and others who may be interested that an R.N.R. station signing MFU transmits practice Morse on 3640 kc during 11.00-11.30 clock-time every Sunday morning. This station is located at Norwich, and reports would be appreciated by: J. F. Cooper, 29 Pembroke Close, Ipswich, Suffolk.

SPECIALLY ON THE AIR

The season of the year is now coming upon us when AT-stations appear on the air either to show Amateur Radio to the public or for some other special purpose. As has been usual with us for many years now—ever since this little feature was started under the original MAGAZINE heading of "Special Activity Stations"—we are glad to have details, for appearance in this space, covering such activities.

All we require is: Callsign, Date, Bands to be worked, Objects or Organisation supported, and QSL address, together with such other details as may be of interest.

To ensure adequate advance publicity, let us have your details, set out in the form shown here, by *April 20* for the May issue, and not later than *May 19* for appearance in June. We cannot undertake to publish, in the relevant issues, any information received after these dates.

GB3ASE, April 12-15: Organised by the Essex branch of the Association for Science Education, from the mid-Essex Technical College, Chelmsford. All-band operation. QSL address: J. F. Turner, G3AYZ, Tiptree County Sec. Sch., Maypole Road, Tiptree, Chelmsford, Essex.

GB3RRC, April 15-17: In connection with the Hobbies Exhibition being promoted by the Rotary Club of Ross-on-Wye. Station provided by Hereford county amateurs, and operating all bands 10-160m., on CW/AM/SSB. QSL address: P. W. F. Jones, G3ESY, 94 Holme Lacy Road, Hereford.

It could well be that in your neighbourhood there is some organisation that would be glad to have your co-operation to make their event a success. To the general public, there are few experiences more interesting than to hear a genuine QSO by Amateur Radio—even if it is only on Top Band with someone in the next town.

NEW CLUB FORMATION

We are able to say that an Amateur Radio club is proposed for the Spalding, Lincs., district — all who may be interested are asked to get in touch with: D. Hoult, G4OO, Chespool House, Gosberton, Risegate, Near Spalding, Lincs. *(Tel: Risegate 382.)*

OSCAR III — March 1965

RESULTS, OBSERVATIONS AND COMMENTS

From Notes by G3HRH

DURING the past month, since the launching of *Oscar III* on March 9, all available on-the-air time at G3HRH (Welwyn, Herts.) has been spent on investigating its possibilities.

Following is a summary of the passes observed, and the results they gave:

Observed Passes	*Stations Identified*	*Observed Passes*	*Stations Identified*
23	*nil*	148	DL3YBA, G6AG, EA4AO
24	*nil*	155	G2MV, HB9RG
44	DL3YBA	156	*nil*
50	SM7OSC	162	G3LTF, ON4FG, EA4AO
51	DL3YBA	168	G6AG, HB9RG, DJ4AU, DL3YBA
52	*nil*	169	G3MED, HB9RG, G6AG, OZ9?
58	HB9RG, G6AG	175	*nil*
64	*nil*	182	OH2RK
65	G6AG, ON4FG		
72	SM7OSC, HB9RG, DL3YBA		
141	*nil*		
142	G3SHK, G2MV, G6AG, G3JEQ		

The telemetry signal on 145·85 mc was heard on every pass listed.

Signals from G3HRH were heard: On *Pass 72*, by G2UN, G3GRA, DL3YBA (?); on *Pass 142* by G3SHK; and on *Pass 169* by G6RH.

Two-way contacts by G3HRH were made, on *Pass 72*, with DL3YBA and though this was not solid, it looked like 339 both ways. On *Pass 142*, G3SHK was worked for a full QSO, 339/449.

Comments and Observations

The near-overhead Pass 142 was the best heard, which is surprising because G3HRH is not using a tiltable array, only the normal beam, 8/8/8/8, which has a very narrow vertical angle. This proved to be a limitation on earlier overhead passes.

A number of stations seemed to be calling as soon as they heard the telemetry signals, with long CQ's and short listening time—also the pattern was wrong, with a lot of CQ's and few callsigns. The only way to make a QSO is by using high-speed CW and calling *e.g.* "CQ de G3HRH," repetitively, making as many callsigns as CQ's. Because of Doppler shift and random fading it is almost impossible to resolve SSB signals fast enough, and they only serve to create QRM. If we all stick to CW there is a chance, but even the CW should be used intelligently!

The operating set-up at G3HRH involves three receivers, all fed from the same converter. One is tuned to the telemetry signal on 145·85 mc; one to the *sending band* (monitored by a local SWL) and the third used to listen on the receiving band. This has proved very useful in knowing who is actually transmitting and when the sending band is quiet (which is when to send CQ!). The general level of activity was quite high on each pass, and it may be that this caused the AGC of the translator to act, and so to limit the outcoming signals to low levels. Some stations just never appreciate the physics of the whole process, and may have degraded the performance of the translator.

It is now clear that the following facts apply: (1) The tracking beacon on 145·95 mc was never audible, (2) The telemetry signal on 145·85 mc functioned well, and served as a tracking and timing signal, (3) Something went amiss with the translator section. There seemed to be a bias in favour of stations sending at the high end of the 144·1 mc band, therefore being heard at the low end of the 145·9 mc area. The translated noise was quite evident, although it had a peculiar "saw-tooth" quality, also noticeable on received signals. The overall gain of the system was much lower than we had been led to expect—the loudest received signals were only as strong as the telemetry on peaks. Compare this with the reported 25 mW of the "hi-hi" of the telemetry signal against the p.e.p. of one watt for the translator. This is also borne out by the fact that the only consistently heard stations were those known to be using high power and high-gain aerials, in some cases with circular polarisation.

A great many theories have been thrown about the two-metre band as to the reasons for these aberrations, but most of them do not fit all the facts. The only one tenable is that advanced by G3BA, who suggests that on ejection from the parent body, the tracker beacon aerial was either broken off or failed to come out, and likewise the *receiver* aerial was partially damaged, greatly to reduce its effectiveness—hence, only the strong got through. It will be interesting to find out, in due course, whether this is a reasonable explanation or whether there was something else to be considered. Also noticeable was the random deep and rapid fading on the received signals, presumed to be a function of the package tumbling in space on its orbit. This would give a degree of shielding of the translator sending aerial, together with an "end-on" effect when actually pointing towards Earth. This observation is borne out by the fact that the *maxima* of telemetry and translated signals did not coincide at all times; of course, their respective monopole aerials were at right angles to one another on the package.

Conclusions

The experiment was quite successful although it would seem that technical faults limited its use. Congratulations to G2AOX for very fast and remarkably accurate predictions, made available to all on two metres as soon as possible.

Basic rules for the best use of a thing like *Oscar III* can now be seen to be: (1) High power, and high speed CW, (2) No phone of any sort, (3) Restricted short periods of sending, with plenty of callsigns, (4) Intelligent timing of calls—it was no use calling with everyone else, because there was no one to listen!

The whole exercise has been remarkably interesting to follow and practice, but in terms of actual two-way use of the translator for long-haul DX, can perhaps be summed up as "so very nearly a success but not quite."

VHF BANDS

A. J. DEVON

WELL, as you might expect, this piece is being started with your A.J.D. just about knee-deep in bits of paper headed "Oscar." The bird took flight at 1830z on March 9, with an orbital period of 103·5 minutes, an inclination of 70° to the equator and a height of 575 miles—and for these details we are indebted to G2AOX (Hendon), who has been working tirelessly on the *Oscar III* project on the U.K. side.

His figures give a maximum point-to-point communication distance of about 3,200 miles, bringing the eastern seaboard of the United States within U.K. range when the satellite is in the right position over the Atlantic—which, of course, would happen periodically. At our latitude, the maximum "longitudinal range" at which it could be used would be between about 46° E. and 46° W. —though it appears probable that ranges like this were never, in fact, achieved, in the sense of producing two-way QSO's at maximum distance.

As the launch was from California in a south-easterly direction, so far as we on this side are concerned it made all day-time passes south-bound and the late-night ones north-bound. (You can work this out for yourself by performing the classic experiment of rotating a globe with your finger in the orbit, at the right start time and with the correct relative speeds and inclination.) The Project Oscar boys give the expected working life as about one month. This means that the return channel may be dead by the end of next week, though it is thought, on present performance, that the "hi's" may chirp on for a while longer.

The buzz that *Oscar III* was up got round pretty quickly and thereafter—on each pass when the telemetry signal on 145·85 mc (characteristic *hi hi*——) could be heard over the U.K. or Europe—the LF end of the two-metre band burst into furious activity. Many called, but few got a repeat, and fewer still a QSO.

However, a great deal was achieved, as the article by G3HRH on p.109 and the log-record opposite from G3LTF show. It is probable that, between them, these two items tell the essence of the story on the European side—though, of course, there is a great deal of individual detail yet to be filled in, and it will be a long time before the *Oscar III* results can be fully evaluated on a world-wide basis.

Naturally, also, we have a lot of information yet to come, as many people who would normally have written in with their own loggings have been too busy to get round to the paper work—and no doubt they are still at it while this is being written.

So far as our information goes, in addition to the G3HRH /G3LTF reports, we have it that G6AG worked HB9RG on the midnight pass, March 14/15, and also had several abortive contacts, or half-QSO's, with EU's—there is also the possibility that he and GM2FHH were heard in the W2 area. There are some reports of W/K's having been received over here—obviously quite possible, as proved by the very fine log turned in by G3LTF—but identifications do not seem very certain. In addition to DL3YBA, HB9RG and SM7OSC—who evidently kept with it all through—a very interesting station heard consistently, and reported by several G's, was EA4AO; as yet we do not know what Martin-Cordova achieved in the way of personal results, but

OSCAR III

Signals logged by G3LTF, Galleywood, Essex

Pass No.	Station
17	SM6CSO, ON4TO, HB9RG, SM7CH (?)
18	DL3YBA, HB9RG, SM6CSO
19	DL3YBA, HB9RG, *SSB stn.*
30	DL3YBA, HB9RG
31	G3BA/HB9RG, SM7OSC, SM6??, SM7ZN
32	DJ3ENA, HB9RG
33	K2IEJ, SM7OSC
44	DL3YBA, ON4FG
45	DL3YBA
47	G6AG, HB9RG, DL3YBA, W3BYF, K2GUG
48	SM5OSC, SM7OSC, HB9RG
50	HB9RG, SM7OSC
51	DL3YBA, SM7OSC
52	K2GUG
58	DJ3ENA, G6AG, HB9RG, OZ9AC
59	HB9RG, ON4FG
61	DJ3ENA, G6AG, HB9RG, K2IEJ, K4QIF, W3BYF
64	SM7OSC
65	DL3YBA, EA4AO, G6AG, ON4FG
72	DL3YBA, HB9RG, SM7OSC
73	DL3YBA, G6AG, HB9RG
74	DL3YBA, HB9RG, SM6CSO
77	*Nil*
85	DL3YBA
86	DL3YBA, EA4AO, HB9RG, HG9WB
88	*Nil*
91	EA4AO, UA??
99	G6AG, SM7OSC, *SSB stn.*
100	DJ3EN, DL3YBA, G6AG, G6OX, OH2??, OZ9AC, SM5OSC
101	DJ3EN, DJ4ZC (*SSB*), SM5K?, SM7OSC
102	DL3YBA, G6AG, W1BU, W1HDQ, W2AZL, K2GUG
113	*Rx fault*
114	DL3YBA, DL6AB, DL9GU, G3EDD, SM6CSO
116	DJ3EN, DL3YBA, EA4AO, SM7OSC, W1BU, W2AZL, K2GUG, W3BYF
119	DL6EZA, DL6TU, DL9GU

Signals from G3LTF were heard: On Pass No. 18, by G3SHZ, HB9RG; on Pass No. 31, by G3EIX, G6OX; on Pass No. 33, by W1BU; on Pass No. 50, by SM7OSC; on Pass No. 77, by SM7OSC; on Pass No. 113, by G2WJ.

G3LTF worked, on Pass No. 72, SM7OSC; on Pass No. 74, HB9RG; and on Pass No. 114, SM6CSO.

no doubt that will be coming through in due course.

There was a good deal of inter-G reception, and a few QSO's, though obviously what most people were after was the DX. There was also much tape-recording going on, for dissection at leisure, and here again more facts should emerge when there has been time to get down to it.

As regards antennae, a variety were in use, apart from the usual beams. G3CQE (Luton) had a tiltable array, and Bill heard himself being called on one of the earlier passes. G3LTF used an 11-ele long-Yagi and, for the nearer passes, an 8-turn helix 13ft. long backed by a ground-plane 6ft. square, which gave very good results (well, you can see that from his log!). It was carefully matched through a quarter-wave transformer and steered by what Peter calls the "armatory method."

For the record, it is perhaps just worth mentioning that A.J.D. relied on a J-Beam "Turnstile" (which consists of two pairs of crossed dipoles) and the results it produced exactly bore out the forecast made by G2HCG in this space last month. It gave almost equal reception from any direction on all orbits that came within range (and the last one heard by A.J.D. was No. 176 at 1003z on March 22, when *Oscar III* was away out at about 40° W.). So long as the "hi's" could be read through or above the noise level, any signals there were could be copied at the same sort of level on the return-channel. In this connection, it was interesting to hear that G3GHI was also getting very satisfactory results with crossed dipoles.

On this Pass No. 176, it was hoped that some W's might be audible, as position and timing were right for activity from the other side. All your A.J.D. heard was the unresolvable buzz of an SSB station and—somebody just sending V's(!). Never mind, it takes all sorts . . .

Back to Earth

We have to remember that not everybody was able to use *Oscar III*, or even to try it—if only for the reason that they could not trust themselves on the key! (It should have been mentioned, earlier on here, that everything happening in the *Oscar III* operations that mattered was on CW.)

Looking now at some of the other goings-on during the period, we had the RSGB's two-metre contest over the weekend March 6/7, for which conditions could only be described as mediocre. For those taking it seriously, it amounted to "hard work and keeping the beam turning" (*pace* G2AUD). This meant that the scores—in the sense of stations-worked—were being made by those having what might be called "a large fall-out area." In other words, either with exceptionally favourable locations, *e.g.* G2JF, or in districts well populated VHF-wise, taking G3OXD/A near Dudley, Staffs., as the example; he had 163S worked by closing time. G2JF had no less than 140 stations accounted for by noon on the Sunday. On the Continent, F9NJ was in the 90's by midnight of March 6/7. GC2FZC was there, available, and making QSO's that would add considerably to the score of any mainland station. From his own rough calculations, your A.J.D. would tip G2JF as the winner, once again.

Meetings and Conventions

On VHF, we are very convention-minded—VHF people are as keen to get together for a dinner-meeting as others are for any mobile rally. There are three big events now slated: First, the London affair on April 10, at the Kingsley Hotel, Bloomsbury Way, W.C.1, opening at 11.0 a.m. and finishing with a dinner. Though it is probable that by now the evening is fully booked, try G3GMY, *QTHR*, with your remittance for 30s., or 4s. 6d. if you want to attend the convention only, covering a trade exhibition, a lecture session and the opportunity to meet VHF types from all over the U.K.

For some years now, the GM's have run a very successful annual VHF convention. This time it is to be on Saturday, May 8, at the City Hotel, Dunfermline, with an equipment display, talks on VHF subjects, a dinner and a prize raffle. The cost is 25s. for the convention-and-dinner (6s. convention only), and bookings can be made with A. Lawrence, GM3IQL, 40 Blake Street, Dunfermline. As

THREE-BAND ANNUAL VHF TABLE

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	TOTAL pts.
G3EDD	5	1	52	9	17	2	86
G3BNL	17	2	32	9	16	2	78
G3HRH	12	1	45	8	5	1	72
G3OWA	29	4	31	5	—	—	69
G2BJY	25	2	34	5	—	—	66
G2AXI	19	3	35	7	—	—	64
G5UM	16	2	27	3	12	3	63
G3FIJ	12	2	27	3	6	1	51
G2CIW	—	—	12	3	24	7	46
G3LAS	—	—	34	8	—	—	42
G3HWR	14	3	6	1	7	1	32
G5FK	12	1	14	1	3	1	32
G3EKP	11	4	9	3	3	1	31
G2DHV	6	1	11	1	1	1	21

Scores are since September 1st, 1964, and will accrue until August 31st this year. Position is shown by last-column total, as aggregate of all scores. Own county and country score as one each. Entries may be made for a single band, any two, or all three. Claims should be sent in as often as possible to keep the table up-to-date. New entries can be made at any time.

usual, they hope to see good representation from south of that line of broken hill-country that makes such a difference to tropo. conditions between GM and the rest of the U.K. And, remember, to get to Scotland, travel can be quick, easy and comfortable if you use public transport, and there is no need to renew your passport!

Then, a bit later on, there is to be another Big Do in the way of a VHF Convention in Manchester, as in previous years. This is to be at the Grosvenor Hotel, Deansgate, on September 18. Always a well-organised event drawing a large attendance from all over the country, a good programme is being arranged, with Geoff Barnes, G3AOS *(QTHR)* responsible for bookings, information and reservations overnight at the Grosvenor.

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1964

Starting Figure, 14

From Home QTH only

Worked	Station
52	G3EDD, G3SAR
45	G3HRH
38	G3CO
37	G3AHB
36	G3FNM
35	G2AXI
34	G2BJY, G3GWL, G3TNO
32	G3LAS, G3PSL, G3TLB
30	G3KWH
29	G2CDX, G3PTM, G4LU
28	G3JHM/A
27	G3FIJ
26	G5UM
23	G3THC
22	G3SML
21	G2BDX, G3TKQ, G8VN
20	G3KQF
19	G3IOE
17	G3CKQ
14	G5FK, GI3SLI, GW3CBY

This annual Counties Worked Table will run till August 31, 1965. All two-metre operators who work 14 or more Counties on the band are eligible for entry. QSL cards or other proofs are not required. After the first 14 worked, simply claim from time to time with counties as they accrue, giving callsign and date for the county worked. To keep the Table up-to-date, claims should be made at frequent intervals. Operators new to VHF are particularly invited to join Annual Counties.

Expedition Arrangements

If on VHF we like conventions, we are hardly less interested in expeditions, particularly if they involve GDX or rare counties.

On Easter Sunday, April 18, the Ainsdale, Lancs., group will be taking G2DQX on four metres, and G2CUZ on two metres, into Westmorland for the day, with four operators and gear specially constructed for the event. An appropriate QSL card is being issued by the Club, and G2CUZ is *QTHR* for skeds or any further information.

Last year, the Midlands Contest Club took a station to the summit of Snowdon, and did very well with the GDX. This season they are back on the same ploy, and will be signing GW3RUF/P during the weekend May 1 1300z to May 3 0900z. Though this expedition is mainly in connection with the two-metre /P contest being held over the same period, they will also be on 70·28 mc in the 4-metre band, for which skeds can be fixed through G3KXA *(QTHR)*.

The GB2GC group, out of London, to be on Alderney, C.I., over August 17 to September 7, with gear for all four VHF bands 4 metres to 23 centimetres, had a dummy run during the weekend Feb. 20/21 to check on their arrangements and to test the two-metre path to the mainland under winter conditions. Using an antenna system that can only be described as "somewhat primitive" (a hand-held indoor 4-ele flat top at about sea-level) they worked nine G's under distinctly poor conditions, with G6AG as about their best DX from Alderney. This preliminary skirmish augurs well for their more serious and protracted all-band attempt during the three weeks from August 17, with a team of eight operators, including none-other-than G3HBW —needless to say, Arnold will be in charge of the 23 cm. machinery. This keen and energetic group, who have worked hard on the VHF DX-pedition front, would like to get skeds fixed for all four bands as soon as possible. The QTH for arrangements is: G3SHZ, 19 Dorset Road, Harrow, Middx.

Rest of The News

With a heavy mail and large calls on space, we now look quickly at another 30 or so individual reports. Where these involve just claims for the tables, they have been taken in—either appearing here, or to appear next time we can get the appropriate table out.

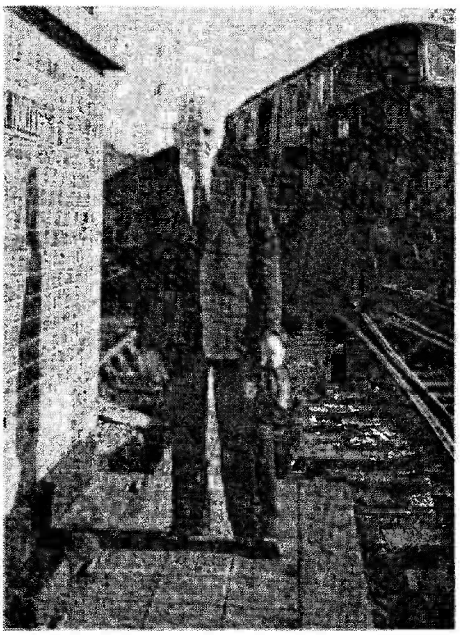
We welcome G8AEJ (London, S.E.20) who runs what he calls "modest home-brew equipment" on the 430 mc band, to be boosted, on the Tx side, with a QQV03-20A in the PA; his beam is a slot-fed 8/8 and he co-operates with G8AAA (Beckenham) in the investigation of fully-transistorised gear for 70 cm.

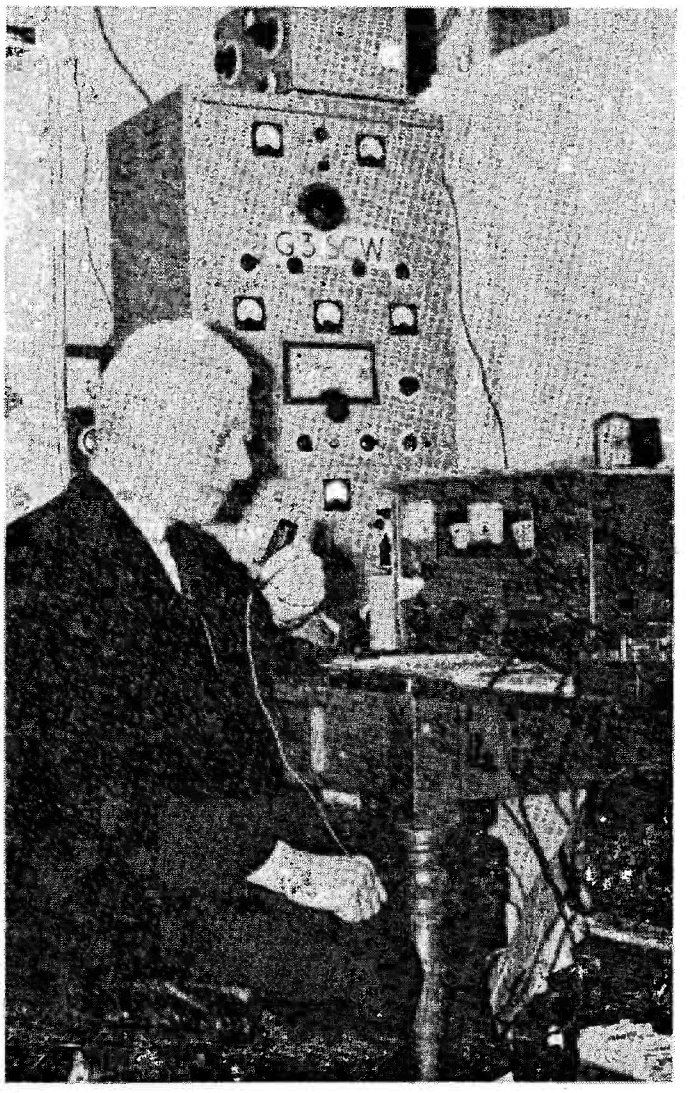
G3RTF (West Mersea, Essex) has been active on two metres for some time and now has 10C for Countries Worked. His PA is a QQV06-40A taking 100w. and the beam is a 6-over-6 at 40ft.; he has nuvistor converters for two and four metres and hopes to join in on 4m. shortly, with a 50w. Tx and a 4-ele Yagi at 35ft.

And now, with people screaming down the landline for *The Copy* and the car waiting for the express post, your A.J.D. can only name the following, with his thanks for their reports, in the hope that they will write again when once more we are on even keel: G3TA (Iver Heath, Bucks.), G3SKR (Wembley), G3EKP (Belthorn, Lancs.), G3IGW (Halifax), G3FYR (Petts Wood, Kent), G3TLB (Tunbridge Wells), G2BJY (Walsall, Staffs.), G2CIW (Birmingham), G3OWA (Old Coulsdon, Sy.), G3LAS (Berkhamsted), G3THC (Wolverton, Bucks.), G3DNR (Broadstairs, Kent), G3SML (Earl Shilton, Leics.), G8VN (Leicester), G3BA (Sutton Coldfield), and G3EDD (Cambridge).

Come in Again—

If you would, by **April 21,** for the May issue. This will be after Easter, during which you must go carefully—and by then all sorts of interesting things could have happened in the VHF way. Whatever you know, send it to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. *73 de A.J.D.*





THE OTHER MAN'S STATION

G3SCW

THIS could be called "The Man's Other Station," because Ron Hooper, G3SCW, is station-master at Tavistock North, in the Western Region of British Rail, and hence his full QTH is: Station-Master's House, Tavistock North Station, Tavistock, Devon. We also know him as the busy hon. secretary of the very active Plymouth Radio Club.

Starting as an SWL 'way back in 1925, and gaining his licence in 1963, G3SCW now runs a Tiger 200HF Tx, mainly on 80m. phone, but with some interest in 20m. For Top Band, much used to keep in touch with the locals, he has a Tiger Tiglet. The main Rx is an HQ-170A, with a 4-metre converter, and a BC-221 as the frequency meter.

Aerials are a bit of a problem for, although he has the space it is hemmed in by telegraph, telephone and power-line overheads, and is a very noisy location for reception—not only electrically, but also in terms of phons, with trains thundering through, a few feet away across the platform. The present aerial system consists of dipoles for each band 20, 80 and 160 metres (the latter is a genuine half-wave, with 132ft. in each leg) all fed at the centre with the same coax line, coupled through a Z-match unit.

His railway duties and his work for the Club keep G3SCW too busy for any sustained constructional effort, so he uses any available time to get on the air. For him, interesting contacts have been with G3NEA, who is station-master at Bristol (Temple Meads), and with GW3OIM, who is at Holyhead. G3SCW thinks there must be many more of his B.R. colleagues who are also licensed amateurs, and naturally would like to get in touch.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for Next Issue: Monday, April, 12)

(Address all reports for this feature to "Club Secretary")

WITH upwards of 150 active clubs in this country, the would-be transmitting amateur has a far easier time of it than he ever did in the "good old days." In point of fact there are so many R.A.E. courses and Morse classes going on all the time that one sometimes wonders why a thousand or more new stations don't take the air after every exam!

The point is that it now seems exceptional for anyone to appear with a brand-new callsign *without* having been through some sort of processing at a local club. The lone wolf is a rarity.

Contrast this with the earlier days, when an average SWL had to find out for himself what went on; where the bands were, how one went about applying for a licence; where one could get the gear and the designs for equipment. As for actually *meeting* someone with a transmitter—that was just a remote possibility.

Nowadays an SWL who joins a local club finds himself surrounded by the very locals that may have caused his initial interest in the subject; and since Amateur Radio is a natural leveller, he soon finds out that all kinds of people aspire to becoming users of key or microphone and that all (or shall we say the vast majority of them) are willing to be friendly and helpful.

Truly one wonders how anyone ever made progress in the days before the club movement became so flourishing. And, especially, one wonders why piracy of any kind now exists, when it is such a straightforward business to get down to it and to qualify for a licence.

There is a reverse side to this, too . . . those clubs who are fortunate enough to number some keen youngsters among their members are undoubtedly those that flourish. The others—gatherings of older and more experienced types who lose interest completely from time to time, and can't be bothered to turn out to meetings, invariably go the other way and eventually disappear from our lists.

ACTIVITY REPORTS

Cray Valley (*QUA*, March) will have held their AGM on the day previous to publication (and we hope it was successful). Next meeting is on May 6, to hear G3MQT on Workshop Practice. **Loughton** are getting organised for their Mobile Rally on June 26, to be held at Loughton Hall—some 12 miles N.E. of London in the Epping Forest area. There will be talk-in stations on Two and One-Sixty, and a comprehensive display of equipment on show.

Maidstone YMCA, continuing their weekly meetings, offer the following: April 7, Tool Maintenance; April 14 and 21, R.A.E. and Morse Class (G3ORP and G3ORH); April 28, NFD Paper-work (G3LXO). **Sheffield** also hold regular weekly meetings, and their April programme (not to hand in detail) includes the AGM on the 9th, at the Clubroom, 8 Sandbeck Place, Sheffield, 11.

Mid-Warwickshire have only one meeting during the month—on the 5th, when the subject will be Valve Performance (Part IV of Radio Theory). On May 3 there will be a talk on SSB Reception, and on the 17th a lecture on Aerials by J-Beams Ltd.

Lothians will have a lecture on Transistors (GM3SBC) on the 8th and a Surplus Sale on the 22nd—both at the YMCA, South St. Andrew Street, Edinburgh, 7.30 p.m. A recent meeting of unusual interest was a demonstration of 3-cm. (10,000 mc) equipment by GM3NZI and 3RVL. **Leicester** meet on Sundays at 10.30 a.m., and Monday at 7.30 p.m. An R.A.E. course for SWL's is under way, and Slow Morse is transmitted on Sundays. Anyone interested in any aspect of radio is invited to attend a meeting or to get in touch with the secretary. Club premises are at Old Hall Farm, Braunstone Lane.

Burslem will be on the air looking out for mobiles entering the district for the Trentham Gardens Rally on April 11. On Top Band they will have G3HVI (South), G3SAJ (East), G3COY (West) and G4QD (North), and tape recordings taken of mobiles will be played back at the club's stand at Trentham.

Acton, Brentford & Chiswick will gather on April 13 to hear W1BB's tape-recorded lecture on 160-metre DX working (with slides). This popular lecture has certainly gone the rounds and has been much appreciated. 7.30 p.m. at the Headquarters, 66 High Road, Chiswick. **Barnsley** report a number of interesting meetings during the past months. On April 9 the subject will be Aerial Tuning Units, by G6LZ; and on the 23rd, an SSB Transmitter and Receiver, by G5KM. Meeting-place, the King George Hotel, Peel Street, Barnsley.

Southgate (*Southgate Amateur Radio Magazine*, March) will hold their "Grand Junk Sale," the first of the year, on April 8. All are welcome, and there is a large quantity of gear to be disposed of. On May 13 the Truvox lecture, postponed from January, will be given. 7.30 p.m. at Atlasta Lodge, Tottenhall Road, N.13.

University of Keele are now active on Two

Metres, thanks to help from Mr. T. Withers and G3LLJ. During the recent Students' Rag, the club helped to raise funds by running a "pirate station" —Radio Potteries. But all strictly legal really, as it was done over a PA system only!

West Kent will be holding their AGM and annual Constructional Competition on April 9, when the two fine silver trophies will be awarded. The 23rd is the date for their "Exchange and Mart"—yet another title for the traditional Junk Sale, we assume! Culverden House, Tunbridge Wells, at 7.30 p.m., with refreshments available at half-time. **Wimbledon** are planning to put on a station at the Wimbledon Exhibition on May 21 and 22; meanwhile their normal meetings continue, on the second Friday of the month. Recent talks have covered Ultrasonics and Oscillators. **Bromsgrove**, a comparative newcomer, reports the enrolling of new members and the fixing of a future programme. Their March meeting was a Film Show, and on April 9 their Chairman, G2CLN, will talk about Mobile Operation. 8 p.m. at the Co-op Rooms, High Street, Bromsgrove.

Chester have a full programme for the month, as follows: April 6, Net Night on One-Sixty and Two (both phone and CW); 13th, second talk for beginners, by G3ATZ; 20th, demonstration of VHF Converters, by G3OWY; 27th, talk on Components, by G3ATZ. All meetings are at 8 p.m. in the YMCA, Chester.

Coventry (*CQ CARS*, February-March) will be hearing G3PQQ on Receivers for the Beginner (April 5) and then on Communication Receivers (April 12). No meeting on the 19th, but a lecture on TVI by a G.P.O. representative on April 26. All meetings 8 p.m. at Westfield House, Radford Road, Coventry.

Northern Heights recently had a repeat of the lecture by Mrs. M. I. Shaw (G3OMM) on "History of Radio on Stamps." Coming events—the AGM on April 14, an NFD discussion on the 28th, and a visit to Manchester Civil Airport on May 12. **Preston** meet fortnightly at St. Paul's School, Pole Street, at 7.45 p.m. The March meetings were on the 9th and 23rd, so we hope we are right in assuming that the April dates are the 6th and 20th. Note change of secretary (*see* panel for new QTH).

Spen Valley will see a demonstration of equipment by Messrs. Green & Davis on April 15; on the 29th Mr. M. A. Browne, F.R.A.S., will be talking about Manned Spaceflights. An May 13 the club will visit Wharfedale Works in Bradford.

Wolverhampton hold an Inter-Club Quiz with Slade (on the home ground) on April 5; no meeting on the 19th; on the 26th, judging for the Home-Built Gear award, the Best Lecture prize and the Arnold Devey Trophy. Both meetings are at 8 p.m. at Neachells Cottage, Stockwell Road, Tettenhall.

235 and 238 Squadrons, A.T.C. (Staffs. Wing) have a keen number of SWL's amongst them. At 235 Sqdn. (Corbridge) G3JGE has started a group, and at 238 Sqdn. (Hartshill) G3COY and G3OMS are lending a hand. We hope to hear that these beginnings lead to the formation of fully-fledged clubs in due course. The **K.W. Radio Club** has hitherto been run for the benefit of the staff of K.W. Electronics Ltd., in Dartford. They are now offering membership to any interested persons in the area, not employed by the firm. Applications in the first instance should be made to the Secretary, K.W. Radio Club, 1 Heath

Group photograph taken at the annual dinner held recently by the Plymouth Radio Club, when the total attendance was no less than 70, with representatives from the Saltash, Kingsbridge and Torbay Clubs. Those identified, front row, left to right, are: G3SVZ, G3SGV (chairman), G5ZT (president), G3SCW (hon. secretary), G3TDN, G3TCJ, G3SN and G3BRJ (vice-presidents). Middle row, standing to face camera, left to right: G3SXW, G6AAV/T, G3HPC, G2BCB, G3LWJ, G3BLO, G3RMZ, G3PGJ (glasses), G3TSE (glass!), G6JF, G3SYV (glasses) and G3HHV. Back row, standing, left to right: G3LSD, G3LMG, G3FQZ and G3ARE. We are told that, altogether, it was a most successful evening — and that we can well believe.

Street, Dartford, Kent.

Wickford meet at 7.30 p.m. every Friday during the school term at Beauchamps School, Hill Avenue. They have three licensed members, two more have passed R.A.E., and several have hopes in May. A dozen younger members make up the roll, but they would like more, and interested persons are asked to contact the secretary (*see* panel).

Verulam recently had a talk by G3DZW on SSB Transmitters. A record number of members and visitors were present, and the meeting ended with a raffle. Next meeting will be on April 21—a talk and demonstration of aerials by Mr. V. Hartop of J-Beams Ltd.

Torbay held their Annual Dinner in March at the Templestone Hotel, with Lt.-Col. D. E. Higgins, M.B.E. (Royal Sigs.) as guest of honour. The president, G5SY, announced the winners of the Club Awards—Senior Construction Cup and 28 mc Cup to G3LHJ; Junior Construction Cup and SWL Cup to P. Hunt; and the G3LFL Rose-Bowl to G3SXW.

Bury and Rossendale, who heard a talk by G3JAG on Receivers at the last meeting, will gather for their Junk Sale on April 13. 8 p.m. in the private room at the Old Boar's Head, The Rock, Bury. **Medway** (*MARTS Newsletter,* February) held their AGM in February, a Quiz and two Open Meetings in March, and will be having their Film Show on April 12. They hope to hold their Mobile Rally on June 6.

Luton have a full programme, starting with a talk (with slides) on Amateur Radio in Antarctica on the 6th; a cheap SSB Tx will be demonstrated on the 13th; W1BB's tape-lecture on Top Band DX will be heard on the 27th; and on May 4 Green & Davis equipment will be demonstrated.

Reading, meeting on April 27, will be combining a Junk Sale with a discussion on SWL's problems, with emphasis (naturally) on improving reception. **Plymouth** (QUA, March) seem to be having trouble with local pirates, and members' own callsigns have been illegally used. Their Annual Dinner was a success, well supported by other local clubs. Latest addition to their 31 licensed members is the call G3TYO. They report their monthly film shows as being "the most successful type of meeting we have ever organised." The AGM is on May 4.

Peterborough have postponed their next meeting from April 2 until April 9, on which day the

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, W.3.
A.E.R.E. (HARWELL): V. J. Galpin, Building 347.3, A.E.R.E., Harwell, Didcot.
AINSDALE: N. Horrocks, G2CUZ, 34 Sandbrook Road, Ainsdale, Southport.
BARNSLEY: J. A. Ward, G4JJ, 44 Northgate, Barnsley.
BEDFORD: J. R. Clarke, G3OWQ, 12 Robin Hill, Brickhill, Beds.
BLACKPOOL & FYLDE: J. Boulter, G3OCX, 175 West Drive, Cleveleys, Blackpool.
BRADFORD: E. G. Barker, G3OTO, 63 Woodcot Avenue, Baildon, Shipley.
BROMSGROVE: J. K. Harvey, 22 Elm Grove, Bromsgrove.
BURSLEM: J. R. Sherratt, G3SAJ, 23 Ash Way, Ash Bank, Bucknall, Stoke on Trent.
BURY & ROSSENDALE: K. Drinkwater, G3RHR, 16 Lindadale Avenue, Accrington.
CHESTER: R. Trickey, G3DRB, 31 Penzby Avenue, Chester.
CORNISH: W. J. Gilbert, 7 Poltair Road, Penryn.
COVENTRY: A. J. Wilkes, G3PQQ, 141 Overslade Crescent, Coundon, Coventry.
CRAWLEY: R. G. B. Vaughan, G3FRV, 5 Filbert Crescent, Gossops Green, Crawley.
CRAY VALLEY: S. W. H. Harrison, G3KYV, 30 Plaistow Grove, Bromley.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
DUDLEY: R. W. Fisher, G3PWJ, 63 Swan Crescent, Langley, Oldbury, Worcs.
HUDDERSFIELD: R. Higton, 5 Brian Avenue, Dalton, Huddersfield.
ISLE OF WIGHT: M. Pettit, 18 Berry Hill, Lake, Sandown.
LEICESTER: P. F. Rowley, 11 Sussex Street, Leicester.
LOTHIANS: T. Spears GM3OWI, 24 Priestfield Road, Edinburgh 9.
LOUGHBOROUGH: G. P. Bateman, G3LCG, 24 Farndale Drive, Loughborough, Leics.
LOUGHTON: A. W. Sheppard, G3JBS, 11 Barfields, Loughton, Essex.
LUTON: P. W. Thompson, G3TUI, 1 St. Michaels Crescent, Luton.
MAIDSTONE YMCA: A. Wilson, 11 Elizabeth Close, King Street, Maidstone.
MANCHESTER: K. Kahn, G3RTU, 12 Cliffdale Drive, Manchester 8.
MEDWAY: M. J. Winter, G3OHP, 47 Watling Street, Strood.
MID-WARWICKSHIRE: H. C. Loxley, 51 Guy Street, Warwick.
NEWARK: G. Francis, G3TWV, 93 Balderton Gate, Newark.
NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.
NORTH KENT: P. G. Wells, 25 St. Davids Road, Hextable, Swanley.
OXFORD: B. Green, G3PMI, 3 Barnet Street, Iffley Road, Oxford.
PETERBOROUGH: D. Byrne G3KPO, Jersey House, Eye, Peterborough.
PLYMOUTH: R. Hooper, G3SCW, 2 Chestnut Road, Peverell, Plymouth.
PRESTON: C. Noblet, 178 West Park Avenue, Ashton, Preston.
R.A.I.B.C.: Mrs. F. E. Woolley, G3LWY, 10 Sturton Road, Saxilby, Lincoln.
RADIO CLUB OF SCOTLAND: A. Barnes, GM3LTB, 7 South Park Terrace, Glasgow.
REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
READING: N. C. Taylor, G3TOQ, 83 Stoneham Crescent, Reading.
RODING BOYS: R. J. Phipps. G3UAJ. 51 James Lane. London, E.11.
SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash.
SHEFFIELD: P. G. Lee, G8AET, 95 Clarkehouse Road, Sheffield 10.
SOUTHGATE: R. E. Wilkinson, G3TXA, 23 Ashridge Gardens, London, N.13.
SOUTH HANTS: G. J. Meikle, G3NIM, 34 Victoria Road, Netley Abbey.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.
TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay.
ULVERSTON: A. H. Gay, G3KLG, 1 Newchurch Lane, Ulverston, Lancs.
UNIVERSITY OF KEELE: V. J. Reynolds, G3COY, Dept. of Comms., University of Keele, Staffs.
VERULAM: G. Slaughter, G3PAO, 5 Leggatts Wood Avenue, Watford.
W.A.M.R.A.C.: Rev. A. Shepherd, G3NGF, 1 North Street, Crewe.
WEST KENT: H. F. Richards, 17 Reynolds Lane, Tunbridge Wells.
WICKFORD: H. F. Smith, 22 Brunwins Close, Wickford, Essex.
WIMBLEDON: E. N. Hurle, G3RZN, 156 Monkleigh Road, Morden, Surrey.
WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral, Cheshire.
WOLVERHAMPTON: J. Rickwood, G3JJR, 832 Stafford Road, Fordhouses, Wolverhampton.
YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil.
235 and 238 SQDNS., A.T.C.: V. J. Reynolds, G3COY, 90 Princes Road, Hartshill, Stoke on Trent.

Overseas

NIGERIAN A.R.S.: K. O. Bray, 5N2KOB, c/o P.O., Box 2873 Lagos.

"DAF" transmitter and receiver will be explained. On May 7, the subject will be Radio Astronomy, by a member of the Royal Astronomical Society, in the Lecture Hall of Peterborough Technical College.

Dudley (*Local Oscillator,* March) will have a talk on April 9 about the Eddystone EA12 and EC10 Receivers; and on the 23rd a lecture on Mobile Radio by Bob Palmer, G5PP. Their meetings are held in the Art Gallery, Dudley, on alternate Fridays.

Isle of Wight are now running a well-attended R.A.E. course every Monday evening, but their normal meetings are on Fridays. All are at the Club Hq., Unity Hall, Wootton Bridge, near Ryde, and new members will be welcome at any of them. Friday meetings include a Construction Course.

Those present at the Ainsdale Radio Club hot-pot supper included, left to right, standing : G3LWK, G3STT, G8QG, SWL Howard, G3PVL, G2CIP, G3OEI. Seated : G3LWQ, G3FNQ, G2CUZ, G2AMV, G2DQX and G3FXI. The Ainsdale boys will be running a two-metre station in Westmorland over Easter.

Picture courtesy "Southport Visitor"

Saltash (*Tamar Pegasus,* March) report a good growth in membership over their first four months, and the fortnightly meetings are now getting themselves well organised. They recently visited Plymouth for a Quiz, which ended in a draw, and are hoping for the return match later in the year. Their first Mobile Rally will be held on Whit Monday at Calstock. Meetings are on alternate Fridays, 7.30 at the Burraton Toc H Hall, Warraton Road, Saltash.

Radio Club of Scotland (*GM Magazine,* January and February) have continued their weekly meetings (Fridays) with talks on RF units (GM2CHN), Transistors (GM3OWZ), Grid Drip Oscillators (GM4HX) and many varied subjects. Their magazine—one of the most bulky which we receive—maintains it high standard and is always full of interest.

Roding Boys' Society recently heard a talk, from a visitor, on the various modern types of street lighting. Two members (one of them the acting secretary, now G3UAJ) have acquired callsigns and will doubtless also be operating the club station, G3SRE.

R.A.I.B.C. (*Radial,* February and March) continue their good work among the bedfast and disabled. Though they seldom appeal for help, they will always be grateful for radio literature, and there are many other ways in which more fortunate amateurs can assist them. It is interesting to note from their journal that they are strongly against the various proposals for making entry into our hobby easier, such as non-licensed members operating club stations, the proposals for a novice band, and other schemes for entering through the back door.

North Kent (*Newsletter,* March) are running Morse classes before their actual meetings (G2FNT is holding the fort at 7 p.m.). Future meetings are on April 8 (TV Servicing) and 2nd (Junk Sale), both at the Congregational Church Hall, Bexleyheath, at 8 p.m.

Huddersfield held an exhibition of home-built gear, at which they were joined by members of the Spen Valley club. They report that "a favourable location" has now been taken over, which will be used for a club station under their call of G3HOV. **Crawley** report that their recent Constructional Contest was won by G3TIR for his 160/80 metre transmitter. SWL H. Church won a special prize for his transistorised double superhet. The main April meeting will be on the 28th, with a lecture on the Shell Communications System, by G3IDF.

Blackpool and Fylde held their AGM and elected Mr. F. W. Bontin president, G3OPT chairman, G8GG vice-chairman and G3OCX secretary. We have no details of future meetings. **A.E.R.E., Harwell** (*QAV,* March), at their March meeting, heard Mr. H. V. Sims (B.B.C. Technical Training Dept.) on the subject of Transmitting Aerials. Two members who have passed R.A.E. have decided not to pursue their original intention of taking out G8-- calls, and are working on CW with the object of becoming G3---'s.

Yeovil report that their club stations, G3CMH, has now been brought up to date by the addition of a modified Viceroy, Mk I, and a Drake 2B receiver. They are on the air on Eighty most Wednesday evenings, and are building a transverter for Top Band. **Bradford** recently visited Spen Valley for their AGM and Junk Sale, and their own meetings are as follows: April 13, visit to see the computer at Bradford Institute of Technology; April 27, to be arranged; April 29, another visit to Spen Valley for a talk on Manned Space Flight.

Newark have a new clubroom at The Hall, Guildhall Street, and some 32 members to help to fill it. Recently they have had a talk on Short Wave Listening, by G3TWX, one on Mobile by G3HLG and one on TV Principles by G3TWV. Future plans cover the subjects of RTTY, Model Control, Top Band Tx

and Rx Construction, and an Open Night on April 26. Meetings every Monday at 7.30, and also Thursdays for R.A.E. coaching.

Reigate (*Feedback*, February) held their Annual Dinner with 40 members and friends present, including a party from Crawley. Their club station, G3REI/A, will be operating from the "Get Pleasure from Leisure" Exhibition organised by Redhill Rotary Club, April 9 and 10. The speaker at the meeting on April 24 will be from Enthoven Solders, Ltd.

Oxford started the year well with some interesting lectures and demonstrations, rewarded by good attendances. On April 28, G3NNG will be talking to them on VHF transistor equipment (up to 23 cm.) Meetings are held on the second and fourth Wednesdays at the Cherwell Hotel, North Oxford.

WAMRAC have planned their third Activity Weekend (May 22-24), and their headquarters station G3NJB will be on the air on Wesley Day (Monday, May 24). W4HNX is their newly-appointed chief correspondent in the U.S.A., where they have members in 38 States. The *Circular Letter No. 51* contains these news items and many more notes of interest to members.

Nigerian A.R.S. (*NARS News*, No. 13) report plenty of on-the-air activity among the 5N2's, and their news-sheet, published every three weeks by 5N2AAF (G3JKO) is strong on the DX side but also relays news of members (when the said members can be persuaded to send it in to the editor).

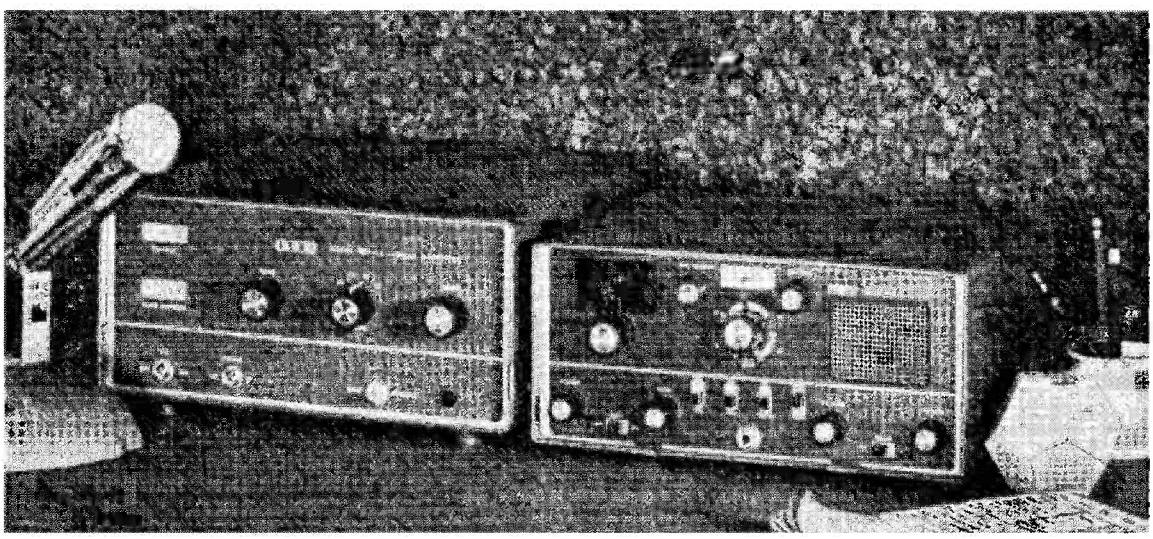
Though formed only recently, the **Ulverston and Furness** Amateur Radio Society can already claim an average attendance of 20 members for the R.A.E. course arranged by their local Education Authority; slow Morse instruction is also being given. At this early stage in their development, Club resources are naturally rather low, so if anyone could help with some "good surplus junk," it would be gratefully received — as would applications to join from potential new members in the Ulverston/Furness area.

Recent events for **Ainsdale** have been a visit by Preston members for a talk and demonstration on /M working and equipment, by G3RTX and G3RUW, and their first club social evening, with a total attendance of 48, and visitors from the Preston, Liverpool and Wirral clubs, with G2AMV-and-XYL as special guests. Meetings are fortnightly, and G2CUZ would be glad to give full details to prospective members.

Loughborough continue weekly meetings, with a programme arranged right to the end of September. Covered in April will be RTTY, by G6CW (a well-known exponent in the field of amateur teleprinter working), with other events such as an SWL evening; a film show; and participation in various portable contests. Fridays, at the Club Hq., Bleach Yard, Wards End, Loughborough, signing G3RAL.

Always a very active group, **Wirral** have meetings and talks arranged for the period April 7 to May 19, covering Receivers; Transistory; Surplus Equipment Sale; and a Video Tape Lecture. Planned are visits to what are described as "places of electronic interest." And tapes of slow Morse are being produced for loan to members.

Crystal Palace keep to a well-organised programme — as well as the running battle with Clifton in the matter of a quiz contest. The current issue of their *Newsletter*, No. 112, has a graceful tribute on the passing of their member G6IO, an old timer well known in the South London district.



The new SB-34 is a transistorised transceiver developed by the American firm of Sideband Engineers, a subsidiary of the well-known Raytheon Company. The range is four-band — 15, 20, 40 and 80 metres — with expanded frequency coverage and a two-speed dial and independent tuning for the Rx over a few kc either side of the Tx frequency. Quick frequency changes are possible, combined with a smooth vernier adjustment for accurate tuning. The design is essentially solid-state, no relays are involved, and a Collins mechanical filter is used in both Tx and Rx sections. The SB-34 gives 135 watts p.e.p. with three valves only, as the whole transceiver incorporates 23 transistors, and 20 diodes. A universal PSU operates from either 117v. AC or 12v. DC and the Rx side takes only 0.5 amp. at 12 volts. The SB-34, which will shortly be available in this country, is completely self-contained, requiring only an auto-transformer for mains operation (or 12v. battery for mobile/portable work) and an aerial and microphone to put it on the air.

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 U.K. section 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.

EI2AW, A. Condon, B.Sc., Abergele, Ashbourne Avenue, S.C. Road, Limerick.

EI8AU, W. C. O'Reilly, Mount Oval, Rochestown, Co. Cork.

GI3TR, R. B. McKinty, 64 Glenholm Drive, Newtownbreda, Belfast, 8. *(Re-issue.) (Tel. Belfast 644352.)*

G3TMU, C. A. Neale, 164 Sycamore Road, Farnborough, Hants.

G3TOT, C. A. Miles, 26 Gun Lane, Knebworth, Herts.

G3TRJ, J. M. Jones, 2A Gravel Pit Lane, Scotter, Gainsborough, Lincs.

G3TRO, L. J. Carter, 53 London Road, Spalding, Lincs.

GW3TSQ, J. D. Bowen, 50 Dunraven Road, Tycoch, Sketty, Swansea, Glam.

G3TWJ, M. H. Roach, 104 Old Lodge Lane, Purley, Surrey.

G3TWS, J. R. G. Corbett, Grad. I.E.R.E., 32 Bibury Road, Benhall, Cheltenham, Glos.

G3TWV, G. Francis, 2 Wyke Lane, Farndon, Newark, Notts.

G3TWW, E. M. S. Brown, Physics Dept., City of London School, Victoria Embankment, London, E.C.4.

G3TXE, A. Parker, Birchfield, Brighton Road, Coulsdon, Surrey. *(Tel. Downland 4010.)*

G3TXH, B. G. Levett, Radio Servicing, R.A.F. Station, Northwood, Middlesex.

G3TXL, J. A. Graham, 6 Belle Avenue, Reading, Berks. *(Tel. Reading 62276.)*

G3TXQ, S. E. Hunt, 1 Anchor Terrace, Milton Malsor, Northampton.

G3TXR, M. J. Dainton, 36 Thornfield Road, Thornton, Liverpool, 23.

G3TXW, P. Williment, 14 Templegate Close, Whitkirk, Leeds 15, Yorkshire.

G3TYB, J. Anders, 29 Newtown, Ashford, Kent.

G3TYI, D. J. West, Schoolhouse, Plowden Road, Wythenshawe, Manchester, 22.

G3TYK, D. Beaumont, 34 Selstead Road, Woodhouse Park, Wythenshawe, Manchester, 22.

G3TYT, W. MacLachlan, The Lowlands, St. Michaels Road, Penkridge, Stafford. *(Tel. Penkridge 464.)*

G3TZD, R. Mansell, 303 Leigh Road, Chandlers Ford, Eastleigh, Hants.

G8ADS, A. W. Morgan, 97 Victoria Street, Dunstable, Beds.

G8AFN, P. Cleall, 28 Oldham Avenue, Wyken, Coventry.

G8AGG, R. A. Butterfield, 23 Sunny Bank Road, Liverpool, 16.

G8AGK, C. A. McKie, 55 Shrubbery Avenue, Worcester, Worcs.

G8AGL, D. J. Standen, 23 Dovehouse Lane, Solihull, Warks.

G8AGM, M. D. Collar, 34 White Close, High Wycombe, Bucks.

G8AGO, J. Truscott, 148 Watford Road, St. Albans, Herts. *(Tel. St. Albans 57899.)*

CHANGE OF ADDRESS

G3BTA, A. R. Hamilton, 17 Ambleside Avenue, Telscombe Cliffs, Peacehaven, Sussex.

GW3CBY, R. Webb, 51 Glan Yr Afon Road, Sketty, Swansea, Glam.

G3DQW, Peterborough Amateur Radio Society, Old Mill, London Road, Peterborough, c/o D. Byrne, Jersey House, Eye, Peterborough, Northants.

G3FRV, R. G. B. Vaughan, 5 Filbert Crescent, Gossops Green, Crawley, Sussex.

G3GFU, W. H. Otley, 11A Gypsy Lane, Nunthorpe, Middlesbrough, Yorkshire. *(Tel. Middlesbrough 55822.)*

G3IAF, M. J. Marlow, 19 Lake Close, Byfleet, Weybridge, Surrey.

G3IFB, F. H. Bliss, 6 Dovers Park, Bathford, Bath, Somerset.

G3JDD, R. G. R. Dobson, Berani, Cotesbach, Rugby, Warks.

GI3JUR, E. M. Byrne, 12 Mountpleasant Avenue, Jordanstown, Newtownabbey, Co. Antrim.

G3KKO, T. Ballantyne *(ex-GM3KKO),* 26 Cardington Square, Hounslow, Middlesex.

G3LNK, C. J. Bourne, 38 Ashcroft Road, Forby, Lancs.

G3LVC, G. Reid, A.M.I.E.E., Lawrences Cottage, Abbotsbury, Dorset. *(Tel. Abbotsbury 308.)*

G3NCE, R. A. Wilson, Rose Cottage, Towne Gate, Heddon-on-the-Wall, Newcastle-upon-Tyne, Northumberland.

G3OLX, J. C. G. Parker, 19 Denbigh Close, Cheam, Surrey.

GM3OXL, D. R. Westbury *(ex-G3OXL),* Crogo Bridge, Corsock, Castle Douglas, Kirkcudbrightshire.

G3PMJ, S. Revell, 154 Abbey Hey Lane, Abbey Hey, Manchester, 18.

G3PTC, Peterborough Technical College, Eastfield Road, Peterborough, c/o D. Byrne, Jersey House, Eye, Peterborough, Northants.

G3PXD, A. J. Hawkins, 1A Roundway Park, Devizes, Wilts.

G3SDK, M. R. Kidman, 232 Marsh Road, Leagrave, Luton, Beds.

G3SRW, G. McGimpsey, 7 Riverside, Egham, Surrey.

G5CX, C. R. Pill, 4 Aspin Avenue, Crag Top, Knaresborough, Yorkshire.

G5JM, H. E. James, Poplar Springs, Middle Barton, Oxon.

GI8LF, E. O. Byrne, 12 Mountpleasant Avenue, Jordanstown, Newtownabbey, Co. Antrim.

AMENDMENT

G8ADC, J. O. Haile, Hillside, Chalton, Luton, Beds.

SMALL ADVERTISEMENTS

(" SITUATIONS " AND " TRADE ")

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, London, S.W.1.

TRADE

QSL CARDS AND LOG BOOKS, G.P.O. APPROVED. CHEAPEST, BEST, PROMPT DELIVERY, SAMPLES. — ATKINSON BROS. PRINTERS, LOOE, CORNWALL.

CAPACITORS AND RESISTORS: Special offer: High-stability, close tolerance, 5% and 10%. Send for lists, 6d. stamp.—Audio Productions, 23 Deerhurst Avenue, Holbrooks, Coventry, Warwickshire.

COMMUNICATIONS Receivers, Transmitters, Test Equipment, Bought and Sold.—Contact: Moecan Electronics, Westbury Road, Cheltenham, Glos. *(24217.)*

100% Transistors: OC44, OC45, OC81, OC81D, OC72, 2s. 9d. each; AF117, 3s. 6d. each; BY100, 5s. each; OC26, 7s. 6d. each.—J. Robinson (Radio/TV), 4 Highcliffe Road, Blackley, Manchester, 9.

THE Halson 3FIF Mobile Antenna. If you're going mobile, Transmitting or Listening, you need the most efficient antenna you can get. Price, complete with coil of your choice, £6 10s. Extra coils, £3 10s. each. From.—**Halson Radio Services, Ltd., Dover Road, Blackpool,** or ring Mr. Wilman *at 20441.*

NORTH-WESTERN Agents for Green & Davis, Codar, Partridge Electronics (" Joystick "). Electroniques and Eddystone components supplied. The Heathkit Apache, matching SB-10U, £100. A K.W. Vanguard, £48. KW-77, £80.—James-Stephens, 70 Priory Road, Liverpool. *(Tel. Anfield 3602.)*

MOHICAN Receiver, just returned from Daystroms, completely modified to latest specifications, £27 o.n.o.? T.W. "Topbander" Tx, complete with transistorised 12v. power supply unit and heavy-duty Dagenite battery, £30 or near offer?—Lloyd-Jones. *(Phone EALing 3893.)*

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Add 25% for Bold Face (Heavy Type). Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 Extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, London, S.W.1.

WANTED: AR-88 in good unmodified condition. Also HQ-170A if price sensible. Private buyer.—Johnston, 26 Greendykes Lane, York.

SALE: Eddystone 840C, in mint condition, £44 o.n.o.? Also PR-30X in perfect condition, £4 10s. Anyone interested in purchasing a radio-controlled powered boat?—Please phone *Calder Valley 3166*, or write M. J. Fisher, 64 Caldene Avenue, Mytholmroyd, Nr. Halifax, Yorkshire.

EDDYSTONE 840C Receiver, 5 months old, EXCHANGE for "Mamiyaflex" 6 x 6 twin-lens reflex camera, or 6 x 6 Roleiflex. Must be mint.—B. Arends, 18 Granada Road, Denton, Lancs. *(Tel. Denton 4937.)*

EXCHANGE: "Yashica" 8T3 Cine Camera, 3 lenses and pistol grip, "Sankyo" 8VP Projector with slow-motion, Exposure Meter, gadget bag, rewind arms, splicer, etc., for 888A, KW-77, or similar.—G3TSJ, 166 Mossley Road, Grasscroft, Nr. Oldham, Lancs.

DX-40U, brand new condition, very little used, with 80m. crystal, manual, £20; delivery within 50 miles Derby possible, or buyer collects.—Tibbert, 397 Uttoxeter Road, Derby.

WANTED: B.44, unmodd'ed or modified for 4m.; also small 2m. mobile rig (Pye, etc.). W.H.Y.?—B. Robertson, 9 Holbeck Lane, Cheshunt, Herts.

SALE: Heathkit RA-1 Rx, xtal calibrator, little used, slight fault, £25 o.n.o.? — Wilson, 28 Hartington Place, Edinburgh, 10.

CR-100, handbook, S-meter, good condition, £17 o.n.o.? AVO Valve Tester, £5 o.n.o.?—Mackinnon, 9 Fouracres, Llantwit Major, Glam.

SALE: Ex-late G2CGR, LG.300 home-built power supply, transformers for modulator, £20 o.n.o.?—G3NAO, 416 Leeds Road, Dewsbury, Yorkshire.

FOR SALE: CR-100, with noise-limiter and manual, good condition, £17. 19 Set, with internal Q-multiplier and manual, no PSU, 25s. Buyers collect. —G3PKA, 44 Sparrow Close, Brampton, Hunts.

SALE: Hallicrafters 6v. p/pack, 300v., 25s. Also Supply Unit No. 4 Mk. II/1, 300v., 15s.—G3GCO, 31 The Crescent, Donnington, Wellington, Shropshire.

HE-40 Rx, mint, £17. P.104 VHF Rx, continuous coverage 115-150 mc, with matching power unit Type 237, £5.—30 Johnson Road, Barrow, Bury St. Edmunds, Suffolk.

WANTED: Ten-metre B/S coil for HRO-MX. Will collect reasonable distance.—G3LSY, 16 Locket Road, Wealdstone, Middlesex. *(100% QSL.)*

PROFESSIONALLY Constructed G2DAF SSB Linear Amplifier, two 4CX250B's, 300 watts output all bands and built-in 1·2 kV PSU, £40 o.n.o.?—F. Meredith, 102 Pontypridd Road, Barry, Glam.

EXCHANGE: Howard 360A Communications Receiver, complete (12 valves, 550 kc to 38 mc, S-meter, bandspread, amateur band calibrator, RF/IF/AF gains, etc.) *for* Phone/CW transmitter. Anything considered.—G3LNK, 38 Ashcroft Road, Formby, Lancs.

SMALL ADVERTISEMENTS, READERS—*continued*

BENDIX RA1 with matching PSU, £15. Creed 7TR Reperforator, £8. Rotary converter: 24v. input, giving 115v. at 7 amps. output, 800-cycle single phase, £5. RF-26, less dial, 10s. All v.g.c. and working order. Rack-mounting 3-cm. range calibrator Type 4807, with 3-cm. horn, 23 valves and tunable klystron, mains, fan-cooled case; almost new, make good 3-cm. Tx or Rx, £15. WANTED: TCS-12 Rx, good condition, no mods. — Box No. 4092 Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SET OF 17 untouched FT-241 SSB crystals, £3. Parmeko transformer (as specified 2DAF Tx), £2. Woden UM3, £2. 1250-0-1250v. 300 mA, £2. U19 (four), 8s. each. HRO 4-gang condenser pack, with dial, £2. WANTED: 4·0 mc, 9·0 mc, 11 mc, 12·5 mc, 13 mc crystals.—R. Bennett, G3SIH, 26 Station Road, Corsham, Wiltshire.

SALE: Mint Hallicrafters SX-110, matching speaker, mains filter, transformer, manual; also TCS-12 Rx, unmodified, and RF-24. The lot £55, or EXCHANGE for Fi-Cord 202 or similar portable recorder.—R. Foulds, 48 Keppel Drive, Glasgow, S.4, Scotland.

COMPLETE STATION: Panda 150w. 10-80m. Transmitter; Hallicrafters S-40, Q-multiplier; Minimitter amateur band tuner, relays; professionally overhauled; FB DX AM/CW, £95.—G3NCJ, *QTHR*, or telephone *Kimbolton 206.*

NEWNES *Radio & TV Servicing Manuals*, 8 volumes to 1960, good condition, £9 10s.—G3PDL, 19 Taylors Avenue, Cleethorpes, Lincs.

WANTED: Crystals 7000-7030 kc; also Heathkit VFO, and "Joystick."—Box No. 4093, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

K.W. VICTOR Transmitter, 120 watts CW/AM, five bands, £45 o.n.o.?—G8MY, 29 Manor Road, Farnborough, Hants.

TAYLOR 45B Valve Tester; Hunts C & R Analyser; 3X T/P and T.U.; R.1475; HRO; hundreds of valves, 1s. each. Inspect Sunday mornings.—R. W. Hilton, 8 Hogshill Lane, Cobham, Surrey.

SPRING CLEANING! Marconi TF-373B Inductance/Capacity/Resistance Bridge, £10 plus 10s. carr. 200-watt 10-80m. Tx, Geloso VFO, 813 PA, mounted on 2ft. rack, with mains PSU, fully TVI-proofed (G.P.O. check!), separate modulator, £20. Crystal calibrator Type 7, 1 mc/100 kc/10 kc, £1 plus 5s. carr. AR88D Rx, just revalved and realigned, £30. Ten-watt 160-metre Tx, built-in modulator and PSU, rack mounted, £7 10s. Home-made electronic counter, 4 dekatrons plus magnetic counter, mains operated, £5 plus 5s. carr. Command Tx, 3-4 mc, built-in FSK for RTTY, less PSU, £2 plus 5s. carr. 12-way 13-bank standard wafer switches, electrically operated 24v. DC (or 12v. DC if several banks removed), ideal remote coil-tap changing on mobile, or for digital clock described in March *Practical Electronics.*—G3LMR, 112 Groby Road, Glenfield, Leicester.

COMPLETE STATION and Contents of Shack for Sale: AR88D Receivers fitted with mechanical filters; G2DAF SSB Tx with 813 Linear; two-metre gear by T.W., G. & D., etc.; Oscilloscope; Test meters, signal generators, mechanical filters; new 4-250 and 4-400 valves as examples; *no* junk. Send s.a.e. for lists.—G5UG, 32 Worlebury Park Road, Weston-super-Mare, Somerset. *(Tel. 5961.)*

SMALL ADVERTISEMENTS, READERS—*continued*

DX-100U, immaculate condition, professionally built, TVI-proof all bands this QTH, complete with handbook and calibration crystal, £60 o.n.o.? Also sell Class-D Wavemeter, £3 10s.—G3KFE, 8 Willowfield, Passmores, Harlow, Essex.

WANTED: Vibroplex vibro-keyer, also Hammarlund Electronic Keyer HK1B. Must be in FB condition.—G3RLF, *QTHR.*

MINIMITTER Converter, needs trimming, £5. B.44 Mk. II less leads and xtals, as new, with handbook, £2. Labgear wide-band coupler unit, 10-80m., £1. Woden UM1 mod. xformer, £1. Eddystone 398 dial and drive, as new, £2. Radio/TV Sig. Gen., £1 10s. "Natterbox" SSB exciter with appropriate *Short Wave Magazine* article, £4. BC-453 Q5'er, 240v. p/pack, £3. Collect, or carriage extra all items; s.a.e. with enquiries.—G3IIO, 5 St. Michael's Terrace, Lewes, Sussex.

WANTED: American Books. John F. Rider's *Radio Service Manual,* Vol. 14. Howard W. Sams *Communications Manual,* Vol. 1, 2, 42/322, 42/447. Service manual for Scott Philharmonic 30-valve receiver Model AA128.—G3MBL, 244 Ballards Lane, London, N.12. *(Tel. HILlside 4921.)*

FOR SALE: Philips Portable Transistor Tape Recorder, £15. 80-metre mains Command Receiver, £5. RF-24 Unit converted 10-15-20 metres, £2. R.1392 Receiver with Type 234 PSU, £7 10s. All FB.—G3RAD, 1 Approach Road, Broadstairs, Kent.

HEATHKIT RG-1, excellent condition, realigned, £30 o.n.o.? TS-34AP Oscilloscope, 110v. AC, with manual, £10. Delivery London or Devon/Somerset areas. Also Top Band "Command" receiver, 12v., with controls and output stage, ready immediate mobile/fixed use, £6.—G3LJB, A. M. Jones, 43 Barncroft Close, Loughton, Essex. *(Tel. LOUghton 7308.)*

CLEARING SHACK: Tiger Tx, 120 watts AM, TT21 PA, all-band, high-low power, purchased June, 1964, cost £89, accept £75. AR88LF, FB condition, with manual, £28. Grid dip oscillator, professionally constructed, in original packing, £8. Typewriter, portable, as new 1964, with leather case, cost £27, accept £18. Wavemeter, £3. Two boxes of bits-pieces, meters, resistors, Eddystone dial, variometer, £3. Aerial coupler built into grey-hammer cabinet, with RF meter, £3. Prefer buyers collect, with cash.—R. Hurst, 7 The Laurels, Burnside, Fleet, Hants.

WANTED: Small portable CW Tx, 10-80m., also small portable Rx, 10-80m., amateur bands only. —Box No. 4095, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Eddystone EA-12 Amateur Band Receiver; year old; cost £185 new; mint condition, highly efficient, bargain £140.—Box No. 4094, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: AR77 handbook, also small portable Petrol/Electric generator, 240 volt AC.—G3EJA, 9 Holybrook Road, Reading, Berks.

G. & D. Falcon 2M15-20 transmitter, 230v. and 12v. PSU, Acos Mic-45, complete set new spare valves, £38. Heathkit Monitor 'scope H0-10, £30. S-meter SR2-P, 25s. 6CX8, 10s. Pair 1616's, 10s. Acos stick mike, 15s.—G5RP, College Farmhouse, West Hendred, Wantage, Berks.

SMALL ADVERTISEMENTS, READERS—*continued*

5-INCH Pye **Camera Monitor,** incomplete, £4 10s. An APG5 **13 Cm Transceiver,** £4 10s. **WG4 Pattern Generator** telequipment, £4 10s. **Valves, crystals,** s.a.e. list, post extra.—V. Cedar, 2A Convent Hill, London, S.E.19. *(***Tel. Livingstone** *8489.)*

SIDEBAND Transceiver SBE-33 with mike, £130. BC-342, complete, £12 10s. Mobile Whip, £3 10s. T.1540 two-metre Tx, £5. Mint OS-1 'scope, £15. AVO R/C bridge, £7 10s. 500v. Wee Megger, £7 10s. Meters, crystals, transformers, all cheap. List free.—G3IDW, Orchard Cottage, Hook, Swindon, Wilts.

SALE: Eddystone 640, £18. American table top cabinet, new panel and chassis, £3. Geloso microphone, £2 10s. Labgear 80-metre coil, DSL4, 17s. 6d. 40-metre coil, DSL7, 30s. *Pi*-tank turret, 30s. Sangamo 2½in. meters (4) 100 mA, (1) 150 mA, 12s. 6d. Carriage extra.—G3IAJ, 30 Treadcroft Drive, Horsham, Sussex.

GOING SSB and CLEARING SHACK: Table-top 150w. AM Transmitter, good condition, neat appearance, £30. Two-Metre 25w. transmitter (commercial model), £12. Four-Metre 25w. transmitter (commercial model), £12. Mobile two-metre transmitter/receiver, Tx aligned, (commercial), £4. Class-D Crystal Calibrator, 240v. AC, £3 10s. R.109 Receiver, 1·9-12·0 mc, £4. Ten-watt Amplifier, 5/10 type (commercial), £4. 40-watt Amplifier, KT-66's (commercial), £10. All o.n.o.?—G3RQY, 15 Tiercel Avenue, Norwich, Norfolk, NOR.76.R.

FOR SALE: Eddystone 840A, little used, excellent condition, £30. Buyer collects.—Perkins, Ridgmount, Church Road, Cookham Dene, Bucks.

WANTED: BC-221; Table Top Tx; Record Player. SELL: QP166, quantity of valves. London Area, please.—Taylor, 10 Linden Gardens, London, W.2.

PARMEKO table-top transformer, 45s. *VHF for the Radio Amateur,* 17s. 6d. *Command Sets,* 10s. *Novice and Technician Handbook,* 12s. 6d.—King, R.A.F. Bempton, Bridlington, East Yorkshire.

CREED 7B Page Teleprinters; friction feed; 110/250v. DC; working. £15, plus carriage.—G3LSD, Netherton Cottage, The Elms, Stoke Damerel, Plymouth.

MINIMITTER "Mercury" Tx, 150w. AM/FM/CW, very good condition, £45. Will deliver 50 miles Birmingham.—Millman, G3PJY, *QTHR (Tel. Redditch 3383, or GRE 5839 after 6 p.m.)*

EDDYSTONE EA-12, few months old, virtually brand new, £160. "Joystick" *de luxe* and ATU.3, unused, £4. Taylor Multimeter 127A, unused, £7 10s. Panoramic Aadptor IP69A, £9.—Box No. 4099, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

MANUALS, circuits of all British *ex*-W.D. 1939-45 Wireless equipment and instruments, from original R.E.M.E. instructions. S.a.e. for list: over 70 types.—W. H. Bailey, 167a Moffat Road, Thornton Heath, Surrey.

WANTED: Someone to make me a 6-transistor receiver circuit to operate on 26 mc only—or to make 12 small receivers of this sort.—Black, 85 Cambridge Road, Hastings, Sussex.

TWOMOBILE Receiver, £20. G. & D. 2M15-20A Tx, mains or 12v. DC, £35. Eddystone 680X, £60. Offers? Deliver Midlands.—Box No. 4096, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

P.C.R.2 Communication Receiver and Power Supply, £3. Also Grundig TK1 Tape Recorder (needs overhaul), £5.—G3TAZ, 14 Manston Road, Sheldon, Birmingham, 26.

COMPLETE Station: Mint Codar AT.5 Tx and mains supply, with HE-40 Rx. £40 carriage paid. Will separate.—30 Johnson Road, Berrow, Bury St. Edmunds, Suffolk.

FOR SALE: Mosley TA-33Jr. Triband Beam, £11. —Ritson, Red Lion House, Hexham, Northumberland.

SELLING STATION: Viceroy Mk. III with extra ½-lattice filter and six spare 6146's, £120. Matching 1 kW Linear Amplifier, £90. Four new 811A spares, £5. Racal Receiver RA-17, £300. TA-33, £10. Grundig TK5 Tape Recorder, £20. Prefer sell complete station and buyer collects Croydon.—Box No. 4098, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

T.W. two-metre Tx and matching power unit, perfect condition and performance, £28 o.n.o.? CR-100, electrically sound but appearance rough, quick sale £8. Heavy-duty AM type Morse key, 7s. 6d. Amateur-built Tx, 10-15-20m., 813 PA and NBFM, £6. Labgear WB Multiplier, type E.5026, £2. Labgear coil turret, type E.5023B, £1. Electroniques WBC: 2/3·5 mc, 2/7·0 mc, 1/14 mc, 1/21 mc, 1/28 mc—the lot £2 10s. Offers for transformer 1500-0-1500v. 500 mA. Carriage extra all items.—Box No. 4100, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: All-band 10-160m. AM/CW Tx. Would consider Vanguard, DX-100U, etc., or good home-brew. Will collect reasonable distance around London. All letters answered.—Write Box No. 4101, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: R.1155A, plus No. 3 PSU, £5 10s. UM1 plus DT2, Woden, unused, £4. Two 832's, 15s. Used PM speaker, 3s. 6d.—71 Moorhouse Avenue, Glasgow, W.3, Scotland.

SALE: R.107, excellent condition, £8. PCR.3, £3. Marconi Crystal Calibrator, £3 10s.—Miller, Old Brewery, Cooksbridge, Lewes, Sussex.

FOR SALE: K.W. Geloso Converter, hardly used, excellent condition, £14 10s. o.n.o.?—Birch, 86 Denbigh Road, East Ham, London, E.6. *(Or ring GRA 6740 after 5.0 p.m.)*

WANTED: KW-160 Transmitter; must be in first-class condition and unmodified.—29 Hillcrest Road, Orpington, Kent. *(Tel. ORP 26802.)*

SALE: CR-100/8, with manual, as new, £27.—Trower, Lewes House, Natal Road, Brighton, 7, Sussex.

WANTED: Eddystone S.640, or similar receiver.—Write or ring P. Brown, 231 Poverest Road, Petts Wood, Kent. *(ORPington 27867.)*

FOR SALE: R.107, excellent condition, covers 1·17-18·30 mc in three bands, incorporates BFO, AVC, CW and speech filters, etc., £11. Call after April 2.—J. Rolt, 7 Exton Avenue, Luton, Beds.

SALE: AR88D, £42. AR88LF, £37. Eddystone 358X, £8. TCS-9 Tx, £10. Hammarlund Rx, 100 kc to 20 mc, £12. TR.1986, two-metre Tx/Rx, £4. DB 'scope tube, O9D, £2. VCR-97, £1. 12-250v. rotary converter, 10s. 6-250v. Vib. pack, £1. R.1132 Rx, £2. —Chambers, 46a Ware Road, Hoddesdon, Herts.

SMALL ADVERTISEMENTS, READERS—*continued*

OFFERS? Eddystone 680X, 10-600 metres, excellent condition, loudspeaker, 24 spare valves.—E. Humbert, 147 Marsh Lane, Birmingham, 23.

SALE: Panadaptor Model RDP, 30 mc IF, variable sweep up to 5·0 mc, 5in. display, 230v. AC, £15 o.n.o.? To go with this Panadaptor, Radar Search Receiver, 30 mc IF, complete with TN2B/APR1 tuning unit, 80-300 mc, 115v. AC, £10 o.n.o.? (These units £20 the pair if taken together.) Marconi Instruments Sig. Gen. TF.517E, 150-300 mc, needs attention, 230v. AC, £2. Marconi-Ekco Impedance Comparison Bridge Type TF.202C, 230v. AC, £2 10s. Microamp. Meters, 500-0-500 μA, scaled 50-0-50 yards, 4½in. dia. flush mounting, G.E.C., brand new, 20s. each. Woden 20 Hy Chokes, brand new: 60 mA, 5s.; 75 mA, 6s.; 120 mA, 7s. 6d. Condensers: 8 μF T.C.C. paper, 750v., 2s. 6d. each; 0·1 μF T.C.C. Visconol, ceramic insulators, 7·5 kV, 2s. 6d. each; 0·25 μF Dubilier oil-filled, ceramic insulators, 7·5 kV, 5s. each. About 7,000 resistors and capacitors, brand new, going very cheaply; s.a.e. for lists. Please phone *Irvine 2189* before visiting.—GM3GSC, 154 Bank Street, Irvine, Ayrshire, Scotland.

CR-100 Rx, good condition, with noise limiter, £15.—61 Hevercourt Road, Gravesend, Kent. *(Evenings or Saturdays.)*

WANTED: K.W. Viceroy, KW-77, two-metre converter, LG.300 or similar, Eddystone 770R.—Homefield, Upper Nazeing, Nr. Waltham Abbey, Essex.

THINKING about Aerials or Mobile? Then you'll need a 30ft. triangular section tower, with base and adaptor for 2in. mast, at £25. Top Band Command Receiver, 1·5-3·0 mc model, with extra audio stage, £6.—Don't delay, contact me today: G3NFV, *QTHR*, **or** *Ashtead 2546 after 7.0 p.m.*

R.C.A. AR88D Receiver, matching speaker, headphones, perfect condition, £45. Buyer collects (Sussex).—Box No. 4106, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HEATHKIT HO-10E Monitor 'scope, few hours' use only, genuine reason for sale, £30 carriage paid.—Box No. 4107, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

KW-2000 and AC power pack, new, £170.—G3FTA, 4 St. Margaret's Road, St. Leonards-on-Sea, Sussex.

SALE: Mohican Receiver, recent Daystrom service (bills shown), bargain, £22, carriage paid.—R. Sinclair, 31 Grange Crescent, Halesowen, Birmingham. *(Edgbaston 4871, Ext. 200. Weekdays only.)*

SELLING UP Tx and Rx valves, high-level modulator, BC-610 drive deck, spares for BC-610 and BC-348, etc., s.a.e. for list.—Box No. 4108, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED URGENTLY: Will pay 30s. for a QQV03-20, or 35s. for a QQV06-40.—G8ADP, Woodridge, Woodway Road, Teignmouth, Devon.

MINIMITTER Transmitter (early type), 10-80 metres, good condition, AM/NBFM/CW, modulation meter. Offers?—G2AVW, *QTHR*.

FIVE-INCH Panoramic Adaptor by Radio Corporation of New York, suitable for receivers having 450/475 kc IF's; nice condition, £25.—G6RF, Talltrees, Lower Cookham Road, Maidenhead, Berks. *(23594.)*

SMALL ADVERTISEMENTS, READERS—*continued*

HEATHKIT Mohican Receiver, perfect condition, hardly used, tuned by Daystrom, Ltd., £30 o.n.o.? —Box No. 4105, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: For G3BDQ SSB Tx, 9 mc McCoy crystal filter, with carrier crystals; also pair of R.C.A. 7360's and any other bits.—G. Eaton, 78a Stratford Road, Sparkbrook, Birmingham, 11.

BIG DEAL: Venus Veritone two-speed tape recorder, needs attention, £10. 160m. mobile Tx, £10. 160m. mobile Tx/Rx, £12. 160m. SSB rig, with Vox, £15. Dependapac transistor PSU, 450v. at 350 mA, £10. R.C.A. mechanical filter, centre frequency 251 kc, pass-band 3·25 kc, £10. Equipment cabinet, £2 10s. Electrocardiagraph 'scope unit, £1.—G3MAO. *(GULliver 4261.)*

SALE: HRO Senior, in mint condition, complete with nine coils 50 kc-30 mc, PSU and matching speaker. — Hogan, 4 Park Villas, Halsnead Park, Whiston, Lancs. *(Tel. Huyton 1933.)*

WANTED, by my HRO-5T, bandspread coils, set or singles.—Details to: G3TVI, 64 Ferndale, Waterlooville, Portsmouth, Hants.

FOUR-METRE Tx, 832A PA; two-metre Tx, 829 PA; both with valves and crystals, £3 each. Four-metre xtal converter, with valves and xtal, £2. Pye P.T.C.114 mobile Tx/Rx, £2. 100-watt Modulator and PSU, with valves, £3. Speech amplifier, £1. Operator's swivel chair, 30s. PSU's: 300v. 300 mA; stabilised 250v. 150 mA, £2 each. Many other items cheap.—G6NB, Red House, Brill, Bucks. *(389.)*

FOR SALE: KW-77, as new. This receiver was purchased in 1964 and has had very little use since new. Therefore I feel it is worth £90.—S. Jesson, 181 Kings Acre, Hereford.

SALE: TBS-7 Rx, 60-80 mc, crystal controlled, mains input, complete with crystal for 72·10 mc and original R.C.A. manual (covering all TBS equipment), £5 10s. AN/APN-4 Mk. IV Loran receiver and indicator, complete all cables, manual, excellent condition, with some spares, £6 10s. WS.38, pair (one needs attention), all accessories, circuit, 40s. WS.46, one only, circuit but no accessories, 10s. Further details s.a.e.—P. Wright, 13 Worts Causeway, Cambridge.

COLLINS KWM-1 Noise Blanker; DX-Daptor; 20-metre crystals; Heath IO-10E DC 'Scope; new 4-400's and 4-250's; Geloso VFO; Heath VFO; LG.300 and Modulator; 12v. Pye Carad JO. Offers?—G3NAC, 29 Sydnal Lane, Albrighton, near Wolverhampton, Staffs.

FOR SALE: Eddystone S.640, excellent condition, unmodified, complete with 3in. external S-meter, £21 o.n.o.? Buyer collects. Gilson 30-watt ultra-linear output transformer, 30s. Woden DT1 push-pull driver transformer, 16s. Garrard Auto-Changer, 4-speed, only had four hours' use, £4.—Parsons, G3OSK, 77 Southampton Road, Cosham, Portsmouth, Hants.

R 107T, S-meter, circuit diagram, etc., very good condition, £12 o.n.o.? E.810 Audio Generator, 4-watt amplifier, atten. o/p, £3 o.n.o.? — Write: Keeping, 11 Falcon Close, Langley Green, Crawley, Sussex.

HEATHKIT Mohican, transistor communication receiver, mint condition, with manual, £25.—G8BD, Hayward, 19 Alsford Road, Purbrook, Portsmouth.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Minimitter Top 2-7 transmitter, good working order (have gone SSB), £22 o.n.o.?—Jack Simpson, G3NJQ, 50 Vicarage Road, Norwich, Norfolk. *(Tel. Norwich 48615.)*

FOR SALE: NCX-3, with NCX-3A PSU, auto transformer and Shure 404C mic., £140—or EXCHANGE two-metre equipment and cash to make up remainder.—Ring *SHEpherds Bush 7009* or write: D. J. Tanner, 32 Davis Road, Acton, London, W.3.

COSSOR CR.1601 4-track, 3-speed tape recorder, complete, unused, new price £61 19s., sell £49. Grundig TK-18 tape recorder, £26 10s. complete. Canon 8T cine camera, 8mm. twin turret with F/1·4 13mm. and F/1·8 25mm. lenses, £39. G.E.C. Miniscope, £5. Several Woden transformers. EXCHANGES considered for unmodified commercial SSB transmitter or transceiver; s.a.e. with enquiries.—Box No. 4102, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

REQUIRED: CDR AR-22, as new. Offered separately, four volumes *Radio & Television,* by Caxton, unused.—Details Box No. 4103, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO, with PSU, good condition, GC and BS coils, £15. 150-watt Elizabethan Tx and PSU, Philpott's cabinet, Labgear WB multiplier, Eddystone dial, almost complete, £7, carriage extra.—Box No. 4104, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Late model Panda PR-120V Tx, excellent condition, £40. Will arrange packing and carriage.—GD3FRK, Somerset, Stanley Mt., Ramsey, Isle of Man. *(Tel. RAM 3394 evenings.)*

WANTED: Minimitter TR7 Mobile Rx, must be in first-class condition.—Kitching, 7 Dalton Cottages, Shildon, Co. Durham.

SALE: W.S. No. 19, modified, reconditioned, complete with power unit, control box, speaker and leads, excellent condition, £8 o.n.o.?—Burrell, 70 London Road West, Batheaston, Bath, Somerset.

SALE: Marconi 52 Receiver, with PSU and manual, mint condition, £12, carriage extra. WANTED: R.1392D VHF receiver with mains PSU; will pay carriage. Write—Wilkinson, 3 Bank Buildings, Pantyrafon, Penmaenmawr, Caerns., North Wales.

WHAT offers for brand-new Eddystone 840C and Codar RF Preselector PR-30X, both from Webb's Radio?—Box No. 4109, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Nombrex 27 Sig. Gen., £8. CR-100, with coil pack rewired and set partly rewired in p.v.c., £18. Two AUY10 power transistors, unused, 40s. each. All working, and o.n.o.? Buyer inspects and collects.—36 Valleyfield Road, London, S.W.16. *(Phone STR 1639.)*

TABLE-TOP Tiger 100, 10-160m., AM/CW, TT21 PA, 150w., £35 o.n.o.?—G3RCE, Greenacre, Lidden, Penzance, Cornwall.

SALE: 888A, complete with mounting blocks, S-meter, cascode front-end fitted and re-aligned by Eddystone, £65. Delivery arranged. RB.150/2 Marconi Terminal Unit, £7 10s., plus carriage.—G3GBS, 41 Elizabeth Road, Moseley, Birmingham, 13. *(Tel. SOU 2102.)*

WANTED: General coverage coils for HRO. Also Heathkit Q-Multiplier.—Williams, Mill Cottage, Ketsby Mill, Louth, Lincs.

FOR SALE: Minimitter 2-7 Tx, very little used, £25 o.n.o.? "Joystick," outdoor *de luxe,* with ATU, £3. Rx R.107, unmodified, £8. Sell separately or £34 the lot. Buyer collects.—GW3RXD, 90 Maesllwyn, Amlwch, Anglesey, North Wales.

FOR SALE: Heathkit Mohican Rx, general coverage and amateur bands 10-160m., £20 o.n.o.? 150w. Tx, CW only, Eddystone dial, Labgear wideband coupler, working order but needs slight attention, £15, or consider EXCHANGE for QRP two-metre Tx. Write—G3RIP, 23 Orchard Close, Great Baddow, Chelmsford, Essex. *(Tel. Chelmsford 55354.)*

HRO Coils, 50-100 kc, 7s., post 2s. 6d. New Silicon Rectifiers, 50 p.i.v. 1·5 amp., 2s. 6d.; 100 p.i.v. 8 amp., 4s. 6d. Zeners, 3·6v. 5 per cent 1W, 3s. 6d.—J. Cooper, Outwell, Wisbech, Cambs.

EXCELLENT condition: DX-40U, complete Tx, with Heathkit VFO VF-1U, £20 the two. Minimitter Top 2-7 Tx, as new, £15. CR-100 Receiver, excellent condition (bought new), £12 10s. No offers. All carriage paid.—Green, 355B Archway Road, Highgate, London, N.W.3. *(Tel. MOUntview 1182.)*

HRO-MX Receiver, p/pack and speaker, five coils, two bandspread, £15. **WANTED: Information on Rx Type 78.**—G3JYJ, 30 Fontaine Road, Streatham, London, S.W.16. *(Tel. POLlard 2744.)*

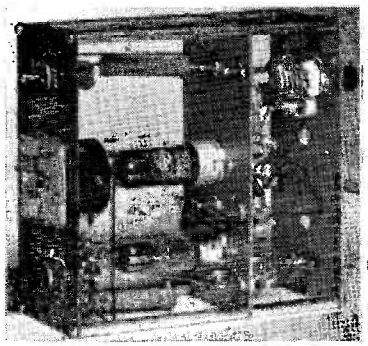
HRO, PSU, nine coils, no mods., sell £15. WANTED: Manual AR88D.—G3TTE, 23 Tilehurst Road, London, S.W.18. *(Tel. VANdyke 2655.)*

SALE: Rx-80, 550 kc to 30 mc, 9 valves ANL, S-meter, etc., mint condition, £15. R.109A Rx, 2-13 mc, mains PSU, £2 10s. Geloso front-end, amateur bands coverage, valves, dial, etc., £5 10s. Carriage paid on all items.—M. Woodhouse, 10 Bedford Street, Oxford. *(42162.)*

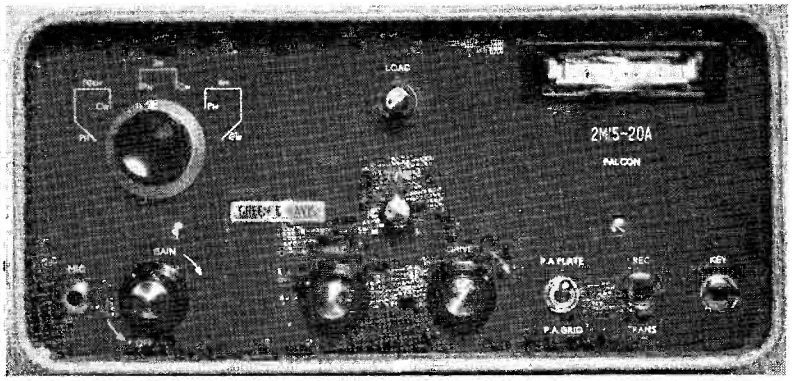
PANDA Explorer 150w. AM/CW Tx, 10-80 metres, self-contained Table Topper, £32, carriage paid. Bendix 50w. TA-12 CW Tx, 40-80-160m., less PSU, £3, carriage paid.—R. H. Percival, 78 De-La Pole Avenue, Anlaby Road, Hull, East Yorkshire. *(52451.)*

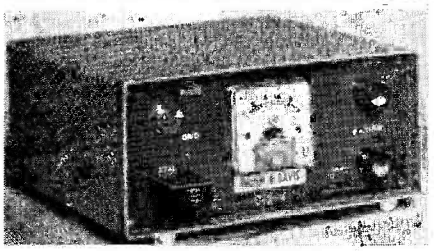
SALE: Sphinx SSB/AM/CW Tx, 20-80-160m., perfect, hardly used, £66 or EXCHANGE for DX-100U. AR88D, sprayed grey, very good condition, working perfectly, £38 or EXCHANGE for RA-1 or G.209R. WANTED: Bug key.—David Power, G3SCJ, Chapel Green, Fillongley, nr. Coventry, Warks.

SALE: Minimitter-200, TT21's, 150w. AM/240w. CW, as new, £70. K.W. Valiant 50w. transmitter, AM/CW, £27. KW-76A mobile receiver, £27. Dependapac Transistor Power Supply, 150-watt, 265v. and 425v., £14. WANTED: NCX-D Power Supply.—G3EMW, *QTHR.* Phone *Ruislip 7810.*



CTR-70 CASE REMOVED





THE CTX-4 TRANSMITTER
Size only 6″ x 2¾″ x 6″

COMPLETE LOW COST 2M, 4M & 70CM STATION

The above Units when used together, give operation on the 3 V.H.F. Bands on Phone, C.W. 4-metres, 70.1–70.7—2 metres 144–146—70 cm. 432–434.

The 2M15–20A, a complete 25 watt Phone/C.W. Transmitter on 2 metres with A.C. mains and 12 volt D.C. power supplies.

The other 2 Units (The CTX–4 and CTR–70) plug directly into the back panel of the 2M15–20A. These are dependent on the 2M15–20A for voltage, modulation and control.

On 2 and 4 metres the Transmitter runs 25 watts input Phone and C.W.

On 70 cm. the Transmitter runs 8 watts input on Phone and C.W.

The CTX–4 and CTR–70 can be purchased separately and used on your own Power Supply and Modulator.

2M15–20A A complete 25 watt Phone/C.W. 2-metre Transmitter with dual P.S.U.'s (A.C. mains and 12 volts D.C.). Front panel switching (top left on photo of 2M15–20A) enables operation on 4-metres and 70 cms. also.

CTX–4 A 25 watt, 4-metre Transmitter. Requires voltage and modulation (your top band Modulator and Power Supply is ideal) will plug directly into the 2M15–20A for power, modulation and control.

CTR–70 An 8 to 10 watt, Phone/C.W. Tripler/Amplifier for 70 cm. (432 Mc/s.) requires D.C. voltage and drive at 144 Mc/s. The drive can be obtained from a CTX–2—see *below*.

The CTR–70 plugs directly into the 2M15–20A for its power, modulation, control and 144 Mc/s. drive.

CTX–2 A 25 watt, 2-metre Transmitter. Ideal for use with your top band Power Supply and Modulator. Ideal for supplying drive to the CTR–70 for 432 Mc/s.

2M15–20A	**48 Gns.** complete
CTX–4	**14 Gns.**
CTR–70	**£20**
CTX–2	**14 Gns.**

CONVERTERS FOR 2m., 4m. and 70 cm.

70 cm.	3N70	**£16.16.0**		
2m.	Mk. III	**£8.19.6**	Mk. IV	**14 Gns.**
4m.	Mk. III	**£8.19.6**	Mk. IV	**14 Gns.**

WRITE or PHONE for FURTHER INFORMATION

GREEN & DAVIS LIMITED

MANUFACTURERS OF ELECTRONIC AND COMMUNICATION EQUIPMENT

104 HORNSEY ROAD LONDON N.7 TEL: NORTH 6871

Printed by The Courier Printing Co. Ltd., Tunbridge Wells for the Proprietors and Publishers, The Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. The *Short Wave Magazine* is obtainable abroad through the following: Continental Publishers & Distributors, Ltd., William Dawson & Son, Ltd.; AUSTRALIA AND NEW ZEALAND — Gordon & Gotch, Ltd.; AMERICA—International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. *April, 1965.*