

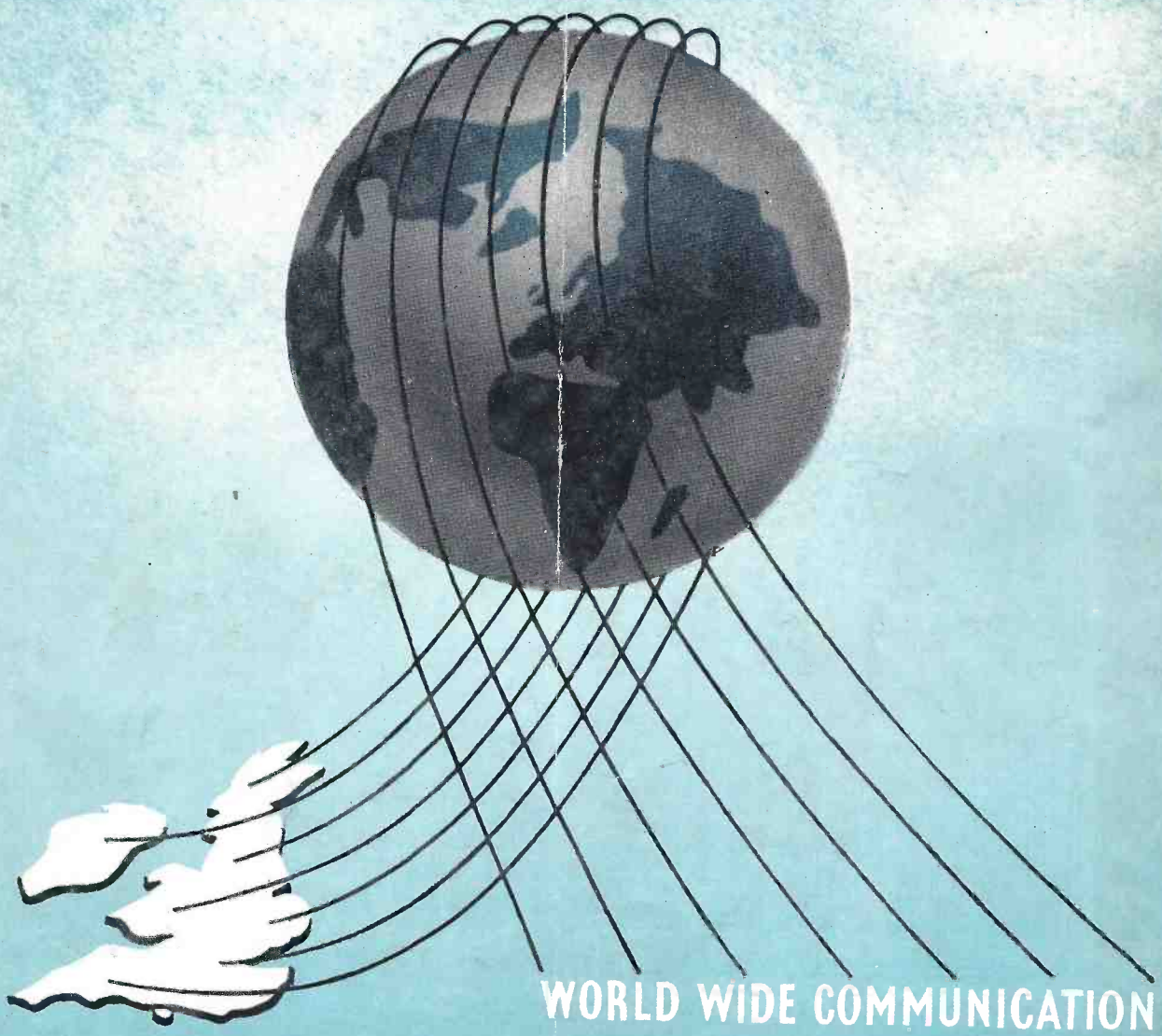
2/6

The
SHORT WAVE
Magazine

VOL. X

JUNE, 1952

NUMBER 4



WORLD WIDE COMMUNICATION

H. WHITAKER G3SJ

10 YORKSHIRE STREET, BURNLEY Phone 4924

MODULATION INDICATOR. Type 2. 10A/10971. In die cast cases size $1\frac{1}{2} \times 6\frac{1}{2} \times 7\frac{1}{2}$ in. Frequency range 2400 kc. to 6250 kc. in two switched bands. Direct reading of modulation percentage up to 100% in $3\frac{1}{2}$ in. 0/500 microammeter. Phone jack for monitoring. No direct attachment to Tx is required. Switch is set to "HF." The coupling coil is set to read "HF." on meter, switch is then thrown to "Modulation" and percentage is read off direct. Only power required is a $1\frac{1}{2}$ or 2 v. cell for diode. Complete with calibration chart for use as wavemeter. Easily modified to cover other bands if desired. Carr. paid £5. The diode valve can be replaced by a crystal diode in which case no cell is required.

PLATE TRANSFORMERS. Input 100/250v. 50cy. Output 2000/0/2000 at 450 mills. Porcelain stand offs. Carr. paid £6. Chokes suitable for the above, 5Kv wkg. 15 hy at 400 mills, 30/-, Swinging U.S.A. Radio Receptor Co. made for Kenyon 9/60 hy at 450 mills, 45/-, 10 Kv insulation.

Plate transformers Radio Receptor Co. U.S.A. Input 100/250v. by rotary switch. Output 1100/0/1100 450 mills, 2½ v. 10 amp for 866s, 12v. 14½ amp ct and 0/10, 11 and 12v. at 2 amp, plus 30v. at ½ amp for relays, etc. £5, carr. paid.

RESISTORS. New and Unused Erie and Dubilier. We have secured another fine parcel of these and offer as follows: ½ watt 8/6 per 100, ¼ watt 12/6 per 100, 1 watt type 9 insulated 15/- per 100, 1 watt standard type 15/- per 100, 2 watt 20/- per 100, 5 watts 25/- per 100. All well assorted values between 100 ohm and 6.8 Meg. Or sample 100 as follows, 20 ½ watt, 25 ½ watt, 20 1 watt insulated, 20 1 watt standard, 10 2 watt, 5 5 watt, with a range of least 30 different values at 14/- post free.

WIRE WOUND. 5 watt. Values in ohms. 15, 20, 25, 50, 75, 100, 150, 175, 200, 250, 500, 750, 1,000, all with wire ends at 6/- per doz. assorted.

OSCILLOSCOPES. By well known British Manufacturer. In black crackle steel cases, size 12 x 8 x 6 in. For A.C. mains 230/200v 50cy. Tube size 3in. (green). Hard valve time base continuously variable from 5 to 250,000 c.d.s. Push-pull "x" deflection circuit with T.B. wave form brought out to separate terminal for wobulator work or synchronising. Provision for fly back suppression. Push-pull "Y" deflection circuit, level from 15 to 300,000 c.d.s. All usual controls and provision for using a D.C. volt-meter to measure the amplitude of an A.C. waveform. Separate synchronised amplifier and no control interaction. Complete with all test leads and instruction manual. They are brand new and boxed in original cartons and represent an un-repeatable bargain at £19/10/0. Carr. paid.

CRYSTALS. 1,000 kc. Valpey, Bliley or Somerset, standard ¾ in. pin spacing, 20/-, R.C.A. 100kc sub-standards 20/-, Western Elec. 500 kc Ft 243 holders with ½ in. pin spacing, 7/6. Full range of Western I.F. freqs. 450, 465 kc, etc., 12/6 each. Amateur and Commercial bands. G3 SJ Xtals are precision lapped, and acid etched to final freq. Are available in either Ft 243 holders, ¾ in. British, ¾ in. U.S.A. or ¾ in. P.5 holders. Your own choice of frequency 2 Mc to 10 Mc inclusive. We will despatch to within 1 Kc of your chosen frequency at 15/- each, accurately calibrated with freq. clearly marked. Slight extra charges for decimal point freqs. We also undertake the calibration or re-grinding of your own crystals at extremely reasonable and nominal charges.

CONNOISSEUR LIGHT WEIGHT PICK-UP. Connoisseur standard light weight pick-up complete with input transformer, brand new and boxed. List price £4/10/5 inc. tax. To clear £1/6/10 each. Available in quantity for export.

7B TX. G.E.C. INPUT 230V 50cy. Crystal Osc. and Doubler, Det 19, Push Push Doubler Det 19, Push Push Doubler Det 19, Power Amp. Det 19, KT66 Modulator, Standard rack and panel complete with power supply. 2 U52 Rectifiers. All stages tuned Grid and anode. Link coupled throughout. Completely enclosed, weight approx. 80lb. Relay for push to talk. Provision for remote HT switch. Frequency coverage approx. 100 to

120 Mc. Easily adapted for 144. Oscillator will function on 8 mc xtals. All stages are meter jacked. Filament and HT pilot lights. Microphone jack. This is a complete Tx with all valves, and beautifully built. Input about 50 watts. Tune/Operate switch for tuning up on lower power. This is a really exceptional bargain at £8 Carr. Paid. 30/- extra Ireland.

STATION LOG BOOKS. A quality production. 300 pages cream laid paper, section sewn, opens completely flat like a ledger. Stout heavy cover, 18/- post free. Sample leaves on request.

TRANSFORMERS. Woden. Immediate delivery from stock. Modulation UM1, 54/-, UM2, 73/6, UM3, 90/-, UM4, 215/-, Mains DTM 11 39/-, DTM 12 48/6, RMS 11 30/-, RMS 12 40/-, DTM 15 75/-, DTM 17 109/6; DTM 18 172/6. Drivers, DT1 34/-, DT2 39/6, DT3 34/-, Filament, DTF 12 12½ v. at 10 amp. at 38/6; DTF 14 5v. 4 amp. at 31/6, DTF 17 7½ v. 5 amp. at 37/6, DTF 18 5v. 3 amp. 6.3v. 4 amp. 38/6. DTF 20 10v. 10 amp. ct. 59/6. Chokes, DCS 14 12hy 350 mills 102/-; DCS 17 20hy 60 mills 28/9; DCS 18-20hy 150 mills 41/6; DCS 20 20hy 350 mills 140/-, Swinging PCS 13 5/25hy. 350/50 mills 58/6. All the above Woden are at pre-increase prices. G.E.C. 1131 spares, Filament 4v. 5 amp., 4v. 5 amp., 4v. 5 amp., at 17/6; 7.5v. 4 amp., 7.5v. 4 amp., 7.5v. 8 amp., 6.3v. 4 amp. twice, 4v. 3 amp. at 30/-, Modulation pp TZ40s to pp35Ts at 70/-, Plate 300/0/300v. 300 mills, 4v. 4 amp., 30/-, All the above primaries tapped 200/250v. Chokes 10hy 250 mills 15/-; Swinging 5/15hy 450 mills, 20/-.

TANNOY AMPLIFIER TYPE 7A. Input 110/230v. 50cy. A.C. Output 60/80 watts of audio from 6 KT66s in parallel push-pull. Complete with Tannoy Power Mike and power supply in original transit cases, brand new £19 10s. 0d. These will run up to thirty speakers at distances of up to two miles.

VALVE HOLDERS: All ceramic, octal with flanges, 1/8, 10/- per doz.; 807 1/3, 12/- per doz.; 4 pin UX Johnson lock-in 4/-; 4-pin Jumbo lock-in for 805s, etc., 6/-; British 5 and 7 pin Clix, ceramic, 4/- per doz. to clear.

FEEDERS. Henley 80 ohm twin line, 6d. per yard. 80 ohm ½ in. co-ax. 1/2 yard. Telcon 300 ohm line 9d. per yard, RG52 1/- yard. Ex-Air Ministry 10in. insulators 6/- per doz. Johnson conical feed through insulators 4in. for windows, etc., 9d. each.

ANTENNA RELAYS. Price Bros., Maryland. Double double throw, suitable for 600 ohm line. 28v. DC. Piston cylinder action, with self-centring contacts. On heavy ceramic stand-offs. Will handle up to 1 Kw. of R.F., 25/- each.

BLEEDERS. 1K to 75K, 85/120 Watts, most values available at 2/- each. All the above are standard vitreous 8 to 12in.

CONDENSERS. Silver Mica 10pf. to 600pf. at 6/- doz. assorted. Mica 350/1,000v., assorted 3/6 doz. U.S.A. Sprague, Sangamo, etc., 2,500v. wkg., 12/- doz., ditto 5,000v. wkg., .001, .0004, .0006 at 2/6 each.

PAPER AND OIL. All metal cased with terminals. TCC, etc., 4 mf., 2,000v. wkg., 5 x 5 x 3in., 6/-, Ditto 4 mf. + 2 mf., 2,000v. wkg., 9 x 5 x 3in., 7/6. Ditto 4 mf., 1,500v. wkg., 5 x 3 x 3, 4/-, Kellogg, 650v. wkg., 4-4-4-2+1 mf., in detachable metal cases, 7/6. 6 mf., 1,000v. wkg., 4/-; 10 mf., 1,000v. wkg., 6/-.

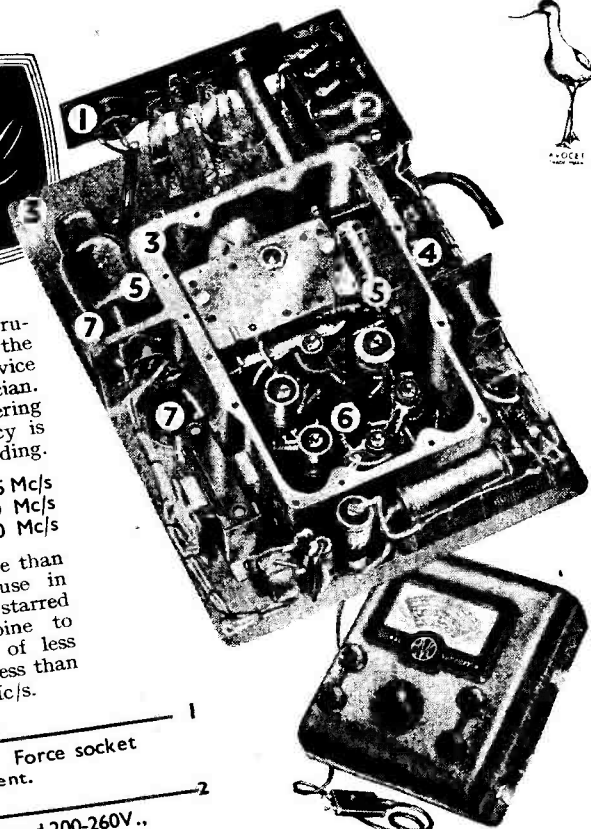
CONDENSERS VARIABLE TX. Hammerlund 1,500v. wkg., 30pf., 3/-, 100pf., 8/-, 50 + 50, 10/-, 60pf., 7/6. Eddystone 18pf., 1,000v., 3/-; 30pf., 1,000v., 3 in. spindles, 3/6. Wavemaster ceramic 25, 40 and 50pf., 4/-; U.S.A. 15pf. Cer. 25pf. cer. RX type with spindles, 1/6; 75pf. miniature U.S.A. screw adjust for IF's, etc., 1/-, Cydon 200pf., 1,000v. 5/-; ditto 250pf. 750v., 5/-, both ceramic. U.S.A. extension couplers for ½ in. spindles, 1/- each. BC 453 3 gang 0005 complete with all gearing, new and boxed, 5/-.



An inexpensive yet precision instrument designed especially to meet the exacting needs of the modern service engineer and laboratory technician. With six frequency ranges covering 50 Kc/s to 80 Mc/s, its accuracy is better than $\pm 1\%$ of the scale reading.

50 Kc/s—150 Kc/s
150 Kc/s—500 Kc/s
500 Kc/s—1.5 Mc/s
1.5 Mc/s—5.5 Mc/s
5.5 Mc/s—20 Mc/s
20 Mc/s—80 Mc/s

Scale sub-divisions provide more than adequate discrimination for use in television circuits. Note the starred features below, which combine to maintain a minimum signal of less than $1\mu\text{V}$ up to 20 Mc/s and less than $3\mu\text{V}$ between 20 Mc/s and 80 Mc/s.



- ★ **OUTPUT** ————— 1
Coaxial socket for attenuated output. Force socket located totally within H.F. compartment.
- MAINS TRANSFORMER** ————— 2
Marked tagboard for inputs of 100-130V. and 200-260V., A.C. 50/60 c/s.
- ★ **CAST ALUMINIUM H.F. COMPARTMENT & CHASSIS** ————— 3
Large number of fixing holes for H.F. compartment cover ensures excellent electrical bonding and good screening.
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- VALVES** ————— 5
Standard types run at a rating to ensure long life.
- TURRET COIL SWITCHING** ————— 6
Standard "AVO" practice.
- ★ **ATTENUATOR SYSTEM** ————— 7
Employs close tolerance, high stability midget carbon resistors, low reactance rotary potentiometer modified for H.F. operation with carefully designed screening.

Other features include:—

- ILLUMINATED SPOT RANGE SELECTOR**
Gives rapid identification of operational band with intensified lighting round precise frequency. Fine hair line gives close discrimination, particularly on high frequencies.
- STOPS**
Separate stops prevent turning of dial with respect to condenser.
- ★ **MAINS FILTER SYSTEM**
This is screened from main electrical assembly.
- BUSHING PLATES**
provide additional rigidity for rotary controls.
- SLOW MOTION DRIVE**
substantially free from backlash.

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TELCON LOW-LOSS TRANSMISSION LINES

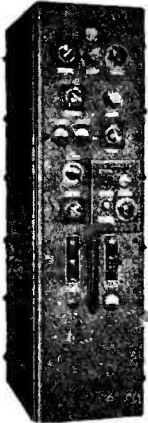
K.24.B 150-ohms nominal impedance, figure-8 section twin; capacitance 10.6 mmf/ft; Attenuation at 50 Mc/s, 2.1 db/100 ft; power rating at 100 Mc/s. 300 watts.

K.25.B 300-ohms nominal impedance, flat ribbon-type twin; capacitance 4.6 mmf/ft; attenuation at 50 Mc/s, 1.0 db/100ft; power rating at 100 Mc/s 500 watts.

K.35.B 300-ohm tubular twin feeder with stable characteristics in varying weather conditions. Capacitance 4.0 mmf/ft; attenuation at 50 Mc/s 0.92 db/100ft; power rating at 100 Mc/s. 550 watts.

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WILCOX GAY VFO for use with above transmitter. **SPEECH AMPLIFIER** British made with 500 ohm output, suitable for use with EF4336B.

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ET4336.K. Brand New in original packing cases and in absolute mint and Factory condition. Limited quantity only. The above transmitters are available for Export only.

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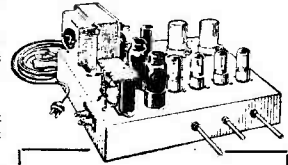
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A good quality general purpose Crystal microphone having a substantially flat characteristic with a high sensitivity
Frequency response substantially flat from 50/5,000 cps.
Output level 55db. ref 1 volt/dyne/cm.2.
Load resistance 2 megohms included.
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On-Off switch incorporated with provision to close an extra circuit.
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Resistance ranges : 0/1 Meg. (13,500 ohm mid-scale), 0/10,000 ohms (135 ohms mid-scale).

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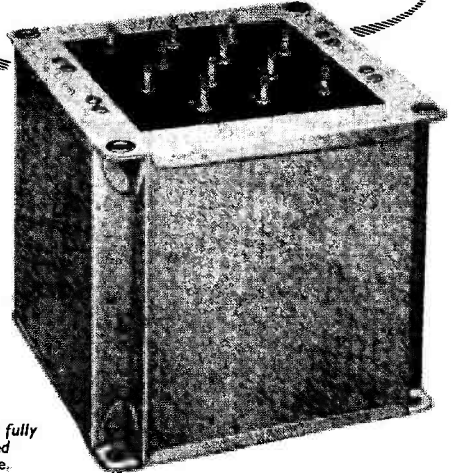
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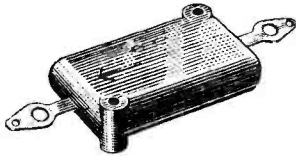
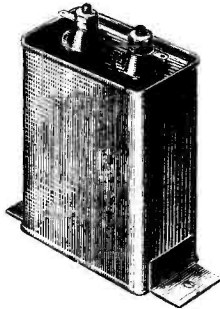
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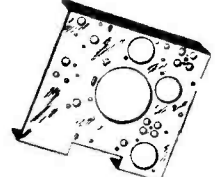
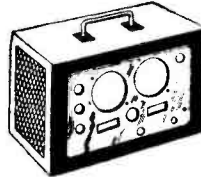


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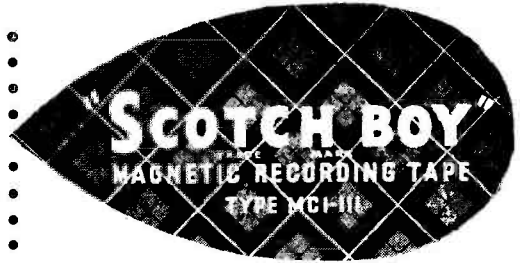
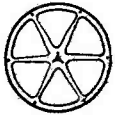


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 Uniformity throughout a reel ± 0.5 d.b.

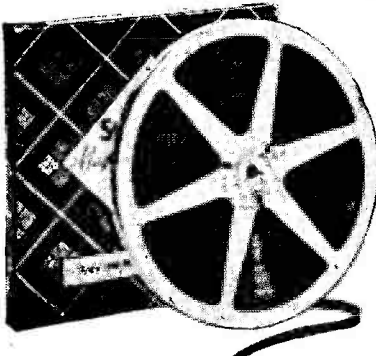
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Medium coercivity gives a high signal output with an extended high-frequency response, whilst still retaining an easy erasure. Signal/noise ratio is high; transfer and distortion are negligible.

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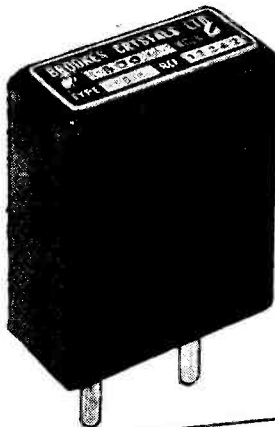
REELS	1 $\frac{1}{2}$ " / SEC	3 $\frac{3}{4}$ " / SEC	7 $\frac{1}{2}$ " / SEC	15" / SEC
1200 Ft.	120 Min.	60 Min.	30 Min.	15 Min.
600 Ft.	60 Min.	30 Min.	15 Min.	7 $\frac{1}{2}$ Min.
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Frequency range 100 kc/s to 15 mc/s. Black bakelite case $1\frac{1}{4}$ ins. high, $1\frac{1}{8}$ ins. wide, $\frac{3}{4}$ in. thick, with two $\frac{1}{4}$ in. diameter pins spaced $\frac{3}{4}$ in. centres.

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The universal testing set for Service Engineers. Sensitivity-10,000 ohms per volt. Strong metal case with carrying handle, complete with leads having detachable bulldog clips and test prods. Size 9 x 5 $\frac{1}{2}$ x 4ins.



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AC/DC Volts :	10, 25, 100, 250, 500, 1,000.
D.C. Milliamps :	2.5, 10, 25, 100, 500.
AC/DC Microamps :	100 Microamps 10v. range.
Resistance ranges :	0/1 Meg (13,500 ohms mid-scale). 0/10,000 ohms (135 ohms mid-scale).



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SPECIFICATIONS :

Amplifier : Max. Gain, Peak to Peak — .3 volts per cm. Frequency response 10 c/s—100 k/c. Flat — 100 c/s to 50 k/c. Time Base: frequency range 5 c/s—30 k/c.

Dimensions : 8½ x 6½ x 11½. Weight 17½ lb. Black crackle finish.

Price : Brand New, £14/14/-, carr. pd.



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INDEX TO
ADVERTISERS

SHORT WAVE MAGAZINE

	Page
Adcola	256
Alpha Radio Service	253
Altham Radio	252
Anglin, J. T.	254
Ashworth, H.	250
Automatic Coil	193
Bensons	249
Brookes Crystals, Ltd.	197
Brown, S. G.	248
Burn Engineering	256
Candler System	251
Chase Products	196
Clydesdale Supply Co., Ltd.	247
Electrad Radio	256
Electradix Radios	249
Elm Electric	253
E.M.I.	255
Field, N. H.	252
Foyle	255
Gage & Pollard	cover iii
Henleys	196
Henry's	198
Hoile, A. C.	254
H.P. Radio Services, Ltd.	248
Johnson's	256
Labgear	248
Lyons, Claude	196
Lyons Radio	cover iv
Mail Order Supply Co.	195
McElroy Adams	194
Minnesota Mining & Mfg. Co., Ltd.	197
Panda	cover iv
P.C.A. Radio	250
Pullin (M.I.)	197
Radiocraft	256
Radio Clearance	247
Radio Exchange	200
Radio Mail	251
Radio Servicing Co.	250
Rollett, H.	256
Samsons Surplus Stores	249
Small Advertisements	251-256
Smith, H. L.	248
Southern Radio	250
T.C.M.	194
Universal Electronics	254
Walton's Wireless Stores	255
Whitaker	cover ii
Woden	195
Young	200

VOL. X

JUNE 1952

No. 107

CONTENTS

	Page
Editorial	201
A Magnetic Tape Recorder, Part III, by E. P. Harris (G3GFN)	202
Amateur Television Transmission	207
Super Modulated 807 Transmitter, by G. W. Alderman (G3BNE)	210
Aerial Coupling and Loading, Part I, by J. N. Walker (G5JU)	213
DX Commentary, by L. H. Thomas, M.B.E. (G6QB)	220
The Discovery of Radio Stars, D.S.I.R. Paper	226
Random Jottings, by The Old Timer	229
Pot Oscillator for Seventycems, by K. E. V. Willis (G8VR)	230
BK Keying System, by C. F. Fletcher (G3DXZ)	232
VHF Bands, by A. J. Devon	234
Thanking You, by "Joru"	240
New QTH's	242
The Other Man's Station — GW3FSP	243
The Month with the Clubs — From Reports	244

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

Advertisement Manager : P. H. FALKNER

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

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The
SHORT WAVE
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E D I T O R I A L

Achievement

This issue of SHORT WAVE MAGAZINE reports the latest amateur triumph—the successful transmission and reception by air-path of amateur TV on the 430 mc band and the first two-way television contact, meaning that those present in the stations at the two ends of the QSO were able to look at one another in the TV sense, though separated physically by a distance of some three miles.

The actual distance is not itself significant—given the conditions, or a different band of frequencies, the distance might have been 30 or 300 miles. What is important is the fact that so many practical difficulties have been overcome in order to make it possible—obtaining an agreed form of licence to transmit amateur TV at all; the limitations imposed by the licence itself; the design of transmitting and receiving equipment for the 70-centimetre wavelength; the obtaining of suitable camera apparatus; and many other similar problems.

Apart from its purely technical interest, this achievement is of deep significance in several other important respects. It opens up a new field of amateur enterprise and endeavour; it promises a new interest in the VHF bands, which must eventually become the main area of amateur activity; it will, in due time, offer manufacturers and suppliers of electronic apparatus an entirely new market, the surface of which has so far hardly been scratched; and it brings Amateur Radio itself in line with the latest techniques in the television field.

The successful outcome of the efforts of the two amateurs concerned—G5ZT of Plymouth, and G3BLV of Sunderland—will be regarded in years to come as marking one of the turning points in the long and fruitful progress of Amateur Radio.

Austin Forth
G6FO.

A Magnetic Tape Recorder

AMPLIFIER DESIGN, AND A COMBINED RECORD/PLAY-BACK UNIT

PART III

E. P. HARRIS (G3GFN)

In this concluding part of his series on home-construction of Tape Recorders, our contributor discusses in detail a number of important points in connection with amplifier design and operation; he also gives valuable practical advice on trouble-tracing and the correction of operating faults in the completed Recorder. The first two articles in this series appeared in our issues for March and April, 1952, of which a few copies are available.—Editor.

SINCE the output from the play-back head is extremely small, considerable amplification is required in the play-back amplifier to produce any appreciable audio drive.

The choice of the first valve is limited, as in the case of a microphone amplifier, to a 6J7, EF37, EF37A, or EF40. The writer tried numerous 6J7's, but in every case they proved very microphonic, and consequently were quite unsuitable. The best valves are undoubtedly the EF37A and EF40, and if a sacrifice has to be made, it is better to use the EF37A in the play-back amplifier, and an EF37 or 6J7 in the microphone channel of the recording amplifier. If an EF37 is used as the first valve in a play-back amplifier, it will be found that a hum bucking resistor will have to be fitted across the heater pins of this valve, and the slider varied for minimum hum, with slider earthed. It is essential to mount this resistor on the valve pins. The writer's experience with a one-side-earth heater line has been far from happy where hum elimination is concerned.

The precautions outlined in the construction of the microphone pre-amplifier also apply to the play-back head pre-amplifier, and should be rigidly observed if the hum level is to be kept to the very low value which is possible with an EF37A. Moreover, in the interests of stability, and since the overall gain of the play-back amplifier is of a high order, screening is of even greater importance.

It is quite possible to design a pre-set equaliser network, for inclusion in the play-back amplifier, and achieve further correction by means of a simple tone control. Personal taste enters into the picture at this point, and while pre-set equalisers can be made to strike a happy compromise, the writer prefers equalisers which are continuously variable.

With a variable equaliser, it is possible to compensate for differences in recorded material, but with the simple tone control, such variation is generally restricted to the ability to alter the response in the upper frequency register.

The ability to patch (connect) the play-back amplifier into another amplifier is quite desirable, and provision for such linking should be made in a play-back amplifier of any scope. Such linking can either be arranged prior to or after the equaliser circuits, but in order that equalisers will always be available, favour is given to linking *after* the equaliser circuits of the play-back amplifier. Any additional tone control circuits on the padded amplifier can either be set for "straight line" operation, or used to give additional control.

Fig. 14 shows the circuit of the pre-amplifier, utilising an EF37A, the equaliser circuit, and the following stage, together with the patch socket. This circuit followed, by a high slope pentode, such as a 6P25, will make an excellent play-back amplifier, and has been used by the writer in an experimental machine.

Play-Back and Recording Amplifiers

Where size is not restricted, and cost is not a limiting factor, the author favours the use of completely separate amplifiers for play-back and recording, as has already been mentioned in Part II (April *Short Wave Magazine*). They can, of course, be fed from a common power supply, since both amplifiers will not be used together.

The use of separate amplifiers enables optimum performance to be secured from each amplifier. It also makes the provision of all the facilities required relatively simple, and moreover, it avoids switching difficulties, re-

moving any possibility of instability; and lastly, it makes experimentation with pre-emphasis and de-emphasis circuits easy.

It has been suggested that the circuit shown in Fig. 14 could be followed by a single pentode output valve, to make a complete play-back amplifier. The resultant circuit, coupled with those shown in the section dealing with Recording Amplifiers and their ancillaries, has given the author excellent results. Further elaboration is, of course, possible in the play-back amplifier; the circuit shown followed by a push-pull amplifier, employing a negative feedback loop, and the provision of the play-back amplifier with a socket to enable tape recordings to be transferred to discs, are but some examples. Whatever is used in the way of an amplifier after Fig. 14 must have reasonable gain, since the output from this unit is still quite low.

Combined Record Play-Back Amplifier

Fig. 15 shows the circuit of a combined record/play-back amplifier, which is provided with reasonable input facilities, pre-set and part variable equaliser network. Although of simple design, the unit is fundamentally sound, and doubtless, once the experimental work in connection with the tape mechanism has been completed, will be modified to give a wider range of facilities should they be required. The unit is attractive because, being a tested design, the constructor can free his mind of one worry, namely, amplifiers!

Play-Back Amplifiers—General

In the construction of a play-back amplifier, certain points which have to be watched have already been mentioned, namely, careful layout of heater wiring, screening, and the like.

Due to the very high gain required, earthing points also have to receive special attention, particularly in the pre-amplifier, where earth loops (liable to introduce hum and instability) must be avoided.

High impedance heads are provided with twin wires covered by an outer screen. This

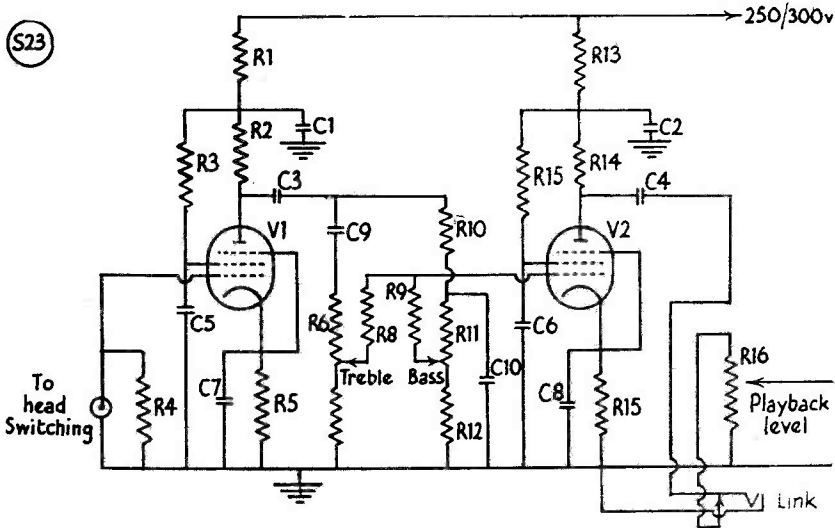


Fig. 14. Pre-amplifier and wide-range tone control circuits for playback amplifier. See table for values.

Table of Values

Fig. 14. Pre-Amplifier and Wide-Range Tone Control Circuits

C1, C2 = 16µF	R3, R15 = 680,000 ohms
C3, C4,	R4 = 470,000 ohms
C5, C6 = 0.1µF	R5 = 2 200 ohms
C7, C8 = 50µF	R7 = 10,000 ohms
C9 = .001µF	R12 = 330,000 ohms
C10 = .01µF	
R1, R6, R8	R16 = 1 megohm
R9, R10,	V1 = EF37A
R11, R13 = 100,000 ohms	V2 = EF37
R2, R14 = 220,000 ohms	

outer screen should be earthed to the metal top plate of the mechanism. The frames of the motors should also be earthed to the metal top plate. It is essential that the metal top plate of the mechanism should be earthed to the chassis of the amplifier by a separate lead, and not via any screening connected with the feed from the head.

A single screened wire can be used to connect the head to the play-back amplifier, provided that it has an insulated outer covering. One of the wires from the head should be connected to the inner conductor, and the other to the braided outer. Under no circumstances should this braiding be joined to, or allowed to come in contact with, the metal of the deck, or otherwise a marked increase in hum level will be apparent. The earthing of one side of the winding of the head to the motor table is, in other words, to be avoided.

In the actual amplifier, the earth point of the cathode resistor and associated by-pass condenser, together with the grid resistor and

the braiding of the screened lead, should all be made at the same point. Too much stress cannot be laid on this arrangement, if maximum stability is to be achieved.

At the selector switch, the centre lead of the screened cable should be switched and the leads to the play-back amplifier/recording amplifier have their braiding joined together. The screened lead to the recording amplifier should *not* be earthed at its terminating point at the amplifier output. The whole arrangement is shown in Fig. 16.

Bias Level

To determine the bias level, a series of recordings should be made, keeping the recording level control at the same setting, but starting from virtually zero bias, increasing the bias by one "notch" for each recording. A temporary calibrated escutcheon should be put on the bias level control, and the control fitted with a pointer knob, thus enabling a note to

be made of the different settings of this control. It is quite important always to record the same material—from a gramophone record, say—for these tests.

On play-back, the use of too *little* bias will show up as distorted reproduction, which as

Table of Values

Fig. 15. The combined Record Play-Back Amplifier complete-

C1, C2 = 16 μ F	R1, R8, R14, R15, R18 = 100,000 ohms
C3, C11, C13, C15 = .01 μ F	R2 = 220,000 ohms
C4, C5, C6, C7, C8 = 50 μ F	R3 = 680,000 ohms
C9, C10 = .01 μ F	R4, R9 = 2,200 ohms
C12 = .0002 μ F	R23, R24 = 3.3 megohms
C14 = 0.25 μ F	R5 = 470,000 ohms
Cx = .003 to .01 μ F	R6, R10, R11, R16, R20 = 470,000 ohms
V1 = EF37A	R12, R13 = 500,000 ohms
V2 = EBC33	R17 = 470 ohms, or as required by HT used.
V3 = 6P25	R19 = 800 ohms
V4, V5 = 6J5	R21, R22 = 47,000 ohms
T1 = Output trans. former	R25 = 1 megohm
S1A-S1D = Single-pole three-way four-wafer switch, with screens between each wafer.	

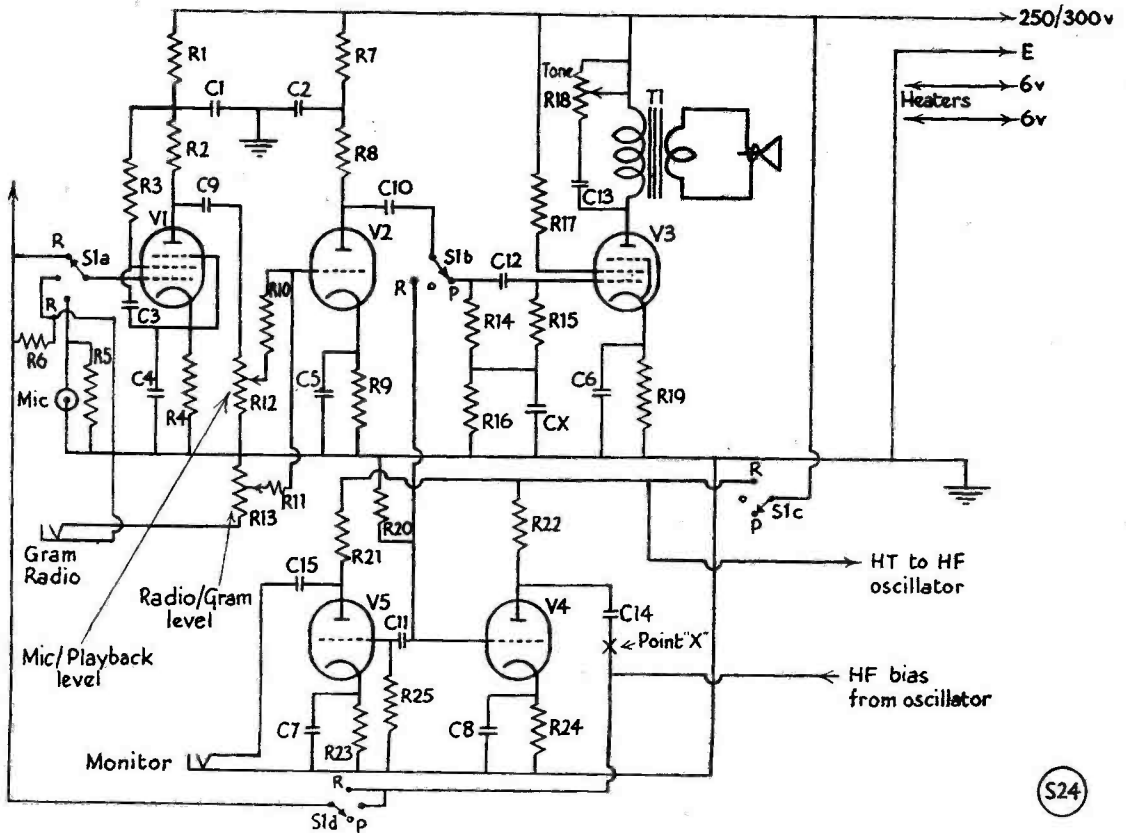
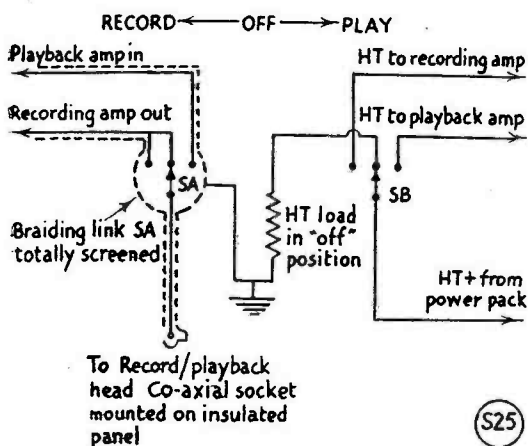


Fig. 15. Combined Record/Playback amplifier, for which values are given in the table. It should be noted that the choice of condenser Cx depends on speaker and mounting; it should be between the figures stated.

(S24)



(S25)

Fig. 16. Switching layout for use with two-amplifier system.

the bias is increased, step by step, will decrease. At the right setting, which has a fairly wide latitude, no distortion will be present. Too

Table of Values

Fig. 17. High Quality Final Amplifier to follow Fig. 14.

C1 = 16 μ F	R7 = 2,200 ohms, high stability
C2, C3, C4 = 0.1 μ F	R9, R10 = 470,000 ohms, 5%
C5, C6 = 50 μ F	R11 = 220 ohms, 5-watt
R1 = 47,000 ohms	R12, R13 = 470 ohms
R2 = 100,000 ohms	R14 = 1,100 ohms, carbon
R3 = 2,200 ohms	V1 = EBC33
R4 = 50 ohms	V2 = 6J5
R5 = 470,000 ohms	V3, V4 = Matched pair 6V6
R6, R8 = 22,000 ohms, 2%	T1 = Output Transformer, pri. 8,000 ohms centre-tapped; sec. 15 ohms.

much bias will show up as loss of top notes, and a reduction in volume.

One fact will be noticed, and it is that the distortion disappears relatively suddenly, and a further increase in bias in point of fact increases the output volume. This increase occurs just prior to the decrease due to over-bias, and it is at the position at which this increase occurs, that the bias control should be set.

When determining the bias level, the recordings should be made as a series, and played back as a series, and not made individually and played back individually. Note that different makes of tape sometimes require different bias levels, the most marked difference being between low and high coercivity tapes. Low coercivity tapes require low bias, and in turn give low output—but they require only a low signal level.

Erase Level

Having determined the bias level, a series of recordings should be made at the correct bias. They should then be played through while varying the erase level control in definite steps. On re-play, the position *after* that which gave complete blank-out should be chosen as the setting for this control, *i.e.*, the next highest erase level.

A certain caution must be exercised in this connection, and it is to ensure that the heads are correctly in alignment with respect to the track. If the erase head is slightly higher or

lower than the record/play-back head, a thin strip of recorded material may not be blanked out, and hence give a confusing indication. In order to overcome this, manufacturers of recording heads are now making the erase track slightly wider than the recorded track, and unless gross mis-alignment is apparent, this difficulty should not arise.

It is quite possible to over-record — signified by a peculiar grating noise on loud passages of an otherwise good recording — to such an extent that the oscillator will not be able to erase. In this case, a permanent

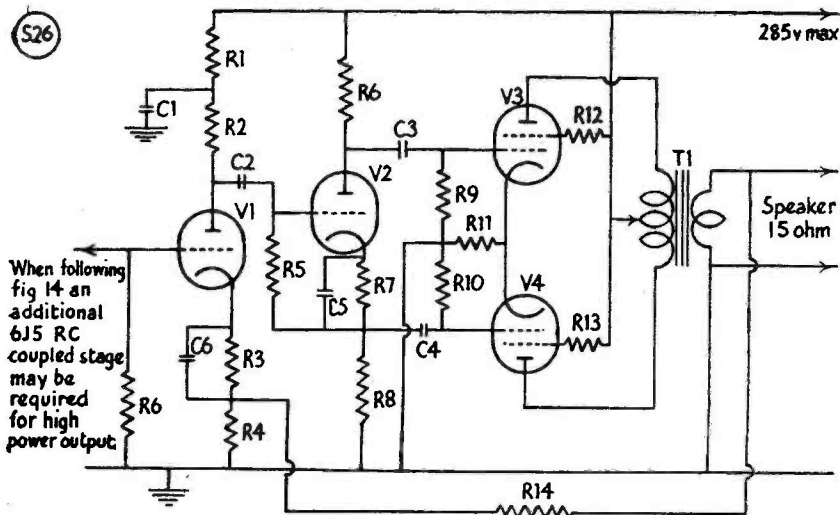


Fig. 17. High-quality final amplifier for use following the circuit of Fig. 14. If a speaker other than 15-ohm is used, R14 must be reduced to maintain the feed-back loop. Values are in the table.

magnet may be held against the tape to give erasure of the previous matter. This DC erase will, however, leave the tape with a high noise level. This can in turn be eradicated by the use of the erase head in the normal way.

Magnetic Heads

It is doubtless not beyond the capability of the average constructor to make his own erase and record/play-back heads. If this is undertaken when constructing a new machine, and without having another machine on which to check performance of the heads, it introduces another set of variables and questions! The author does not favour this. It is far better to start with one set of heads professionally manufactured, and tested, in order that there are no doubts in this direction.

It will be obvious from the foregoing sections, that even with professional heads, the constructor of a tape recorder has sufficient variables to provide "fun and games," and the introduction of additional hazards is not recommended if really pleasing results are to be obtained.

Conclusion and Summary

It is hoped that these articles have been of assistance to constructors who are in the process of building tape recorders, and will have stimulated the interest of others who may wish to embark on a fascinating project.

All the designs given have been tested and proved by the writer, and the circuits can be copied without fear concerning their performance. In the way that this article has been presented, it is hoped that the individual part-circuits and designs will allow the constructor to fit them together, according to the way in which they are required, for the specific design in mind.

In conclusion, a summary is given of possible faults that may arise, and their cures.

Mechanical Faults

Cyclic Wow Record a steady tone from an AF Oscillator and on play-back, watch revolving parts, pressure roller and fly-wheel, to determine which is introducing the speed variation. In the case of the fly-wheel, determine the heavy spots, and drill out. In the case of the pressure roller, determine high spot and rub down with glass paper.

Flutter or Jerking Record a steady tone. On play-back, hold lightly tape coming from feed spool, to determine if motor cogging is the cause. If cogging, increase value of series

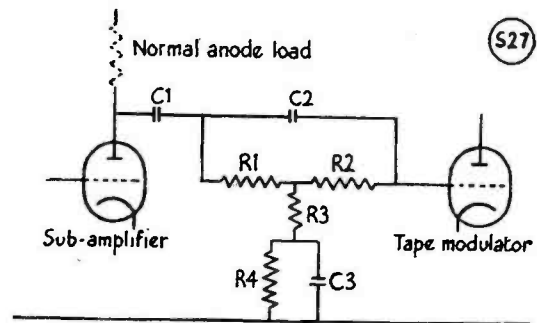


Fig. 18. Recording pre-emphasis network, for which the values should be: C1, 0.1 μ F; C2, 350-500 μ F; C3, .01 μ F; R1, R2, R3, 100,000 ohms; R4, 1 megohm.

resistor. If supply is smooth, increase roller pressure.

Low Output Examine pressure pads to ensure that they push the tape forward on to the heads.

Tape Flap If on re-wind, the tape flaps about in the head mechanism, ensure that the spool from which the tape is being re-wound revolves in a circle, and not elliptically. Correct spool holder.

Slack Re-wind If the tape does not wind on to the feed spool tightly enough on re-wind, feed the take-up spool motor with a low voltage, via a series resistor in the re-wind position. The highest resistance possible consistent with good re-wind should be used.

No notes are given on electrical faults, since they may be traced by the usual methods.

Recording Amplifiers—Final Comments

As a result of further work since the writing of Part II of this article (published in the April issue), certain interesting facts concerning Recording Amplifiers have come to light.

Perhaps the most interesting thing is the difference between various makes of high impedance heads, and also the difference between heads of the same manufacture, having widely different serial numbers!

It will doubtless be remembered that when discussing recording amplifiers, and the tape modulator in particular, it was stated that it was usual to find that the recording head was fed via a series resistor to give constant current feed to the head. It was also stated that difficulty had been experienced in fully modulating a high coercivity tape with a single 6J5, when a resistor of the value of 50,000 ohms was employed, but that omission of this resistor had no apparent effect on the performance

quality. Experience with later heads has shown that, due probably to a modification in design of the head, a series resistor *is* required, and when this resistor is of the value of 12,000 ohms the output from a 6J5 will be adequate. (See point "X" on Fig. 15 also.)

Moreover, for the same recording amplifier design, but using more recently manufactured heads, a deficiency in bass response has been noted. Use of the pre-emphasis circuit shown

in Fig. 18 in the recording amplifier has been found to give sufficient bass lift when used in conjunction with the play-back tone control circuits given in this part.

It is evident from recent experience that even with proved circuits, experiments may be required to produce optimum results, due to variations between heads and/or amplifier layouts. As an example of this, the comments above are perhaps pertinent.

Amateur Television Transmission

G3BLV/T AND G5ZT/T
ESTABLISH FIRST TWO-WAY
TV QSO

THE photographs illustrating this article show the equipment used by G5ZT/T of Plymouth and G3BLV/T of Sunderland for the transmission of Amateur Television in the 430 mc band.

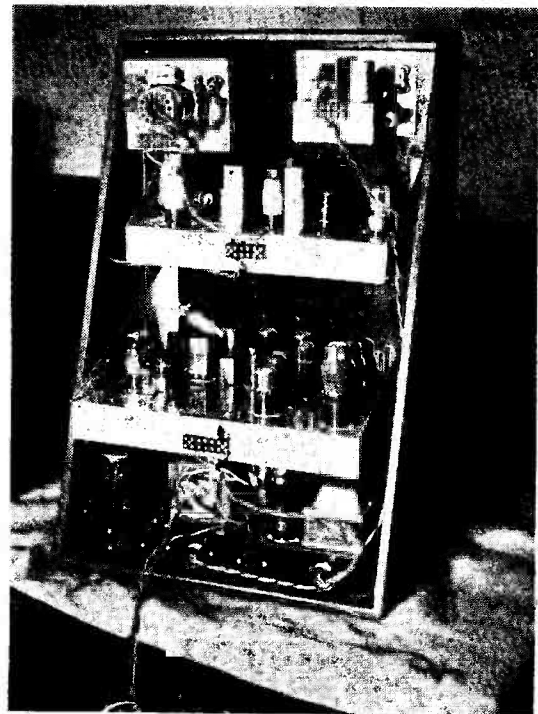
As already announced in the June issue of our *Short Wave Listener and Television Review*, G3BLV and G5ZT have together made history by achieving—on May 1st, 1952—the first two-way TV QSO, over a range of three miles in the Plymouth area. This is believed to be the very first such QSO, amateur or professional, in the world, but on this particular point is subject to verification. It is, however, undoubtedly a new "first" for Amateur Radio in this country.

This remarkable achievement was preceded on April 3, 1952, by the first reception report to be received by a British amateur station transmitting TV "air wise," when G5ZT/T was seen by a local viewer using a 70 cm converter into a standard TV receiver. Between April 3 and May 1 good reception reports were obtained by G5ZT/T daily, and several keen experimenters in the neighbourhood of Plymouth have converters built expressly for the purpose of viewing on G5ZT/T. These results culminated in the two-way contact, G3BLV/T-G5ZT/T, at 8.00 p.m. on Thursday, May 1st, 1952, when observers and press representatives were present at both ends and were themselves televised with excellent results. G3BLV had brought his gear down to Plymouth from Sunderland in order to carry out the test in collaboration with G5ZT.

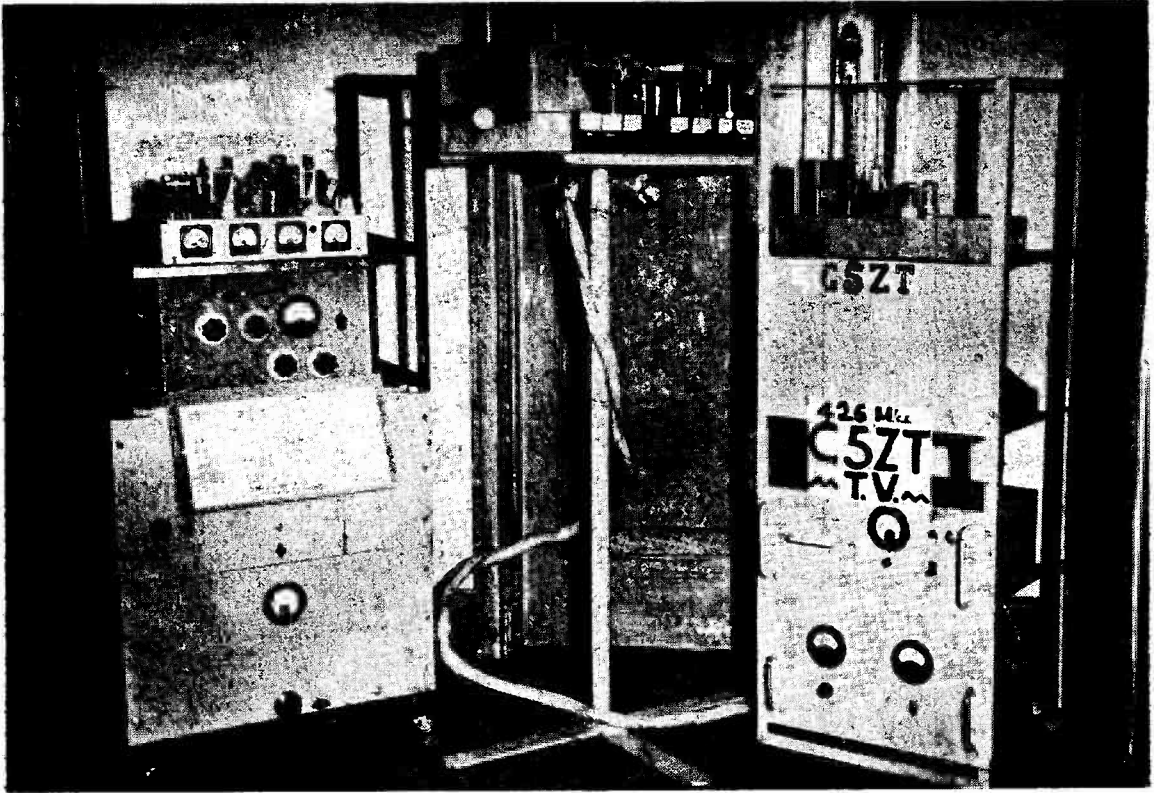
These are momentous events, and in years to come the dates on which they occurred will be regarded as historic in the annals of Amateur Radio.

General Description—G5ZT/T

The gear in the left-hand unit in the photograph includes (top rack) the complete TV/Phone transmitter on 427 mc, running an 832 in the final, grid modulated for TV using a



Rear view of the main unit construction at G3BLV/T. The 70 cm transmitter is top right on the upper deck, with the 3-in. waveform monitor on the left. The crystal-controlled pulse generator is on the second deck from the bottom, with the power supplies below.



The amateur TV transmitting equipment at GSZT/T, Plymouth. From this station on April 3rd, 1952, for the first time in this country, amateur TV was radiated air-wise to local viewers. On May 1st, contact was made with G3BLV T for the first two-way TV QSO. All amateur TV transmission is in the 430 mc (70 cm) band.

6V6, with a speech modulator for the prescribed announcement of callsign every 10 minutes.

The centre unit is the camera section complete, comprising adjustable-focus lens into a 5527 Iconoscope, feeding a video amplifier using seven EF50's; frame and line oscillators, also with EF50's, at 50 and 1,000-15,000 cycles variable respectively; the monitor tube VCR137; and output to video modulator.

In the right-hand rack are contained the power supply units for the camera, time bases and monitor tube and also (top deck) a crystal input converter for actual reception monitoring, feeding into a standard 12-in. commercial receiver in the same room as the camera unit. This ensures that what is being transmitted "airwise" is received by air path for monitoring purposes, there being thus a double check on the outgoing picture.

Equipment at G3BLV/T

The RF gear for 70 cm TV transmission is quite conventional, with a QQVO6-40 tripling

to 430 mc, video modulation being supplied to its screen by a 6AG7 modulator. The aerials at G3BLV (up in Sunderland) are a double-corner-reflector and a folded unipole ground-plane, with vertical polarisation.

In the flying spot scanner, the CRT is a Mazda 30C2, the valve sequence being 6H6 DC restorer-6J5 inverter-6AC7 sync separator-6AC7 line time base-6SN7 line amplifier-6AC7 frame time base-6SN7 frame amplifier. The video amplifier is a 931A multiplier photo-cell followed by three 6AC7's, with output through a 6SN7 as cathode follower. The pulse generator is a 100 kc CO, divided by two 6SN7's in a multi-vibrator circuit, producing 25 and 12.5 kc. The 12.5 kc output goes into a flip-flop trigger circuit, and the frame pulse is derived by rectifying and squaring the mains supply. A rectangular pulse of 320 μ sec. duration so obtained is used as a gate on a stage locked to the 25 kc pulse. The resultant is 8 frame pulses every 1/50th of a second.

The video-pulse mixer consists of three stages

of video amplification, with video applied to the grid of the first stage. Blanking, to suppress fly-back, is fed to the suppressor grid of the first valve. Synchronising pulses appear on the suppressor of the third stage, the final video output then being coupled to the main modulator through a cathode follower.

Back in Sunderland on May 12, G3BLV/T also obtained satisfactory local reception "air wise" over distances similar to those in the Plymouth tests. G3ACK (Blyth, 15 miles) is preparing to view on G3BLV/T, and the latter hopes shortly to have a "live camera" using a 5527 Iconoscope.

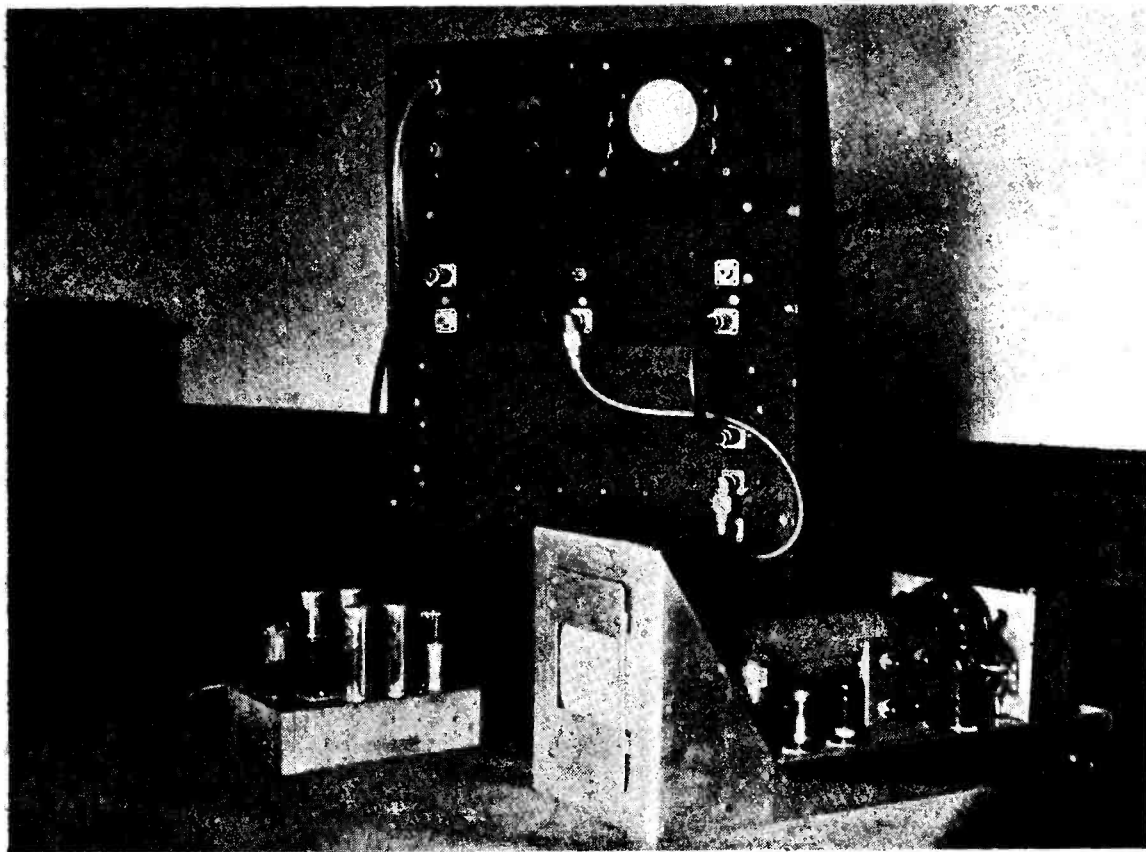
For reception, G3BLV recommends the resonant-cavity type of 70 cm converter, as described by G5BY in the May, 1950, issue of *Short Wave Magazine*, but with the IF taken out at 51.75 mc (in his case) so as to facilitate coupling directly into standard Northern TV receivers. Another successful arrangement is

that on the lines of the G3EJL-G2QY design (see p.112, April, 1952, *Short Wave Magazine*).

Pioneering Achievement

The design and construction of these fine amateur TV stations, which in many ways are quite different and the outcome of much original thinking on the part of G3BLV and G5ZT, reflect the greatest credit on them both. A number of technical problems had to be overcome before constructional work could be commenced and their joint results are the reward of much hard work in this entirely new field of amateur TV. It is certain that the lead they are giving will stimulate more practical interest in TV transmission on the 430 mc band, with increased activity and a wider circle of viewers following progress.

Readers generally will wish to join us in congratulating G3BLV/T and G5ZT/T on their outstanding pioneering achievement.



The amateur TV equipment used by G3BLV/T, and described in the accompanying article. The unit at lower left is the photocell multiplier and amplifier. At centre is the main pulse equipment, with mixer and monitor gear. Right, the scanner unit. G3BLV collaborated with G5ZT to make the first amateur two-way TV QSO.

Supermodulated 807 Transmitter

CIRCUIT DETAILS AND VALUES

G. W. ALDERMAN (G3BNE)

For those who have read about Supermodulation, and perhaps thought of trying it, here is a practical arrangement using normally available valve types. Notes on setting up and adjustment are also given.—Editor.

HAVING for some time used the grid modulator described in the September, 1948, issue of *Short Wave Magazine*, the writer became interested in Taylor supermodulation, which appeared to offer a more efficient method of control.

The basic Taylor circuit originated in the States and is given in Fig. 1. It consists of two stages known as the Power Amplifier and Power Modulator, which will be referred to

as the PA and PM respectively. The PA is biased to cut off and the PM to twice cut-off. For correct modulation the drive should be set so that the PM just draws anode current. Under this condition the PA will provide the carrier, and with audio input, the negative modulation and some positive modulation. The PM, however, will only operate on positive audio input and thus boost the positive modulation.

Now with the drive set as above, the peak value of drive will be equal to the cut-off bias voltage and hence, under quiescent carrier conditions, the PA grid will only just lift to the cathode potential and just start to pass current. Under these conditions it was found that the carrier power was very low. In order to increase the power input to, and the efficiency of, the PA, it was decided to increase the PM bias to four times cut off. Now, with the drive set to a peak value of three times cut off, the essential condition that the PM should only just conduct with no audio input is maintained, together with full drive to the PA. This results in a marked increase of carrier power and a high level of modulation is retained.

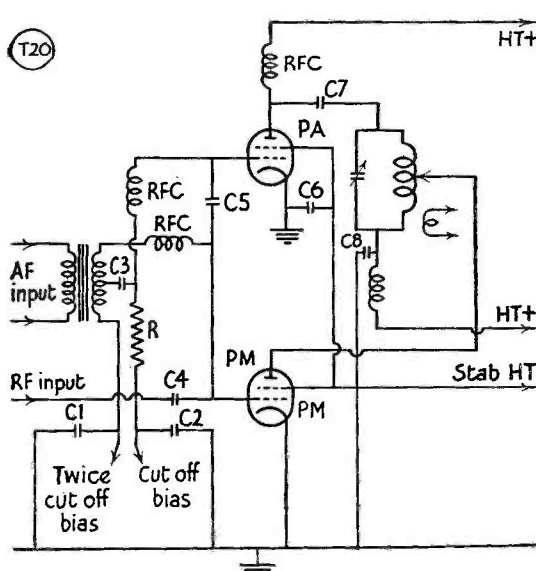


Fig. 1. The basic Taylor Supermodulation Circuit.

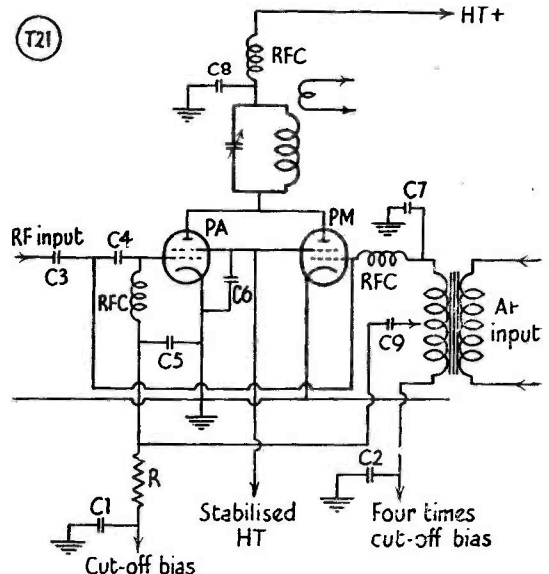


Fig. 2. A modification of the original Taylor circuit—see text.

Table of Values

Fig. 1. Basic Supermodulation Circuit, after Taylor.

C1, C2 = 1.0 μ F	C5 = 500 μ F
C3 = 0.5 μ F	C6, C7 = .001 μ F
C4 = 250 μ F	C8 = .01 μ F

Fig. 2. Modification of the Taylor Circuit

C1, C2 = 1 μ F	C5, C6, C7 = .001 μ F
C3 = 250 μ F	C8 = .01 μ F
C4 = 100 μ F	C9 = 0.5 μ F

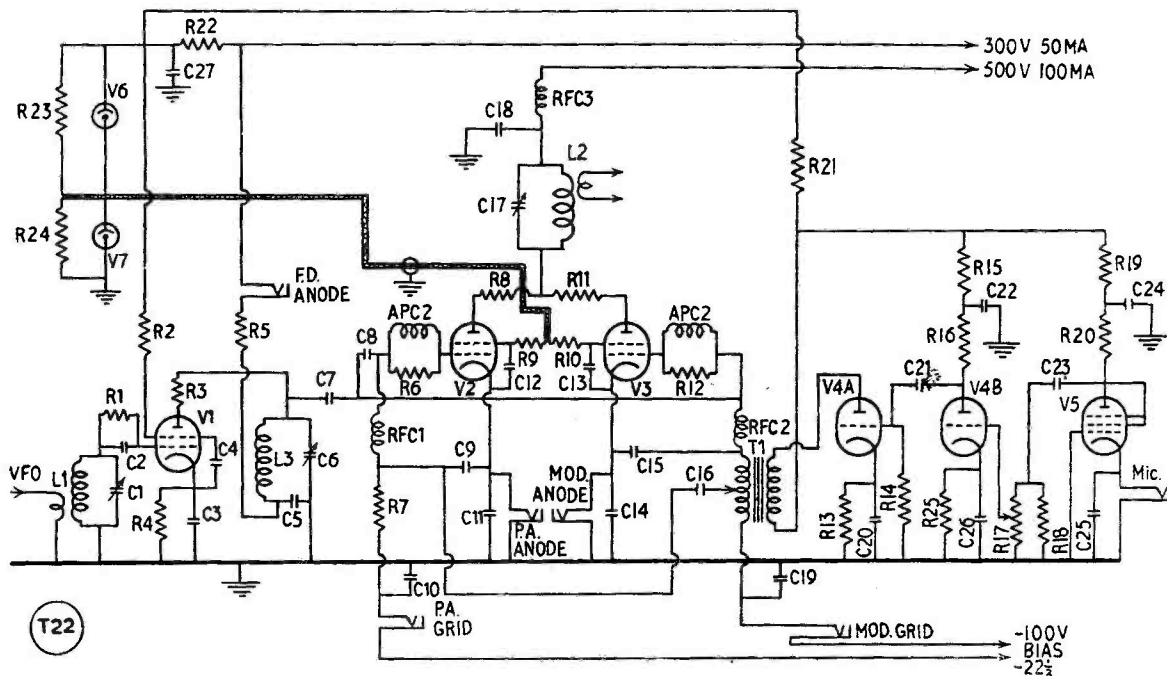


Fig. 3. Circuit of the Supermodulated 807 transmitter complete, designed and operated by G3BNE. See table for values.

Table of Values

Fig. 3. Circuit of the 807 Super-Modulated Transmitter Complete

Condensers		C18 = 0.01 μ F 1000 volts DC working C20 = 25 μ F 25 volts DC working C21, C27 = 0.1 μ F 350 volts DC working C22 = 2 μ F 300 volts DC working C23 = 0.01 μ F 350 volts DC working C24 = 2 μ F 300 volts DC working		RFC1, RFC2 Eddystone transmitting chokes. RFC3 Eddystone transmitting chokes with one pile removed.	
C1, C6 = 160 μ F variable. C2 = 100 μ F silver mica C3, C4, C5, C9, C11, C12, C13, C14, C15, C25 = 0.001 μ F mica C7 = 500 μ F mica C8 = 200 μ F silver mica C10, C19, C26 = 1.0 μ F 150 volts DC working C16 = 0.5 μ F 150 volts DC working C17 = 100 μ F variable, double spaced		R1 = 15,000 ohms R2 = 22,000 ohms R3 = 150 ohms R4 = 1,000 ohms R5 = 470 ohms R6, R12 = 4.7 megohms R7 = 15,000 ohms R8, R11 = 50 ohms R9, R10, R13, R21 = 1,000 ohms R14 = 470,000 ohms R15, R19 = 10,000 ohms R16, R20 = 47,000 ohms R17 = 500,000 potentiometer R18 = 250,000 ohms R22 = 2,000 ohms R23, R24 = 10 megohm R25 = 4,700 ohms		Erie type 9 Erie type 8 Erie type 9 1 watt Erie type 8 Erie type 8 Erie type 9 Erie type 9 Erie type 9 Erie type 8 Erie type 9 20 watt vitreous Erie type 9 Erie type 9	
Transformer		T1 SCRS22 modulation transformer, or as available.		L1 7 mc 14 turns, 1 1/4 in. diameter, spaced 1 1/4 in., 4 turn close wound link. L2 14 mc 10 turns, 1 1/4 in. diameter, spaced 2 in., 4 turn close wound link. L3 15 mc 8 turns, 1 1/4 in. diameter, spaced 1 in.,	
Coils		APC1, APC2 22 SWG enamelled copper, close wound on R6 and R12.			

As shown in Fig. 1, in the original Taylor circuit, the PA is loaded by the tank circuit, whereas the PM is taken to the centre tap of the tank coil. Under these conditions the PM is mismatched and this results in some loss of the positive modulation peaks. In order to offset this mismatch, the two anodes were

strapped together and this resulted in increased positive modulation. Thus the circuit and operating conditions shown in Fig. 2 were evolved.

This circuit was embodied in the transmitter, the full circuit of which is given in Fig. 3. The peak AF required for the PM

to give full modulation is of the order of twice the cut-off bias.

The 807 screens are returned to the 125 volt line in order to avoid overloading the power supply, which is rated for only 120 mA output. It is suggested that where a 200 mA supply is available, the screens be fed at 250 volts. With this setting, bias voltages of 45v and 180v are recommended for the PA and PM respectively. The condenser C25 was required to prevent RF feed back *via* the microphone.

Operating Conditions

With the audio gain control turned down, switch on carrier and adjust the drive so that the PM passes one or two milliamps of cathode current. With the supplies shown, the PA grid current should be between 2.0 and 2.5 mA, and the PA cathode current should be approximately 60 mA, at this drive setting. With the audio gain turned up, the current readings should vary as follows on modulation peaks :

- (1). The PA drive should rise by approximately 0.5 mA.
- (2). The PA cathode current should fall by between 5 and 10 mA.
- (3). The PM cathode current should peak to 30 mA.
- (4). The PM grid current should peak to between 1 and 2 mA.

On speech peaks the aerial current meter should indicate a mean increase of 50%, representing a power increase of 125%. With saturation audio input the present transmitter raises aerial current by 65%, representing a power increase of 170%.

Results

Among the claims for supermodulation are the following :—

- (1). Low quiescent carrier giving reduced heterodyne interference.
- (2). Reduced bandwidth.
- (3). Appreciable carrier increase on modulation peaks together with full modulation.

These claims have been substantiated by reports received with this transmitter. Stations report that, although the carrier appears to be fairly low, the modulation penetrates QRM in a surprising manner. One station gave the following report : "For two to three kilocycles either side of your carrier your modulation appears to have constant strength, but in the next five hundred cycles your signal falls from S8 to inaudibility." Another station reported that his S-meter was lifting by two S-points on modulation peaks.

It should, however, be pointed out that the transmitter will *appear* to be overmodulated on some local receivers. This is due to the time constant in the second detector and AVC stages of these receivers causing distortion, due to the increase of actual carrier on positive modulation peaks. This effect can usually be greatly reduced by switching off the AVC at the receiver. At a time when such a report was received from a local station, another station, using an oscilloscope, reported that the negative modulation was about 90% and that the carrier was definitely not broken on speech peaks.

XTAL XCHANGE

A small offering this time ; readers wishing to exchange crystals are reminded that insertions in this space are free, but can be accepted in respect of *exchanges of crystals only*. Send in your notice on a separate slip headed "Xtal Xchange — Free Insertion." Negotiations should be conducted direct.

G3FCT, 29 South Road, Faversham, Kent.

Has BC-610 type crystals for 3510, 3520, 3550 and 3580 kc, no certificates ; also vacuum-mounted 1000 kc bar for BC-221. Wants 100-1000 kc bar for Class-D Wavemeter, or 100 kc bar.

HB9KH, Pierre Weber, Meilen, Switzerland.

Has FT-243 type crystals for 7020, 7040, 7070, 7083, 7100, 7130, 7150 and 7175 kc, no certificates. Wants frequencies 6000-6083 kc, and 100 kc bar.

RADIO HANDBOOK, ELEVENTH EDITION

The 11th edition of the *Radio Handbook* is the theory-guide to all aspects of radio, covering the standard data, methods and circuits—but not giving a great deal of purely constructional information, provided mainly in later editions. Only 20 copies of this valuable Eleventh are now left (anywhere in the world), and Gage & Pollard have them, at 26s. 2d. post free. Students, designers and technicians should note this.

CARDS IN THE BOX

The operators listed below—for whom we have no forwarding address—are invited to apply for card(s) held for them in our QSL Bureau. Send a large stamped addressed envelope, with name and call-sign, to: BCM/QSL, London, W.C.1, and the QSL's will be sent at the next (fortnightly) G clearance. If publication of the call-sign/address is also desired in the *Radio Amateur Call Book*—the only call-sign directory with a world-wide circulation, containing the QTH's of all the known amateurs of the world—this should be mentioned at the same time.

G2AYT, 2LH, 3BAS, 3DHG, 3HRF, 3HUO, 3IBT, 3IDX, 3IGT, 3IJK, 3ZQ, G131FD, GM3GYJ, 3HZN, GW3CY.

Aerial Coupling and Loading

THE EFFICIENT TRANSFER OF ENERGY FROM RF STAGE INTO RADIATING SYSTEM

PART I

J. N. WALKER (G5JU)

This important article will be of great interest to all who are concerned with getting RF power into an aerial on our normal communication frequencies. The author surveys a number of methods and systems, covering all the operating points arising from the application of each. His treatment is original, his approach is practical, and his explanations are clear and fully illustrated. It can confidently be asserted that his article will suggest the solution to the aerial coupling problem under all operating conditions met with in practice.—Editor.

A GREAT deal is written about transmitters and almost as much about different types of aerial systems, but comparatively little information has lately appeared about transferring efficiently the RF power developed in the transmitter to the aerial proper. This is a vital factor in the successful operation of any radio station, amateur or otherwise, and the newcomer in particular should be clear about the basic principles and methods involved. The fact that a correct reading is obtained on a milliammeter in the PA anode circuit, or a high reading on an RF ammeter somewhere in the aerial circuit, does not necessarily mean that maximum RF power is being generated, or that it is reaching and being radiated by the aerial system.

The Transmitter

First of all, it will be well to consider the final stage of the transmitter. As in an audio output stage, the load reflected into the tank circuit must be of a certain value if maximum output is to be secured. At one time it was usual for the valve manufacturers to quote the load impedance of any given type of valve, but this information is now rarely given, presumably because the correct value, or something near it, is secured if the valve is operated under the conditions generally stated for different classes of service. But when a deviation is made from the recommended conditions—for example, lower anode or screen voltage—the load impedance may change and to minimise this, it is well to maintain the quoted *ratio* of anode voltage to anode current, irrespective of other factors.

At resonance the tank circuit, if properly designed, acts as a very high resistance and does not in itself present a working load to

the valve—the load must be coupled into the tank circuit in one way or another. Because of the high “Q” (magnification factor) of an unloaded tank circuit, a very high voltage will be developed across it at resonance. With a triode valve, the only deleterious effect may be the breakdown of the insulation at some overstressed point (usually the tuning condenser), but in a tetrode or pentode valve, the screen current is liable to run high; it is mainly for this reason that the recommendation is always given not to run the valve without a load of some kind. During normal operation, of course, the aerial forms the load, but when setting up or conducting experiments with a transmitter, it is advisable, for two reasons, to employ an artificial aerial load. The first is that definite comparative indications of RF power output—or rather of power delivered into the load—are easily obtainable. The second is that unnecessary interference is not created on the particular band in use.

It is a good thing to be in a position to measure power output to a reasonable degree of accuracy, rather than to make what may well be a wild guess at it. Further, much valuable experience can be gained by noting the effects of transmitter adjustments (including also coupling) on power output. It is therefore well worth while going to a little trouble in this direction.

Indicating Devices

In an amateur station, the accurate measurement of RF power is by no means an easy matter, the chief reason being the difficulty of providing a resistance which (a) Presents a pure resistance and not quite a degree of reactance (usually inductive) at radio frequencies, (b) Maintains a constant value irrespective

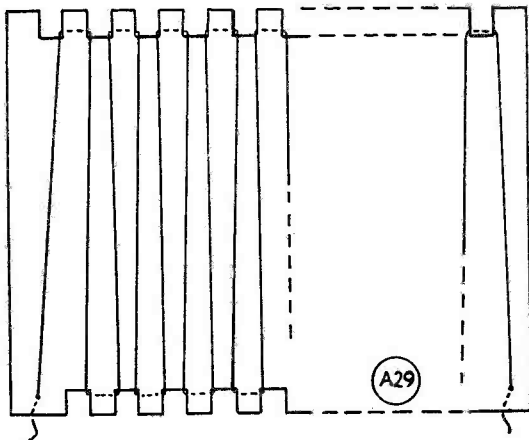


Fig. 1. Sketch showing construction of non-inductive, low capacity resistor, for use as artificial aerial load. Note that the wire is wound on the former in such a way as not to make it a "coil."

of the applied power (the resistance of an ordinary metal filament lamp varies widely), and (c) I_s of known value at radio frequencies; it will not necessarily be the same as the DC resistance.

Special constant-resistance vacuum-mounted components are made, but they are not readily obtainable and recourse must be had either to a home-made affair or to a bank of carbon resistors. The latter will be the more convenient if the power is low, but becomes a little cumbersome if it is desired to measure powers in excess of ten watts. The actual value will be governed by circumstances—if low impedance links are in use, the effective resistance should be in the region of 75 to 80 ohms, but otherwise it will be necessary to use a higher value, say 300 or 600 ohms. Six 470-ohm 2 watt resistors in parallel will approximate to 75 ohms and, provided the load

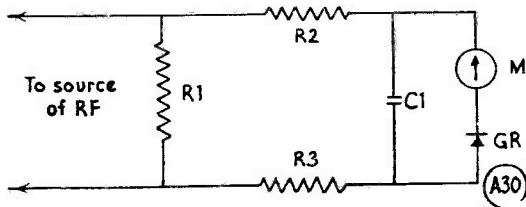


Fig. 2. Circuit of a simple RF voltmeter arrangement for measuring RF voltage across the artificial aerial. GR is a germanium or silicon rectifier; readings to be expected are given in the table Fig. 3. In the circuit above, R1 is the load resistor of Fig. 1; R2, R3, can be 1/2-watt carbons of 40,000 ohms for an 80 ohm value for R1 and a maximum power to be measured of 80 watts; C1 can be .001 μ F, but is slightly dependent on frequency.

is only applied for short intervals, will stand up to something approaching 20 watts.

A suitable resistance can be constructed on the lines sketched in Fig. 1. A board of insulating material is prepared and notches are cut to hold the wire. Dry plywood will serve if nothing better is to hand, but paxolin is to be preferred. Nickel-chrome resistance wire is wound on, the direction being reversed at each notch and the result is a high wattage resistor having negligible inductance or self-capacitance. The gauge of wire should be as thin as will carry the current without undue temperature rise, because the RF resistance will then more nearly approximate to the DC resistance. The open form of construction permits rapid heat dissipation. The total length

CURRENT IN RF AMMETER Amps	READING ON RF VOLTMETER Divisions*	POWER IN 80 Ohm LOAD Watts	POWER IN 300 Ohm LOAD Watts
0.1	1	0.8	3.0
0.2	2	3.2	12.0
0.3	3	7.2	27.0
0.4	4	12.8	48
0.5	5	20.0	75
0.6	6	28.8	108
0.7	7	39.2	147
0.8	8	51.2	192
0.9	9	64.8	243
1.0	10	80	300

* Circuit of Fig. 2. One division = 8 volts

Fig. 3. Specimen chart relating meter indications to the RF power dissipated in the artificial load circuit, enabling power output measurements to be obtained.

of wire will of course depend on the resistance required and on the gauge of wire employed and a few preliminary measurements, using an ordinary DC ohmmeter, will indicate the amount of wire to be wound on.

The power expended in the resistor can be measured in two ways—by a series RF ammeter, or by a parallel voltmeter. The former method is simple but not very accurate. The meter should be of the thermo-couple type and one with a full scale deflection of one ampere will indicate a maximum of 80 watts with an 80-ohm resistor, whilst a 0.5 ampere meter will read up to 75 watts with a 300-ohm resistor.

A voltmeter can easily be made up following the circuit in Fig. 2. The rectifier can be

a silicon or germanium crystal, the meter an 0-1 mA instrument (not higher) and the resistors carbon 1-watt types, of a value dependent on the load resistor. Assuming the latter is 80 ohms, two 40,000 ohm resistors (half-watt size is adequate) will result in a full scale reading (one mA) with a power of 80 watts.

The indication on either type of meter is not linear, but varies with the *square* of the power. A half scale reading therefore does not mean that half the power is present, but a *quarter*. A chart should be prepared for easy reference, a sample being given in Fig. 3.

Rather more space than intended has been given to this question of power measurement, but it is justified because, irrespective of aerial matching problems, the simple equipment described can be of much value when testing out a new transmitter or carrying out modifications to an existing one, whilst to many amateurs work of this sort is actually of more interest than merely communicating with others.

Points About Aerial Coupling

Increasing the coupling between transmitter and load may give the impression that apparently increased power is being delivered by the power amplifier, because the anode current has risen—but it may be that the heavier loading is causing a reduction of RF power and an increase in valve heat dissipation, which, if beyond the maximum, will harm the valve. Also, the signal emitted will tune broadly, since overcoupled circuits in a transmitter will decrease the selectivity in just the same way as in a receiver.

Loading too lightly means that advantage is not being taken of all the RF power available, harmonic generation may be excessive, and with a tetrode valve, there is also the possibility that the screen current will be on the high side. However, it is better to adjust the coupling slightly on the side of under-loading if anything, as efficiency is then likely to be at a maximum, the actual output will be only a little less, whilst the emitted signal will be sharp and less likely to cause interference.

The Aerial

The type of aerial system, and its impedance at the point at which the power is fed to it, will affect the method of coupling, while of course there may be more than one aerial system in use. When untuned feeders are employed, either coaxial or twin balanced line, it is essential that a proper match be arranged at the junction of feeder and aerial. If this

is not the case, the load will not be truly resistive and the inherent reactance will give rise to peculiar effects, the latter perhaps varying considerably over quite a small range of frequency. The indications at the transmitter end will be misleading and no amount of adjustment to the coupling at the near end of the feeder will put matters right. This is all another way of saying that a high standing-wave-ratio exists on the feeders, giving rise to reflections which will bring about unduly high voltages and currents at points in what should be a "flat" line.

Bound up with the matching at the distant point are the lengths of the aerial elements and because the latter have been made to a given formula, it does not follow that everything is in order! One good method of carrying out a check is to use a grid dip oscillator and the reader is referred to the article by the present writer which appeared in the May, 1951, issue of *Short Wave Magazine*.

Methods of Coupling

Broadly speaking, coupling methods can be divided into direct and indirect. By direct coupling is meant a system which draws power directly from the tank circuit — by indirect coupling, any system which involves the use of a second tuned circuit.

It is hardly possible to draw a hard and fast line between them as often a second tuned circuit, although not essential, is used for isolation purposes or for harmonic attenuation. In brief, inductive coupling of an untuned feeder for one, and the well-known Collins or "Pi" coupler for another, are examples of direct coupling and most others come into the second category. Ways of energising a second tuned circuit are given later.

Untuned Feeders

The simplest coupling, applicable to untuned feeders or to a line acting as a link to another tuned circuit, is a coil arranged to engage directly with the magnetic field of the transmitter tank coil. If the latter is balanced to earth, the coil is inserted at the centre; if unbalanced, it is placed close to the earthy end of the coil. The degree of coupling must be variable and adequate insulation provided.

The ends of the coupling coil are connected directly (but often through the contacts of an aerial change-over relay) to the ends of the feeder. If the feeder is of the coaxial type, the outer screening will usually be earthed, which means that one end of the coupling coil is automatically earthed. If twin balanced

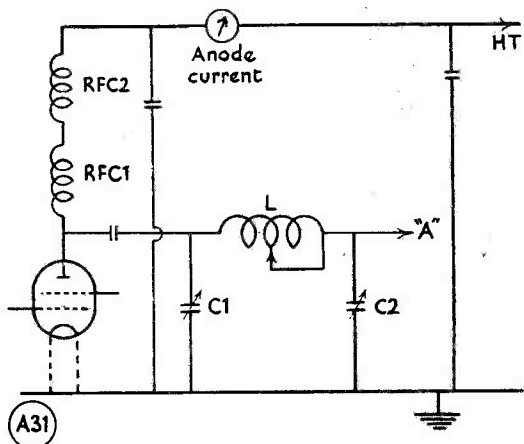


Fig. 4. Circuit of a single-ended, or unbalanced, Pi-coupler

feeders are employed, the centre tap (necessarily approximate) of the coupling coil should be earthed, using for the purpose the shortest possible length of flexible braid.

The number of turns in the coupling loop must be such as to reflect the correct impedance ratio and the problem is somewhat similar to that of matching a low impedance loudspeaker to a high impedance valve, different ratios being necessary according to circumstances. In a transmitter with a balanced final stage (single or push-pull), the working impedance is higher than when using an unbalanced single-ended stage and the same applies when a high impedance tetrode valve (high ratio of anode voltage to anode current) is used, compared to a low impedance triode (but there are also high impedance triodes).

The ratio between tuning coil turns and coupling coil turns will accordingly vary, but in actual practice this factor is generally taken care of automatically because, in a high impedance circuit, the tuning coil should possess considerably more turns (involving a smaller tuning capacitance or, in other words, a high L/C ratio) than in a low impedance circuit.

For example, and taking 7 mc, a high L/C ratio could mean a coil of up to 20 turns (about $2\frac{1}{2}$ inches diameter) but the low impedance circuit will call for only 12 or 14 turns. In practice therefore the *coupling* coil will remain fairly constant in size whatever the circuit, but should any doubt exist, the coil should be made on the small side and increased only if sufficient coupling is not obtainable at "full mesh." On 28 and 14 mc, one turn is usually adequate: on 7 mc two turns and on 3.5 mc,

3 or 4 turns, all for 75 to 100 ohm cable. For higher impedance feeders the number of turns should be increased, not in direct proportion to the impedance but to the square root of the ratio. For instance, with 300-ohm feeder the ratio is 300 : 80, or roughly four to one. The square root is two and the number of coupling turns should be doubled.

The "Pi" Coupler

The "Pi" or Collins coupling method has much to recommend it. The system is straightforward in its application, permits rapid adjustment for proper loading and tends if anything to reduce the radiation of harmonics. Perhaps its greatest advantage is the ease whereby a wide range of aerial impedances can be correctly matched. The aerial can be long or short, resonant or non-resonant or even of unknown length *and yet made to accept a load efficiently*. It is hard to exaggerate the importance of this. The disadvantage is that high capacity tuning condensers are often necessary, particularly on the lower frequencies.

The usual single-ended circuit is given in Fig. 4 and is suitable for working into an end-on aerial of almost any length, into a single wire Windom-type feeder or into coaxial unbalanced feeder. By adjustment of condenser C2, the impedance at point "A" can be varied widely with respect to earth. When C2 has a high capacitance the impedance is low, and *vice versa*. Naturally the actual working value of C2 depends on the frequency, and to match into 80-ohm coaxial cable on 7 mc calls for a fairly large condenser. Also, the ratio of impedance between the coil L and the loading condenser C2 has to be taken into account. Where the aerial impedance is expected to be high (as with a half-wave) the inductance L should also be high. In actual practice it is well to make L variable in steps.

Whilst L and C2 are in series, the circuit as a whole is still a parallel resonant one and tuning to resonance is effected with C1. Because of the wide variation in series reactance, C1 must necessarily possess a larger maximum capacitance than if C2 were omitted. It is interesting to compare the Fig. 4 circuit with that of a superheterodyne oscillator, when C2 would be the padding condenser, and also with the well-known Clapp oscillator—both of these may appear to be series circuits but are actually parallel ones.

It is normal practice to remove HT from the tuned circuit when using a "Pi" coupler, as is indicated in Fig. 4. High radio frequency voltages appear at the valve anode, of course,

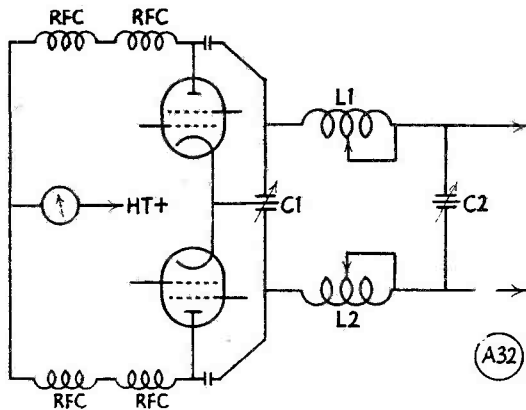


Fig. 5. A balanced Pi-coupler working into a balanced aerial load.

and also across the RF choke through which HT is fed. This choke will be of a low loss type, but the high RF voltage may be greater than the insulation can withstand and for which the choke was designed. The volts-per-turn may prove excessive, with consequent failure of the wire insulation and probable overheating. The position is similar to that found in an audio or mains transformer, in which the power being handled may not be excessive but the voltage applied or developed is. In the present application, it is wise to employ two or even three chokes in series to give a more reasonable RF voltage drop across each.

The spacing of the vanes of condenser C1 will be normal for the power employed, but the operating conditions affect what spacing is necessary in the case of C2. If the aerial impedance is low, so also will be the voltage across C2 and a receiving type condenser will often prove adequate. On the other hand, with a high aerial impedance, a transmitting type condenser is necessary unless the power is low. Considerable RF voltage is developed across the tuning coil and both ends should be well insulated.

It is sometimes required to work a balanced PA circuit into a balanced aerial system (e.g., 300 or 600 ohm feeders, or a "Zepp") and the circuit then becomes as in Fig. 5. The inductance is duplicated and split-stator tuning condensers are used. Adjustment of the taps on the coils must be kept as nearly equal as possible for proper balance.

In operation and referring to Fig. 4, the aerial or feeder is attached to point "A," condenser C2 is set to maximum, and the circuit brought to resonance, as indicated by minimum

dip on the anode current meter, by adjustment of C1. Unless the aerial impedance is very low, it is probable the anode current will be but little above the unloaded value. C2 is then reduced in steps, resonance being maintained with C1, until a correct reading is obtained on the anode current meter. If an RF ammeter is available, it should be inserted in the aerial lead—the actual current recorded means little unless the impedance at the point of insertion is known accurately, but the meter will prove of value in showing that the PA is continuing to deliver additional power as the matching improves and anode current rises. Should the RF meter show a maximum and then begin to decline before the correct PA anode current is reached, it is a clear indication that operating conditions are not correct—the drive may be inadequate or perhaps the bias is too high.

If the final setting of C2 is low, it may assist in the securing of a better adjustment if the amount of inductance in circuit is reduced and again, when a definite maximum cannot be achieved with any setting of C2, alteration to the taps on the coil will be necessary.

Occasionally it will be required to match a balanced PA into an unbalanced load. The "Pi" coupler does not readily lend itself to this application and a suitable method is given later.

Coupling to a Second Tuned Circuit

There are a number of methods available for coupling from the transmitter to a second tuned circuit, the aerial taking its feed from the latter. This second circuit should have characteristics similar to those of the tank circuit except that it is not advisable to employ an unduly high L/C ratio.

The inductive loop described in a foregoing paragraph is one good way, a similar loop being provided to couple to the second circuit as in Fig. 6, which illustrates three different conditions. Some experiment may be called for in the number of turns to ensure sufficient coupling, but the advice given earlier holds good. As usual, the coupling to the first coil is variable, but, with the second, it can be fixed. Coaxial cable is almost invariably used, with the outer sheath earthed, at least at the transmitter end. This particular method is most convenient when the aerial circuit must of necessity be well separated from the transmitter proper, whilst of course it is useful also when TVI is experienced as it allows insertion of a low-pass filter in the line.

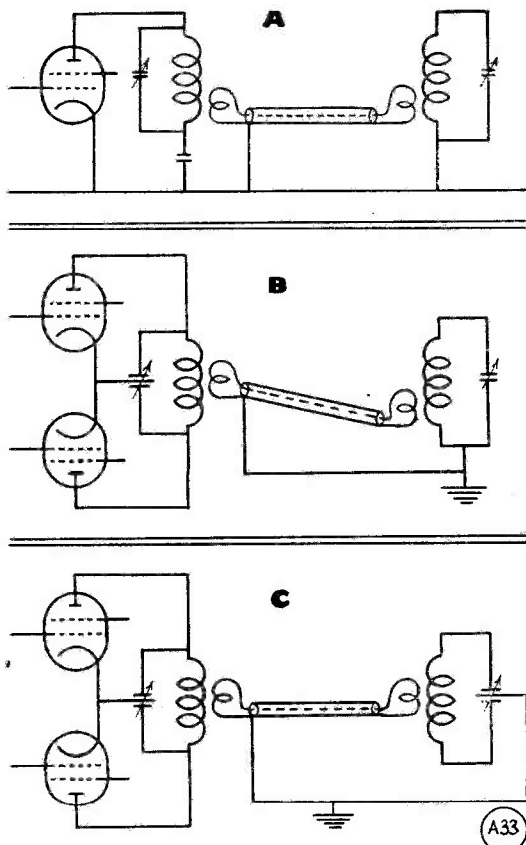


Fig. 6. (A) Low-impedance link coupling between a single-ended PA and an unbalanced aerial circuit. (B) Arrangement when PA is balanced and aerial unbalanced. (C) Balanced PA and balanced aerial circuits.

A variation which dispenses with the second coupling loop is shown in Fig. 7. Here the current flowing in the line has necessarily to flow also through the circuit as a whole and the first loop and the line itself form part of the tuned circuit, albeit a part possessing low impedance.

Then there is direct inductive coupling between the two circuits, a system the writer

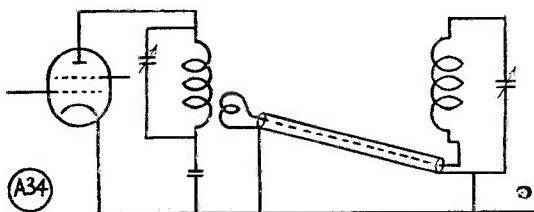


Fig. 7. Alternative method of providing link coupling. A single-ended PA is shown but it may equally well be of the balanced type.

favours because transfer losses are exceedingly small and a very precise degree of coupling is obtainable—and the latter is a very desirable feature when a long wire aerial is used on several bands, or when more than one type of aerial is employed. However, with the increasing popularity of the fully screened “table top” type of transmitter, direct inductive coupling is practically out of the question.

Yet another method is top capacitance coupling. This is used to a considerable extent in receivers yet only rarely is it applied to a transmitter. The circuit is as in Fig. 8, a

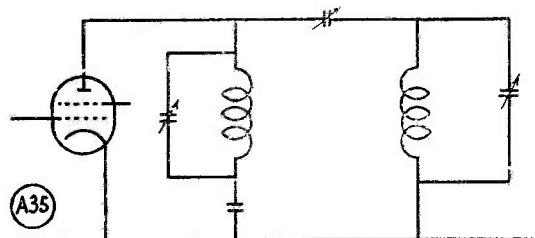


Fig. 8. Top-capacity method of transferring power to a second (or aerial) circuit. The coupling condenser should be a wide spaced variable of about $15\mu\text{F}$ maximum capacity. Very small coupling capacities are all that are required in this application.

variable condenser of small capacitance (10 to $15\mu\text{F}$ is ample even on the lowest amateur frequency) being connected between the “hot” ends of the tank and aerial circuits. Again the degree of coupling is readily adjustable for peak transfer, it being only necessary to avoid over-coupling which may give rise to an unduly broad signal.

Applying the Aerial Load

As suggested earlier, those unfamiliar with the proper procedure would do well to carry out preliminary experiments with an artificial aerial load. The way it is connected will depend on the impedance it simulates, but, with the exception of a 75 or 80 ohm load which will be connected direct to a line, the artificial load will be placed across a portion of the aerial circuit—that is, tapped on to the coil as described for the actual aerial in the following paragraphs, where it is assumed that the non-radiating experiments have been completed.

To give a medium value of L/C ratio, the tuning condenser should have a maximum capacitance of about $50\mu\text{F}$ on 14 mc; $100\mu\text{F}$ on 7 mc; $160\mu\text{F}$ on 3.5 mc, and $250\mu\text{F}$ on 1.7 mc, the coil being of such a size that resonance results with the tuning condenser at about three-quarter mesh.

One of the most reliable indications of the degree of loading is given by watching the movement of the needle in the PA anode current meter as the aerial tuning condenser is rotated. If on passing through resonance the rise is very sharp and to a high value, the loading is much too light. On the other hand, if the rise is very slow and the maximum value is maintained over quite a number of dial degrees, the loading is too heavy. It is a matter of getting the "feel" of the circuit. Correct loading obtains when no meter movement is observed until resonance is approached, then the rise is smooth and steady to a single peak, neither too narrow nor yet unduly broad. This peak should be quite definite but should not entail critical adjustment of the tuning condenser. It may be that when this condition is reached, the anode current is too low or too high. It is then a matter of adjusting the degree of *coupling* and not the *loading*, until the correct reading is obtained. The combination of transmitter, coupling and aerial is then working at high efficiency and reports received from stations worked (and they will be worked) will indicate good consistency.

In broad principle, the aerial or feeder, of no matter what type, presents a certain impedance, which is another way of saying that a definite *ratio* of voltage to current must be applied for maximum energy transfer to occur. As an example, in the case of a feeder having a surge impedance of 100 ohms, the correct

ratio is 100 and if 100 watts of RF energy is available, the feeder requires an applied voltage of 100 when one ampere of current will flow. If the feeder is attached to a point which tries to maintain a potential of 200 volts, it cannot accept the 200 volts—to maintain the correct ratio this would mean a current of two amperes and the power would then be 400 watts. Again, if the applied voltage is 50, only 0.5 ampere would flow and the feeder would only draw 25 watts. In the former case, the circuit would be heavily damped, the RF voltage would fall and the actual power drawn by the load would be well below the maximum possible. In the second case, there would be every indication of light loading, with too much RF voltage in evidence at high potential points. Actually in practice, the voltage across the feeder is brought to the correct value by adjustment of the magnetic coupling.

Tuned "Zepp" Feeders

It is not proposed to say much about these as they are adequately dealt with in the various handbooks. According to the length of the feeders and to the frequency, the near ends of the feeders will present either a low impedance, which will call for current feeding, or a moderately high impedance, when voltage feeding will be necessary. In either case, the coil is the same and it can be coupled to the transmitter by any of the methods outlined earlier.

(Part II of this Article will follow)

SOME ERRORS CORRECTED

In the April 1952 issue, p.112, values were not given by G2QY for condensers C11, C12. They should be 3-30 μF concentric trimmers, or some similar very small variable capacity.

G5JU slipped into a small one (p.144, line 7, left-hand column) in his excellent article on a Top Band aerial in the May issue. A length of 30 feet is, of course, "near enough one-sixteenth wavelength" on the 1.7 mc band, and not as stated. In this same issue, G4AY ought to have shown, in his circuit on p.175, one side of the heater of V1 taken down to earth, the cathode only going to the coil tap. And for C12 in this diagram, read C8 with value as given in the table below the circuit.

In the article by G3EN1 (May issue), an unfortunate transposition of the text occurred, for which no good reason could be found in the subsequent *post mortem*. The piece commencing "An improvement . . . (top right, p.165) as far as " . . . adjustment procedure should be adopted" (under "Final Observations" in the right-hand column, p.166)

should be read as being at the *end* of the article. That is to say, the part headed "Development" on p.166 should follow immediately after the left-hand column on p.165 of the May issue.

OUR QSL BUREAU

For the information of those who may be interested, we now have 3,178 readers listed as regular users of our QSL Bureau—a very much smaller number, incidentally, than those who would be entitled to its full use both ways by virtue of being direct subscribers. Not only does the method of operation of our Bureau contribute something to the expeditious handling of cards through *all* bureaux (since we operate on the direct-mail system), but those who can use BCM/QSL as their *sole* QSL *address* automatically get a faster and more certain service than any other bureau organisation can give. Some more detailed notes on our QSL organisation appeared on p.180 of *Short Wave Magazine* for May, 1951.

DX COMMENTARY

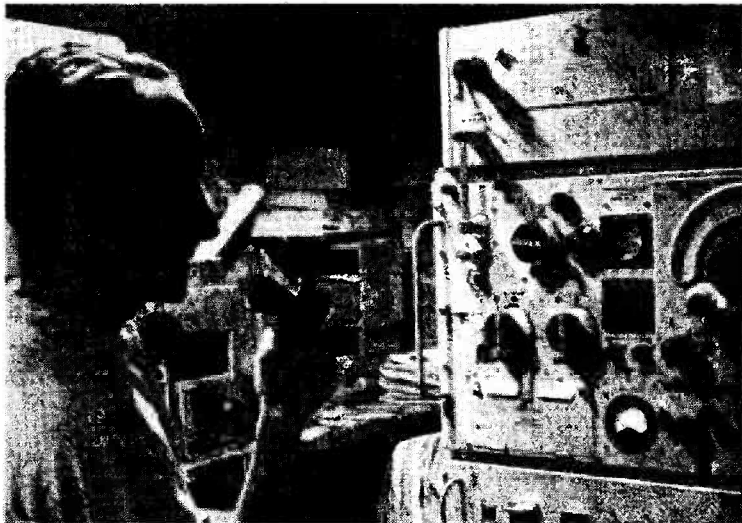
L. H. THOMAS, M.B.E. (G6QB)

SO things are looking up! At least, they are at the time of writing, but it may well be that they have fallen back in the hole by the time this reaches you. After a most depressing April, May saw a series of openings on the 14 mc band, until by the middle of the month it was almost back in its old form. Day-time operation was not easy, owing to short-skip and static, but the early mornings and late evenings were very much more promising than anything we have yet had this year.

As an example, on the morning of writing this, your Commentator heard KH6, KJ6, KM6, KS6 and VR1 in quick succession, all on phone around 14300 kc, and between the hours of 0730 and 0830. And, on CW, ZK2AA came back to a CQ

This leads us on to a suggestion that has been lying dormant for some time. We would like to make this feature more of a general picture of the DX world and less of a series of sentences saying that G3XYZ has worked VQ7XX. Such statements mean so very little nowadays, especially when unaccompanied by times or frequencies. Now, if we could say, as the result of scanning several letters, that VQ7XX operates around 14100 kc most week-days at 2000 GMT and has been worked by several G's at that time—then that would *not* be a waste of space.

So we propose to give fewer individual credits for working this-and-that, in order to have more space to paint the general DX picture. Please co-operate in



G40U

CALLS HEARD, WORKED AND QSL'd

this, by keeping the really common-or-garden DX out of your logs, and by giving fuller details of anything unusual—frequencies and times, and any knowledge you may have of skeds or operating periods.

Our other main function—that of maintaining a running commentary on operating practices and malpractices—continues all the time. So please don't take the previous paragraph as a request to cut your letters down to a mere statement of a contact or two. Keep your letters as general as you iike, but if you are a "regular," please eliminate all the stuff about having worked PY's, LU's, EA8's, ZS's and so on—unless you are a newcomer, a QRP exponent, or just a guy who hasn't worked those countries before and feels very pleased about it! From the newcomers we are always pleased to hear, with all the news they care to give.

The 21 mc Band

It is common knowledge by now that the 21 mc band is being partly released to us on July 1. We shall have 200 kc (21.0-21.2 mc) for CW only; later on the phone fraternity will be given their slice. With conditions (speaking in the long-term idiom) as poor as they are, this band will not be exciting this year or next; but anything in the way of new territory is interesting and very acceptable. Several countries are already in full swing on the band, and there should be quite a lot of contacts to be made. So we will celebrate the opening with a 21 mc Marathon, to run for one year from July 1, 1952.

Zones will not enter into this—simply Countries Worked on 21 mc. So get ready for the opening and send in your scores month by month. And don't forget that even "G" counts as one country!

EK1CW (Tangier) worked WIBUX on the 21 mc band at 2310 GMT on May 10, and was very surprised at the lateness of the hour. He thinks this was the first-ever 21 mc contact from Tangier. In addition, EK1CW heard W1, W2, KP4 and OQ5 on CW; also OZ and HB9 on phone. (In a later note he adds that he has now worked W1, PY and OZ, and heard W1, 2, 3, 4, 5, 9 and Ø, OQ, SM, HB and KP4. The culminating achievement was a contact with a GM station, who was working on 7 mc but "knew he had a strong harmonic"!)

G3FXB (Hove) also did some listening on the new band, and logged OQ5RA, TI8PE, KP4, PY and HB on CW, as well as lots of PY's, ZB1, OQ5 and OD5 on phone. (That OD5, by the way, is now the official call of the formerly-unofficial AR8's. Old AR8AB is now OD5AB).

No further news about 21 mc, except that we heard a fine signal one evening from ZE3JJ; the ZE's have been allowed to use the band for some years, but until now there hasn't been much point in their doing so.

We foresee a certain amount of TVI trouble in the Home Counties for this band, but at least we haven't the same headache as the W's, who have to cope with some millions of TV receivers with a 21-mc IF!

DX on 14 mc

Whatever happens to our new toy, the 14 mc band will never be out of the DX picture. Until July 1 it remains the *only* DX band under present conditions, so there is nothing strange about the preponderance of mail concerning Good Old Twenty.

G8KP (Wakefield) ferreted out VP5AY, JA2KL, F18AB, CR9AH and VR2CG; he also heard VR1A but had no chance to call him. G3FXB (Hove) supplies CR4AJ and 9AH, FB8BB, KG6, KH6 and ZD9AA, with OA4EK as the most exciting Gotaway. He found FB8BB very easy to work on 14130, but doesn't like the dog-fights that take place over ZD9AA. On one occasion (after a QLM) everyone called on his frequency, and a certain EA, not having any luck, proceeded to stay on the

same frequency and call CQ instead. (An attitude described by 'FXB as "I can't wait, I must shout"). There is an awful lot of this particular kind of clottery these days.

G8FC (RAF, Locking) puts in an impressive list of DX worked, complete with times and frequencies. Some of the better ones are DU1MB (1525, 14035), F18AB (1530, 14025), FO8AB (0745, 14060), VK9DB (1500, 14048), ZK1BC (0720, 14060) and 4U-AJ (1725, 14070).

G2VD (Watford), using a ground-plane, collected ZM6AK (1300, and highly suspect!), YS10 (2300), VP7NM, VP9G, CP1BK and XE1FH (all 2300), CR5JB (1900) and a UA1—all on CW. Another one of interest was SU10G operating from Jordan with the call JY10G. After being called by the pack during a QSO, he came back, sent simply "Wolves!" and went QRT.

Another ground-plane has 25 watts pumped into it by G3HZL (Isleworth), a new correspondent to this feature. His best were VK, EA9, OX, Y1, CT2, plus some mighty interesting Gotaways!

Three new ones for G3BDS (Worcester) were FM7WH, Y13BZL and ZP1TB. The FM called "CQ F," so 'BDS had a crafty go with a "CQ FM7" and was rewarded. Perhaps the fact that he was FM7WH's first G had something to do with it?

G2DPY (Shoreham) has now gone up to 50 watts and hopes to go even higher when he finds a screen supply of the right voltage! His best were KL7, KV4, 5A2CC, OA4ED (0600), KG6, CT2 and VS6. G2NS (Bournemouth) maintains his usual afternoon vigil, and between 1400 and 1630 he worked KV4, EA9, VQ2, VP4, W6 and some lesser lights. Gotaways were FN8AD, VK3DB, 4U-AJ, VP8AJ and some VS7's. Other stations heard include loads of Far East stuff such as FI, five DU's and some VU's, as well as the elusive VQ8CB (wish we could even hear that man).

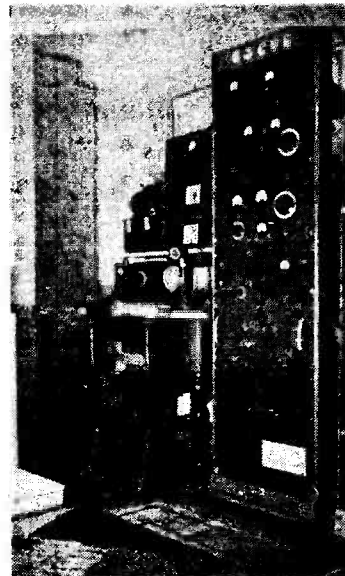
Some Phone DX

GM2DBX (Methilhill) found F18AC and DU7SV for two nice new ones on phone, and pushed his Zone score for this year up by

eight. Zone 26 yielded FI, HS and XZ. His QSL from DU7SV arrived within three weeks. New ones this year for G3TR (Southampton), also on phone, were SU, KH6, OD5, KM6, VQ4 and GM2DBX! The Midway Island contact was with W6HQH/KM6 (0825, 14295). He's the one we heard this morning, and a very nice signal, too—but, for us, only a Gotaway.

G5BZ (Croydon) also did quite well on phone, mopping up such DX as OD, MI, YA3UU, YV, HK, HP, HR and ZP (the latter for the first time in 23 years). CW brought him HP, EQ, CR5, CP and ZD9, among many others. He would like to know how to work XE for Zone 6, as the only one he ever hears is XE1AC, calling CQ USSR. (We did find XE2N one day at about 1630, but we wouldn't call him regular).

G6YR (Southport) still hasn't got his VFO going, but with three crystals he has managed a very substantial jump up the Marathon ladder. He says that crystal tech-



Neat station of G3CVG, Wakefield, Yorks., who is active on all bands 10-80 metres. On Twenty, he runs 150 watts to an 813 and over a period of 18 months maintained a regular schedule with his son VS6AC (see p. 479, October), who is now G3IAD. As at the middle of March, the scoring at G3CVG stood at 149C in 39Z, with 48 States worked and DXCC held.

NEW BAND OPENED

It is announced by the Post Office that, with effect from July 1st, 1952, amateur operation on CW only will be permitted to all British licence holders in the band 21,000-21,200 kc. Simultaneously, and from the same date, the width of the existing 14 mc band will be reduced by 50 kc to 14,000-14,350 kc. In effect, the nett gain is 150 kc of new space. A number of other countries are already licensed for and operating on the 14-metre band. It is understood that an additional 250 kc, making the band 21,000-21,450 kc, which is the final entitlement, will be released to us in due course, together with authority to use phone as well as CW.

nique at least ensures that you don't miss anything on your own frequency; and a good deal of the DX drifts on to your frequency sooner or later. 'YR worked XE2OK (G5BZ, please note), HE9LAA (who is quite legit) and LU4Z1, Deception Island.

G3FPQ (Bordon) added quite a lot of nice DX to his score, still using 25 watts. He found a good patch for South America and collected KZ5, PY, CX, LU and YV in one hour, with only one fruitless call. Other good ones were KG4AF, KV4AC, VP4LZ, 7NM, 7NT and 9F. G2HKU (Sheerness) has been too QRL for much time on the air, but did wrinkle out FF8AF for a new one.

G3ABG (Cannock) worked IT1AGA and CR5JB for new countries, as well as plenty of the more ordinary things. He heard CR7AG, 9AH, JA2KW, 7SL, 8AB and KG6ABW, but had no luck there. G2BW (Walton-on-Thames) put in two new ones with MP4BBD and JY1AJ. G6QX (Hornchurch) stuck on one crystal and raised VP4LZ, 5BH, 9OO, CX6AD, KV4AC and T12TG—mostly late at night.

G3GUM (Formby) was pleased to find mornings opening for the Pacific and West Coast USA, but his two all-time new ones came from the other direction—MP4BBD and 4U-AJ. He is one of the few who remark on the afternoon signal from C3MC (another of our Gotaways), who seems to be genuine and on Formosa. 'GUM also heard F18AB and 8AD. CR9AH, CR4AJ and ZD9AA. He finds that he has a rival "G3GUM," who works phone on the Top

Band and Twenty. The genuine 'GUM is Twenty CW only. He got quite a kick (and gave one, too) working KZ5LL for the latter's *first contact ever*.

G6TC (Wolverhampton) says "those misguided fellows who say conditions are good could never have listened during the years 1946-49. In fifteen years of Amateur Radio I've never known them so *bad* as during the first four months of this year." He's probably right, at that, but the DX is still there and may even be improving at last. 'TC bagged VP9, KV4, VK, ZL and W7, but nothing else much. G3FXA (Bexhill) was cheered up by ZD6DU for a new one, but otherwise he thinks it was a shocking month, in spite of KG6ABI (1635), KH6WU (0924), CE4AD (2359) and various oddments. The ZD6, by the way, came back to a CQ at 1730.

General Gossip

General items of news, all concerning Twenty, are that the EA9DC expedition to Ifni came off, but only used phone; that ZC2MAC is in full blast from the Cocos Is., but doesn't seem to hit G-land very hard; that WØELA hopes to get a permit to operate from VS4 and VS5 this year.

There is said to be a VR6AC, using a kilowatt, who has worked some LU's with a T6 signal . . . VP1AA is returning to the air . . . FH8AB and FW8AA were both said to have been pirates . . . WØEGY/KJ6 is worth watching, phone on 14285 . . . ZK2AA is on both phone and CW . . . FU8AA has been heard on the band, but the genuine one is said to use 7 mc only.

News of Forty

Precious little activity on 7 mc comes under the heading of DX these days. That happy hunting-ground of European phone and all-and-sundry broadcasting has very little to offer. G2DPY managed to wrinkle out VK, ZL and W. G2HKU heard G6BS working ZK2AA and calling VS4BJ; 'HKU worked VK and ZL, and heard VQ4CW, CM2EG and 8BC, and KZ5CS. Otherwise the band is apparently ignored, even by its erstwhile friends.

Activity on Eighty

One thing about the 3.5 mc band—it never suffers from lack of activity. But whether you could call any of it DX these days is rather doubtful. G3ABG found CN8FQ and CT2BO for new ones, and G3FPQ worked CN8FQ, EA9AP and 4X4BX, with VP7NT and KV4AA as Gotaways. G5BZ made two new ones with YI and CT. Gotaways being CE, LU and ZS3. G3HYJ (Norwich) asks whether FKS8BB is genuine—he certainly is, and FKS8 is the proper prefix for the French Zone of Austria.

G3CQU (Coulsdon) sends an "Eighty Only" letter. He says W's and VE's have been logged (not very well), and recently he has heard VK's occasionally at 0600. 'CQU, with his 15 watts, has worked VE1 and W2, and tells us that EI9J would certainly surprise us with his 80-metre score. G3FXB says that DL1FF has been running a sked with LU3EL. 'FXB and YU1AD arranged skeds with EA9AP and IS1AHK, but neither of them showed up.

G8KP found nothing new, but worked OY2Z and 3IGO, CT1QN and VE1ZZ. He tells us that EI9J has 65 confirmed and 71 worked on this band. (How about breaking silence, Paddy?)

Miscellany

G6AB (Holland-on-Sea) supplies a little Top Band news—he raised OH7OH and HA5BT at 2235 and 2350 on about 1900 kc. G3CED (Broadstairs) sends a message from W2EQS, saying that no one over there seems to hear all this European activity on the band, but W9NH received SWL reports



This happy-looking party is a group of ZE's (and supporters) taken on February 24th last, at Que-Que, Southern Rhodesia, on the occasion of the AGM of the Radio Society of Southern Rhodesia. All the OM's hold calls, and left to right are (men only): Standing, ZE3JI, 4JB, 4JE, 1JE, 2JA, 3JF, 2JB, 3JY, 4JW. Seated, lower row, ZE4JU, 4JA, 4JV, 3JL, 2KR, 4JR. ZE3JJ took the photograph.

from ZL and W1LYV had them from OK and (of all places) UAØ!

G8KP says rumour has it that yet another certificate is around—"Worked four 4X4's on four bands." believe it or not!

Clottery

GD3HQA (Ramsey) sends all his worst compliments to a GW station who called CQ on top of a QRP contact he was making with a VS1, and says he still doesn't know which foot the GW was using. HQA says that, from what he hears, some of these types would have difficulty in raising DX on a megawatt.

Compliments, also, from ourselves, to a couple of II's who proceeded to work cross-town phone of indescribable quality right on top of a KJ6 who was working a VR1 (14300, 0700). This secret-weapon quasi-telephony (modified fish-phone?) might be intelligible in the next street, but

from here is sounds like another UA jammer.

An interesting point from a reader who knows all about the Public Schools' Cadet radio nets: Whereas, he says, the amateurs seem to be permanently eager to break off a QSO and look for someone new, the cadets are interested in the other chap's school and himself, and don't care how far off he is or which county he is situated in. He rather suggests that the QSL craze is responsible for the "cat-on-hot-bricks" behaviour which is taking much of the friendliness out of Amateur Radio, at least on the DX bands. And he accuses us of condemning the chap who monopolises a DX station when there's a queue forming; his contention is that it's up to the DX station to choke the other chap off if he wants to. It's quite right, you know—how often do we hear and use the phrase "Mustn't keep you"? Why not?

The Overseas Mail

VS6BZ is now home and asks us to tell all the gang that their QSL'S will arrive, but his logs and cards are temporarily held up. He hopes to be on the air soon.

F7BB (St. Denis-en-Val) reports that he operated 3A2AQ from April 21 to 25, and QSL's have been dispatched through REF. There is an English-speaking resident in Monaco, now 3A2AH. F7BB hopes for permission to operate in Andorra, but nothing is yet settled. 4X4CJ, meanwhile, occasionally operates from F7BB, but hopes he may obtain an F7 call of his own.

Nick of VU2JP is back at GM3FJP for a while. He confirms that 4U-AJ is genuine, and so, he says, is VS9BB (Maldivé Is.) OZ7BM (Vity) is very keen to make contact with Edinburgh on 7 mc phone . . . ZS2FV (Port Elizabeth) spent over a year in Brighton and wants to make contact with that town, on 14 mc CW.

1600-2200 GMT; he also needs his first GC and GD contacts . . . VK2OW (Temora, N.S.W.) is short of cards from GC and GM stations, and wants them both badly. Contacts, please note.

ZE3JJ, already mentioned in connection with 21 mc, speaks for himself and says that we mustn't get in the habit of calling it the "15-metre band"—if we *must* have metres, let's be accurate and count only 14 of them. He adds that he and ZE2KH made and erected a rotary beam for this band in the middle of 1950, and thus claims the first (amateur) beam for 21 mc! American papers, please copy . . .

DL1KV, Vice-President of DARC, writes to express extreme surprise at the statement by DL6MU (see "DX Commentary," March) to the effect that the DARC was struggling for a power limit of 600 watts. He assures us that this is not so, and that the highest figure ever mentioned by a Club official has been 100 watts dissipation (possibly 300 watts input). Their present figures, under consideration, are 80 (dissipation) and 200 (input).

DL2SR, who is G3IDR, passes on word that anyone wishing to apply for a DL2 call on posting to Germany should write to P. Bye, Office of the Assistant Controller General, SX (CTG) Branch, Wahnheide, BAOR 19. Licensing conditions are identical to those in the U.K. DL2SR says they suffer equally from "Klots" out there, and makes special reference to a notorious EA3. He listens for hours on the Top Band and wishes they could use it—several G's have been logged on both phone and CW.

SU1FX tells us that during his recent spell on Eighty he worked lots of G's, sundry Europeans, and FA8, EA9 and the like. He even heard a few East Coast W's. Twenty, he says, is perking up but patchy; Forty is a madhouse, and he keeps clear of it. The general situation in SU is, of course, chaotic, and newly-arrived chaps are amazed to find that the SU's are all strictly "under cover." Several of the amateur population there, he says, are taking unnecessary risks and doing extremely

silly things on the air, which might result in a wholesale close-down.

A further hint from the Middle East is that, following a judicious close-down, the prefix batch 4PA-4SZ might come in useful. Talking of queer prefixes, it seems that the "5A" crowd in Tripoli have run out of calls beginning with 5A2T . . . as a 5A3T . . . has now been heard.

OZ2NU (Aalborg) is most regretful that our new WABC Certificate is Top Band only, as the OZ's are not allowed to use it—pity! He adds that any reader sending two IRC's to him, as EDR Contest Manager, Box 335, Aalborg, Denmark, will receive a personal copy, in English, of the rules of the Danish OZ-CCA award.

M13KW will be back in Asmara, Eritrea, very shortly and pushing a 45-watt CW signal towards the U.K. on Twenty. As, in accordance with present agreements, the Ethiopian Government is to take over the administration of Eritrea in September next, the M13's remaining may be allotted ET calls—the point being that after that there will be no more M13 cards.

Ladders and Certificates

Last month we announced a certain number of new awards which would become available shortly, and promised full details this month. Here they are:

The first is a *WABC Certificate* for the Top Band only. "WABC" means "Worked All British Counties"—but obviously the Certificate cannot be withheld until all have been worked, or no one could claim it. It will therefore be awarded to all who submit proof of having worked, on the Top Band, *sixty* or more British counties, with a starting date of January 1, 1952.

This starting date has been decided upon after much consideration; it seems that it is desirable for a new award like this to stimulate activity on a band, rather than merely to cause a lot of searching of back logs. So get going now and fill up your gaps, but count all contacts already made this year.

Cards must be submitted as proof—and the date and band must be clearly marked thereon, or they will not pass scrutiny. To save valuable space, we do not propose to print a list of counties here and now, but we will conform to the well-known *geographical* (as opposed to administrative) list thereof. The administrative list, as shown in *Whitaker* and other works of reference, includes the Isle of Ely, the three divisions of Lincs., East and West Sussex, East and West Suffolk, the three Ridings, and so on, making a total of 49; the "geographical" total, including the County of

FOUR BAND DX TABLE
POST WAR

Station	Points	3.5 mc	7 mc	14 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	28 mc	Countries
W2QHH	500	92	92	210	106	210	G3ABG	279	35	79	137	28	144
G6QB	487	51	94	207	135	224	G8VG	258	34	76	122	26	140
G2AJ	433	42	81	192	118	211	G2BW	254	23	56	141	34	146
G5BZ	409	54	89	205	61	209	G2YS	248	40	45	123	40	136
G2VD	403	42	80	175	106	183	GM2DBX	223	5	31	106	81	126
G5FA	365	33	111	148	73	163	G3GUM	215	31	38	145	1	156
G3FBX	333	46	94	154	39	163	G6TC	214	17	58	111	28	119
G6QX	317	47	82	133	55	158	GM3EDU	197	37	41	96	23	116
G6BB	310	38	80	138	54	147	G3FXA	189	22	44	115	8	123
G6YR	303	19	43	140	101	160	G2HKU	183	4	46	119	14	129
HC2JR	293	3	15	143	132	183	G3FPQ	168	41	19	101	7	107

London, comes to 41, or 42 if you count Monmouth in England and not in Wales.

We could argue for ever about this business, but let's leave decisions to the scrutineers—and don't send in your 60 cards until you are pretty sure that they will pass the most hard-boiled scrutiny. Remember that the Channel Is. and the Isle of Man count in the total of British Counties, but *not* the Isle of Wight!

The Four-Band Award

This is a tough one, necessitating proof of contacts with at least twenty countries, each of

WAZ MARATHON, 1952

Station	Zones	Countries
G5BZ	34	122
G2VD	34	111
G3FXA	33	87
G6QB	32	95
G6QX	30	77
G3FXB	29	95
G2DPY	28	81
G6YR	28	77
GM2DBX (Phone)	27	77
G8FC	27	65
G3FPQ	26	66
G2BW	24	74
G3GUM	24	69
G3ABG	23	71
G3BDQ	23	66
G3TR (Phone)	22	60
G3DOG	21	59
G5FA	20	57
G5GK	17	24
G2AJ	16	45
G2BAM	13	35
G6TC	12	32
G2BJN	10	37
G3HZL	10	34
G2VJ (Phone)	8	12
G4QK	4	7
G3GVY	2	7

NOTE: New entries in this table must not include QSO's dating back more than two months from the time of entry. Regular reporters should send in their score month by month — three months' failure to do so will be taken to indicate loss of interest and the score will be deleted.

which must have been worked on *four different bands*. Cards are necessary, again—perhaps not 80 separate ones, because cards showing multiple contacts on more than one band will be accepted. All contacts must be post-war.

WNACA Certificate

WNACA means "Worked All North American Call Areas," but does *not* include Central America, the West Indies or Mexico. So the requirements are contacts with all ten U.S. Districts (W1 to W0); with *nine* Canadian districts (VE8 being subdivided into two: the Yukon and the North-West Territories); with KL7 (Alaska), VO (Labrador) and VO (Newfoundland). Cards required again, of course. All contacts must be post-war—and this one is not available to N. American amateurs!

The WFE Award

This is one for the real DX man, and covers the Far East—the first certificate to do so, as far as we know. So as to avoid argument about what constitutes the Far East, here is the list of qualifying countries, out of which 18 must have been worked and confirmed. This is an arbitrary list and there will be no amendments or exceptions to it. Once more: Post-War only.

- C China
- C3 Formosa
- C9 (MX) Manchuria
- CR9 Macao
- CR10 Timor
- DU Philippines
- FI French Indo-China
- HL Korea
- HS Siam
- JA Japan
- KR6 Ryukyu Is.
- PK1, 2, 3 Java
- PK4 Sumatra
- PK5 Dutch Borneo
- PK6 Moluccas only (*not* Dutch N. Guinea)
- UA0 USSR, Zone 19 only
- VS1 Singapore
- VS2 Malaya
- VS4 British North Borneo and Labuan Is.
- VS5 Brunei
- VS5 Sarawak
- VS6 Hong Kong
- XZ Burma

Eighteen cards from those 23 countries will bring you one of the

hardest-earned certificates yet available to the DX man! (But please don't ask why we haven't included New Guinea, Guam, Solomon Islands and the rest—you have to stop going East *some* time, or you eventually get to North and South America!

There, then, are details of four certificates which will be available by the time you have got your cards together. Two of them (the WABC and the Four-Band Award) will also be featured as monthly "ladders," showing who are the leaders in Top-Band Counties and in Four-Band Countries—both before and after the award of the actual Certificates.

We are doing all this because we have been so repeatedly *asked* to do it by readers—not just as a stunt to stir up more rivalry, more claims and more correspondence. There is a demand for these things, obviously, and we hope these four new "teasers" will help to fill it. All claims must be accompanied by the cards, with a check list, and addressed to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

While we're on the subject of Certificates, perhaps this is the right spot to mention that G8KP says the whole business gets him dizzy at times, but he has had an awful lot of fun out of it, and there are more than *forty* of them adorning his wall! Then W2QHH (Hamilton, N.Y.), on his latest card, lists the following: AAA, EDXC, WAA, WAC/YL, WAS/YL, WPR (200), WASM, WFJS, BERTA, BPL, CP/35, DUF-4, DXCC, FOC, KZ5-50, ORS, RCC, WAE, WACD, WACE, WAP, WAVE, WBE, WMM, WNEV, WRAMEY. Alas—no WAZ! But do you know what all the others are? Seems to us it might be as much fun collecting sets of rules as going out for the certificates themselves

And so that (as they used to say in 1922) concludes our transmission for to-night. Please note that next month's deadline is **first post on June 11** (horribly early but unavoidable); for the following issue it will be first post **on July 16**. So, until then, 73, Good Hunting, and BCNU on 21 mc.

The Discovery of Radio Stars

NEW SCIENCE OF RADIO ASTRONOMY

The article below, prepared by the Department of Scientific & Industrial Research, will be of considerable interest to the general reader because it gives a glimpse of the great and thrilling developments and the new discoveries that are being made possible by the application of radio to astronomy. These developments are at least as important, and certainly as interesting, as the discovery of the short waves themselves, and in years to come the scientists now pioneering in the field of radio astronomy will be held to have made as large a contribution to human knowledge as those who pioneered in radio itself.—Editor.

THE first large telescopes were built in Great Britain by Herschel and Rosse during the 18th and 19th centuries. Unfortunately the country could not maintain this early advantage in astronomy. Giant telescopes require clear skies and extremely good atmospheric conditions if their full advantage in exploring the depths of space are to be realised. For this and other reasons the great telescopes of the 20th century have been built in America on Mount Wilson and Mount Palomar. There, in the hands of brilliant teams of American scientists, they have been used to unravel the incredible facts of the universe. First, in 1920, the 100-in. telescope on Mount Wilson showed that the Milky Way was a system of stars far more extensive than hitherto imagined, and that it would take nearly 100,000 years travelling with the speed of light (186,000 miles per second) to traverse it. From that time the sequence of discoveries has excited the admiration of scientists and laymen alike, until recently the 200-in. telescope on Mount Palomar has revealed star systems which are so remote that it would take hundreds of millions of years to reach them, even though travelling as fast as light.

Not the least surprising feature of this revelation is the evolutionary coincidence by which man's eyesight is able to penetrate the atmosphere of the earth. The human eye is sensitive to that part of the spectrum which constitutes visible light, and it is only this small region which can penetrate the earth's atmosphere without absorption. Any radiation from space

which has a wavelength beyond the red end of the spectrum or less than the violet end of the spectrum is completely absorbed. It is only in the intervening small gap or "window" that the absorption is small enough to allow appreciable radiation to reach the earth's surface. Thus, if man had evolved with eyes sensitive in the deep infra-red or far ultra-violet part of the spectrum we should have no knowledge whatsoever of the outer universe—our vision would be blanketed as thoroughly as on a cloudy night, no matter how big a telescope we used. This restriction of our vision has never worried astronomers. For over half a century it has been well known that most of the energy output of a hot body, such as the sun or the stars, lies in this visible gap, and hence it has been believed that our view of the universe has been as complete as the best telescopes allowed.

Radio Waves from Outer Space

In 1931, however, an American scientist, Jansky, made the very surprising observation that radio waves were reaching the earth from outer space. The existence of a second gap or window in the atmosphere in the long radio wave region had been known for sometime. At the long wave end—at about 20 or 30 metres wavelength—it is cut off by absorption in the ionosphere; at the short wave end—at a wavelength somewhat below 1 cm.—by molecular absorption in the atmosphere. It was no doubt appreciated that any emissions coming from space could be picked up on the earth if their wavelength fell in this "long wave window," but no one considered that this region of the spectrum would have any interest to astronomy. Little notice was taken of Jansky's discovery, and by the end of the second world war it was generally accepted that these radio emissions were being generated by atomic processes in the rarefied hydrogen gas in interstellar space.

At the close of the war, however, the radio and radar techniques, which had been so highly developed for military purposes, were applied to this problem by groups of workers in England and Australia. In the first experiments the receiving aerials were of conventional types—that is "radio telescopes" or aerial arrays which received the radiation in a beam of, say, 10 or 20 degrees wide. The early results of Jansky were confirmed. But the resolution of these radio telescopes was very poor indeed, compared with the resolution of even a small optical telescope, and it seemed unlikely that they could give much further

information about the origin of these radio waves. The difficulty is fundamental because the wavelength of the radio emissions is over a million times longer than the wavelength of light. By 1948 simultaneous developments in Sydney by Bolton and Stanley, and in Cambridge by Ryle and Smith, led to the construction of a new type of radio telescope which, to a certain extent, overcame the severest difficulties of resolution. In principle these systems used two separate aerials spaced by several hundred metres, the signals from the two aerials being connected to the common input of a radio receiver. Whereas the reception pattern of a single aerial consists of a main broad lobe which narrows as the size of the aerial is increased, the reception pattern of these spaced aerial "interferometers" consists of a close-packed system of lobes, resembling the corrugations of a fan. As the earth rotates and this lobe system sweeps over the sky, the intensity of the signal in the receiver output will remain steady, or vary only slowly, provided the source of the radiation subtends an angle large compared with the separation of the lobes. If, however, the radio signals are coming from a source which subtends an angle small compared with the lobe separation, then the signals at the receiver output will go through a series of maxima and minima.

Some Startling Results

In 1948 both groups of workers in Sydney and Cambridge used their radio interferometers to study the radio emissions from the Galaxy with the most startling results. First, from Sydney, Bolton and Stanley announced that they had found an intense source of radio emission with an angular diameter of less than eight minutes of arc in the constellation of Cygnus. Shortly afterwards Ryle and Smith discovered an even more intense source in Cassiopeia. The most remarkable feature of this work was not so much the discovery of localised sources of intense radio emission, but *the complete inability to identify them with any particular visual objects in the sky.* Although lacking the precision of optical telescopes, the radio interferometers can position these intense sources with considerable accuracy. In the region of space which contains the Cygnus and Cassiopeia sources there are, of course, many visible stars, but none of outstanding visual characteristics. In fact, the most recent conclusion is that no star brighter than 16th or 17th magnitude is near either the Cygnus or Cassiopeia radio source. Since the original work in 1948 many more of these

localised sources of radio emissions, or radio stars, have been located, but no one has yet been able to identify any object or class of visual objects in the Galaxy with the source of these radio emissions.

The question arises immediately as to the number of these radio stars contained in the Galaxy. So far, the number discovered has increased with improvements in the sensitivity of the radio equipment. The answer as to how long this process of discovery will continue is not known, but the most plausible speculation is that the hundred or so now known are merely the nearest and most intense of a very large number in the Galaxy. With the unaided eye, or with a small telescope, the Milky Way appears as a diffuse patch of light. It is only with the larger instruments that this diffuse appearance can be seen to be due to the existence of myriads of stars. We now believe that a similar situation exists with the radio stars, and that the radiation which we receive from the direction of the Milky Way appears diffuse because our contemporary radio telescopes are not good enough to resolve it into radio stars. From the strength of this unresolved emission and from the strength of the signals received from the known radio stars it is possible to make an intelligent guess at the total number of radio stars in the Galaxy. The answer is very surprising—the population of radio stars in the Galaxy must be very similar to the population of the visible stars.

The paradox is astonishing. The Galaxy contains some hundred thousand million stars which emit light and can be seen with the human eye and telescope. Does it also contain a similarly vast number of dark objects which generate intense radio waves and can only be seen by the *radio* telescope? The problem of the nature of these radio stars is certainly one of the most puzzling in present-day astrophysics.

Another Approach

Meanwhile, Lovell at Jodrell Bank, was making a different attack on the problem of resolution—that of constructing a giant radio telescope receiving only in a single, very narrow beam. The instrument is 220 ft. in diameter, and with its aid in 1950 Hanbury Brown and Hazard succeeded in detecting the radio waves from the great nebula in Andromeda, 750,000 light years distant. The implications of this experiment are far-reaching. The only reasonable conclusion is that the radio stars must populate the Andromeda nebula as well as the Milky Way system, and a comparison of

the total radio emissions of the two stellar systems indicates that their radio star population must be very similar. These are merely two nebulae in an assemblage of millions of similar ones scattered throughout the universe. It therefore seems highly probable that the objects which generate these radio emissions exist in all the external nebulae and the most recent experiments strongly support this view. The detection of the radio emission from the Andromeda nebula with the large radio telescope has recently been followed by the measurement of similar emissions from five other individual nebulae, both with the radio telescope at Jodrell Bank and with the radio interferometer at Cambridge. Perhaps even more significant is the detection by Hanbury Brown and Hazard of the radio emissions from three great clusters of nebulae which are far too closely grouped to be resolved individually by the beam of the radio telescope.

During the last few years equally startling results have been obtained in other branches of radio astronomy. The atmosphere of the sun has been found to emit radio waves, and the study of these emissions is throwing new light on the conditions in the solar atmosphere. Also, when the solar surface is disturbed by sun spots very intense radio emission is received on the Earth. The solar flares which occasionally occur in the region of sun spot groups are accompanied by immense bursts of radio energy. The solar corpuscular streams of charged atomic particles which are then ejected take about 24 hours to reach the earth and then cause severe terrestrial disturbances, such as fade-outs of long distance radio communication and displays of the Aurora Borealis. Radio astronomy also provides a new method of studying the Aurora. Pulses of radio energy are transmitted through the radio telescopes, and their reflection from the aurora enable them to be studied under all conditions of daylight and cloud. These new solar and aurora studies seem destined to be a powerful factor in the study of the sun and of solar terrestrial relationships.

Investigating Meteors

The radio echo, or radar pulse technique, has just been mentioned in connection with the aurora; but the most striking application of this technique to astronomy has been in the study of meteors. For the first time in history it has been possible to study the activity of the daytime sky and the existence of great streams of meteors incident on the sunlit hemisphere of the earth have been revealed. These move

in short period orbits and whether they are associated with comets, disintegrated minor planets, or have some other origin, is not yet known. The radio techniques have also given new methods for the measurement of the very high velocities with which these meteors enter the atmosphere. The age-old controversy as to whether half the meteors come from interstellar space has been settled, and it can now be concluded that all meteors are confined to the solar system. The radio pulse technique has also been used to obtain echoes from the moon, thus providing a new avenue for the investigation of the ionosphere and of the lunar surface.

Future Programme

The aperture of the new radio telescope is a little larger than the fixed one at Jodrell Bank; it is completely steerable and will be able to transmit or receive signals from any part of the sky. It will be used in all aspects of radio astronomy. The priority programme will be to continue the study of the galactic and extra galactic radio emissions with particular reference to the number and nature of the dark radio stars. It will also be used to plot the intensity of the radiation, particularly from those important regions of the Milky Way system which are obscured from normal vision by the great dust clouds in interstellar space. As and when this urgent programme permits, the instrument will then be applied to new solar and terrestrial studies, to meteors, the moon, and, perhaps, the study of the nearer planets. It is anticipated with confidence that this great instrument will do for radio astronomy what the large telescopes in America have done for classical astronomy.

NEW PRESIDENT OF THE R.I.C.

This year the Radio Industries Club celebrates the 21st anniversary of its foundation. The occasion was marked by a Luncheon at Grosvenor House, Park Lane, on May 20, 1952, at which was present a large number of important and interesting people connected with all sections of our great radio industry. The retiring President of the Club, Sir Ian Fraser, installed Lord Brabazon of Tara as his successor for the coming year. Other distinguished and brilliant speakers on the Toast List were Mr. Beverley Baxter, M.P., and Lord Reith, the first Director-General of the B.B.C., who was addressing an audience representative of the radio industry for the first time in 14 years. To us, it was of particular interest that Lord Brabazon—among many other of his pioneering activities in the fields of science and engineering—held an amateur licence in the pre-1914 era, when he was on the air with a spark transmitter.

SO the 21-mc band is to be released at last! You still have the best part of a month in which to discover that your nice frequency-doubler is not so hot when you try to make it treble. There will be much head-scratching and coil-winding among the DX fraternity during June, only equalled by the imprecations of the phonophiles (Pat. applied for). As the full band will have a width of 450 kc, though, it seems that the present 200 kc allotted to CW only will probably be cut down, finally, to 150 kc. For the moment, 200 kc for the CW boys will be a nice opportunity to study the characteristics of our new band, which, I feel, may not be so hot for this year or even next. We all know what "Ten" is like at present, and the prospect of a DX band behaving midway between that and Twenty is not exactly thrilling until the level of conditions improves quite a lot. The main thing, though, is that this represents a gain of 200 kc to us, only slightly marred by the loss of the upper 50 kc of Twenty.

TOP OR BOTTOM ?

For years I have been mystified by the strange theory that telephony should be extremely "topy" to "cut through the QRM," as they say. Somehow it doesn't make sense to me; we all realise that most of the *power* in a phone transmission is in the low frequencies, not the upper ones. We also find out, by experience, that most QRM consists of high frequencies — scratchy noises, whistles, side-bands off an adjacent transmission, and so on. Why, then, should a toppy, screechy transmission (pentode amplifiers and bad crystal mike, for instance) "cut through"? I have always found that a phone transmission of the well-rounded type, with plenty of bass in it, was the one that beat the QRM; not, let me add, if it is actually *deficient* of top. Another point—with receivers in their most selective condition it is the low frequencies, not the high, that get through. So will someone please explain how top "cuts through"



the QRM? (And why does it have to "cut" through? Isn't there such a thing as gently pushing one's way underneath it with a nice insidious display of deep bass voice?)

UNDER-WATER RECEPTION

My recent note on Rugby's 16-kc transmissions and their world-wide range has brought an interesting comment from a reader who verifies that fact by personal experience. Apparently, Rugby did not always cover the notorious graveyard in the Indian Ocean, but he was audible everywhere else. This reader adds the interesting rider that the 16-kc broadcasts for submarines, during the war, were highly successful, and that submerged reception was also world-wide. The number of kilowatts devoted to this service seems uncertain, but rumour has it that the power was in the megawatt region. When I last visited Rugby Radio I remember being shown the aerial current of 465 amps, and the slightly charred window frame surrounding the main lead-in—several feet distant from the actual insulator in the centre of the glass pane. And so back to our QRP!

TOP-BAND AERIALS

Those fortunate beings who have enough space in which to erect a half-wave aerial on the Top Band (270 ft. or thereabouts) are often puzzled by the fact that their signals, up to a radius of 50 miles or so, are actually weaker

than on their former "piece of wire," which may have been a 40-metre dipole or something of that kind of size. This is an effect which a little study of aerial theory will explain at once. The half-wave will not work as a real dipole (it is never anything like high enough); but it *does* give a strong high-angle sky-wave and extremely little ground-wave. Hence the signal may be weak at 25 miles or even at 10 miles; after dark it may even fade on quite local contacts. But for the GDX work, up to 300 miles or thereabouts, the half-wave will show its advantages at once. The ideal arrangement for the Top Band, attainable by very few, is the possession of two separate aeriels—a long, horizontal wire and a comparatively short, top-loaded vertical. For the latter, a 40-metre dipole with its feeders shorted at the bottom and tuned against earth, is excellent. Over some ranges, particularly in daylight, it will beat the long wire hollow.

COMPONENTS AND THEIR SIZES

I sometimes wonder whether we realise what a debt we owe to the component manufacturers. In the past twenty years many essential radio components have shrunk to a quarter of their old-time size without any sacrifice of efficiency, and without this change we should find many of our receivers and transmitters of a most forbidding size today. I was recently looking at some of the old wire-wound resistors that we used to plug-in to their holders. Some of the fixed condensers of the larger sizes and, of course, even the variable condensers for receiver tuning. An exciter unit consisting of CO and two FD's used to take up more room than my entire transmitter does today—even the valves (LS5B and DE5B) were colossal. When one compares them with 6SN7's, 6SJ7's and Metalmite condensers, the old components bring a breath of Heath-Robinson air along with the nostalgia that always clings around them. How much smaller are we going to get?

Pot Oscillator for Seventycems

TUNABLE SEO ON 430 MC

K. E. V. WILLIS (G8VR)

For those contemplating operation on the 70 cm band, here is a practical design for a tunable oscillator. The band will be "found" if the dimensions given are carefully reproduced.—
Editor.

THE local-oscillator is a definite problem in the design of 430 mc receivers since the choice of valves for such an application is somewhat limited. The disc-seal triode in a co-axial line circuit is attractive, but apt to be both expensive and difficult to construct. More conventional valves do not permit very much of the tuned circuit to exist outside the valve envelope, which makes for difficulty in tuning and extracting power from the oscillator. The best solution is not necessarily to use a crystal-controlled source of local-oscillation, because the band allocated is 6 mc wide and therefore requires that the first IF tuned circuit shall accept this width. For intermediate-frequencies below 50 mc this is not attractive, and a simpler solution would appear to be the use of a tuned local oscillator and a fixed IF. The oscillator described is of the "Peterson Pot" type, and it is easy to build and extremely stable in operation. Moreover, tuning is quite simple, even at 450 mc, and since this type of oscillator produces almost zero field externally, there is considerable freedom from hand-capacity effects.

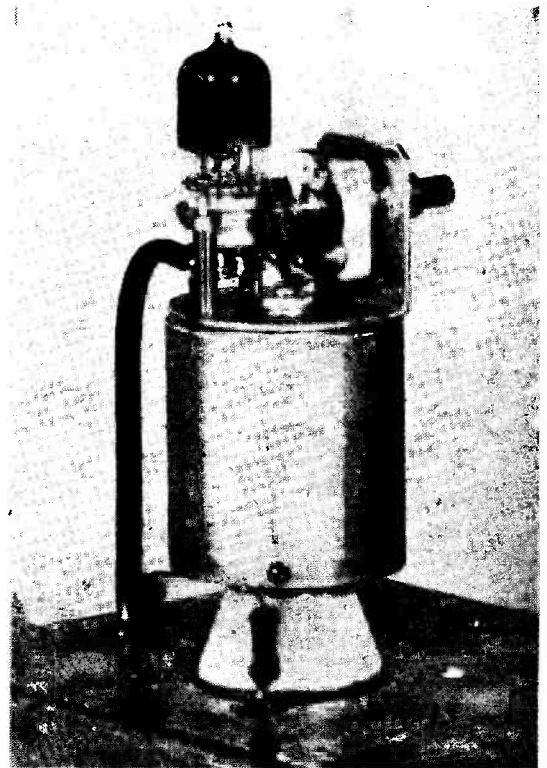
Fig. 1 gives the theoretical circuit of the oscillator, which is recognised as an anode-tuned arrangement with a feed-back winding in the grid circuit. The circuit L1C1 determines the frequency of the oscillator, and this is the "pot" with a miniature tuning condenser connected across it. If the dimensions given in Fig. 2 are followed closely, the oscillator should operate in the range 400 to 450 mc. This band is more than adequately covered by using a small tuning condenser of 25 $\mu\mu\text{F}$ maximum capacity.

Construction

The "pot" is constructed from spun aluminium cans, one being taken from a defunct EF50 valve and the other being an IF transformer or valve-screening can. Cylindrical

cans improve the appearance of the finished unit, although they are not essential to the operation of the circuit. The two cans are joined to opposite ends of a brass rod A (Fig. 2) forming a concentric system. The lower end of the outer can is left open. Before assembly it is necessary to fit a small soldering tag to the top of the inner can B and to solder to it a short length of wire. This wire is led through a hole in the top of can C to connect to the anode of the oscillator valve. Another operation which must be carried out before assembling is to mount the valve-holder on two small pillars screwed to the top of can C, and to fix a small metal bracket to carry the tuning condenser.

The feedback coil L2 is simply a straight piece of wire threaded through the inner can parallel to the central rod A. Its distance from A influences the mutual inductive coupling, the wire being positioned by passing through a second hole in the closed end of can B in alignment with the hole on the top of can C. The coupling is not at all critical. At the point



The 430 mc Pot Oscillator as constructed by G8VR. This is a reproduction of the original photograph on p. 627 of our issue for November, 1950.

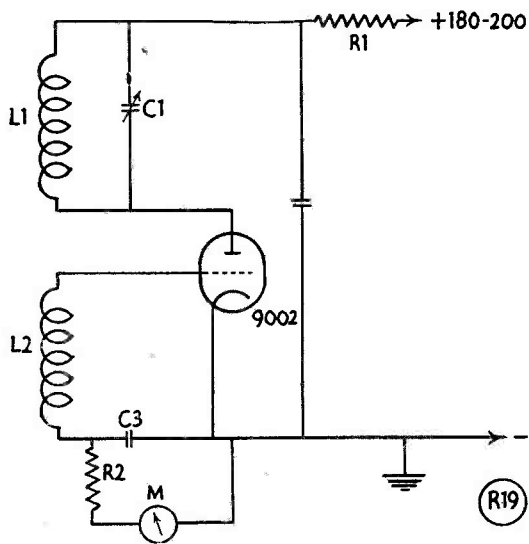


Fig. 1. Circuit of the Pot Oscillator, a simple arrangement electrically, but demanding care in construction and setting up; see table for values. (NOTE: The condenser between R1 and earth in this sketch should be marked C2).

Table of Values

Fig. 1. Circuit of the 430 mc Pot Oscillator

C1 = 25 μ F trimmer	R1 = 2,200 ohms, $\frac{1}{2}$ -watt
C2 = 10 μ F	R2 = 6,800 ohms, $\frac{1}{2}$ -watt
C3 = 100 μ F	L1, L2 = See text

where this wire leaves B it is decoupled to the outer can C via C3, which is about 100 μ F. At the same point the grid-leak R2 is connected, and it is useful to include a meter-jack between the free end of R2 and HT negative to check on the grid-current of the oscillator.

The cathode of the valve is decoupled to the top of can C through C2, which is approximately 10 μ F. This condenser can be pre-fabricated from a piece of copper foil and a mica sheet if desired, but a small ceramic or silver mica condenser is satisfactory. The HT positive connection is taken through R1 to can C, so that both cans are at high potential when the oscillator is in operation. The whole assembly is therefore mounted on small stand-off insulators, and the spindle of the tuning condenser provided with an insulated coupler. A very rigid heater feed can be constructed from a piece of copper tubing, as shown in Fig. 3. The cathode and one heater are connected to the tube itself, and thus to HT negative, and the other heater connection is taken through an insulated wire inside the tube.

Mixer Injection

The most difficult problem of all is to extract power from the circuit for injection into the mixer circuit. Inductive coupling by means of a loop inside can B is recommended and can be accomplished in the following manner: A narrow slot is cut along a diameter in the closed end of can B, and a pick-up loop pushed up through it. The slot fixes the loop in a radial position with respect to the inner rod A and gives maximum coupling. The degree of coupling can be varied by moving the loop in and out of the slot. A very rigid loop can be made by cementing a fine wire around the perimeter of a flat strip of perspex. The perspex must be thin enough to pass it into the slot, and the strip can be screwed to a bracket when the optimum coupling has been determined. A slotted hole in the perspex strip allows the coupling to be varied.

With an anode voltage of 180 to 200 volts, the oscillator grid-current should be about 1 milliamp. In the writer's converter, which is designed for an IF of 26 mc, an injection current of 100 micro-amps is obtained with a CV 102 crystal diode mixer in a co-axial line circuit. The injection current rises rapidly when the oscillator is tuned towards the fundamental frequency of the mixer circuit, so the actual injection depends to a large extent on the IF used. The CW note produced by this oscillator is very good indeed, and stability is excellent after a short warm-up period. The frequency is sensitive to changes in HT, however, and

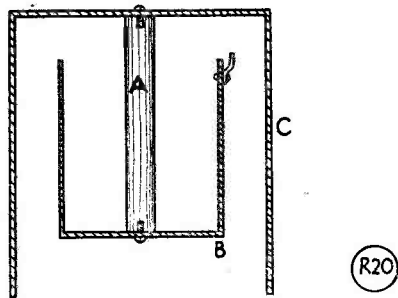


Fig. 2. Detail of the Pot construction. Dimensions are given in the table.

Table of Values

Fig. 2. Construction of the Pot Oscillator

A = Brass or Copper Rod, $\frac{3}{16}$ in. diameter, $1\frac{1}{2}$ in. long, tapped 6 BA at either end.
B = Aluminium can (from EF50), $1\frac{1}{2}$ in. long and $1\frac{1}{2}$ in. diameter, with solder tag fitted.
C = Aluminium can, $1\frac{1}{2}$ in. diameter by 2in. long.

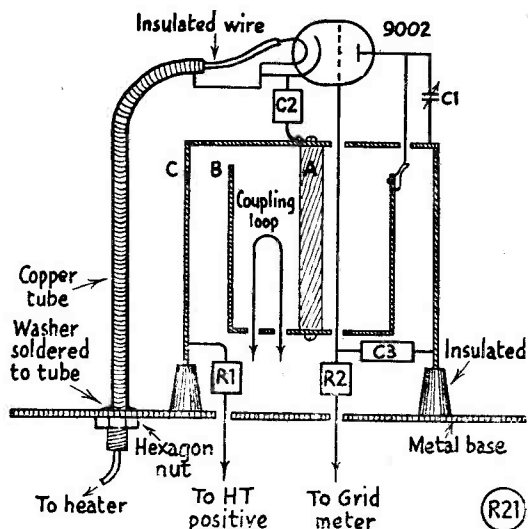


Fig. 3. Build up of the circuit complete for the 430 mc Pot Oscillator. Compare with the photograph.

stand-off insulator. It will be noted that the bracket supporting the tuning condenser is secured underneath the valve-holder pillars, to provide an additional top-plate to the outer can. This improves rigidity since the cans are of very thin gauge material.

The model shown is a general-coverage version of the oscillator used as a signal generator, and has a tuning range of 420 to 495 mc using a type 9002 triode valve. For local oscillator applications the tuning condenser is stripped to one fixed and one moving vane, and a trimmer connected in parallel with it to set the band.

TV Application

The oscillator should be particularly suitable for a simple converter for the reception of amateur television signals in the 70 cm band. Such applications require wide-band IF systems and this would off-set any trouble due to long-term drift of the local oscillator.

the anode supply should be well-filtered and stabilised.

The photograph shows the general layout of the oscillator when mounted on a single

BK Keying System

ELECTRONIC BREAK-IN CIRCUIT

C. F. FLETCHER (G3DXZ)

This note describes an ingenious method of electronically controlled BK, for which the author claims entirely satisfactory results at high operating speeds. A further advantage is that the current across the key contacts is very low.—Editor.

AFTER trying many relay controlled break-in systems and finding in each the troubles of clicks and dirty contacts, the writer decided to test an electronic system of transmitter and receiver keying. The circuit as eventually derived is shown at Fig. 1.

It consists of two triode valves, or one double-triode of the type having two completely separate sections in one envelope. Approximately 120 volts of bias was used to key and block the transmitter and receiver.

The only contacts used in operation are those of the Morse key and the slight clicks produced

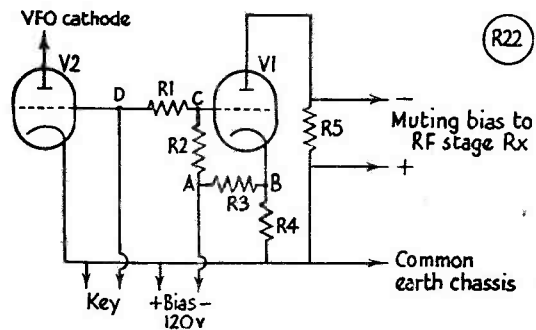
here were easily eliminated by using a keying filter of normal design.

The time of change-over from transmit-to-receive is so short that incoming signals can be heard on the receiver between the transmitted dots up to speeds of 30 w.p.m. using a bug key.

Operation

Firstly, in the "receive" position the circuit operates as follows: In Fig. 1, current flows from the bias negative point A, through R3 and R4 to earth, bias positive. This causes a voltage of approximately 28 volts to appear across R3; the rest of the bias voltage is dropped across R4. As point B, which is connected to the cathode of V1, and point C which is connected to the grid, is at full bias potential (no current flowing through R2), bias is applied of the order of 28 volts negative. This prevents any current flow through V1 and hence no voltage appears across R5 to mute the receiver.

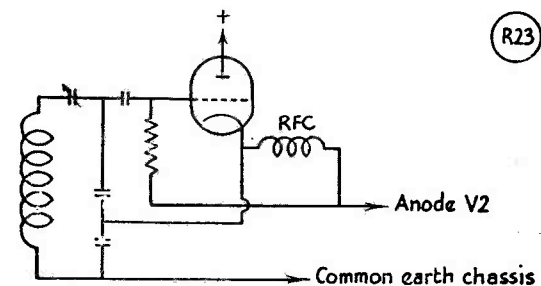
At the same time, the grid of V2, which keys the cathode of the VFO, is at full bias potential via R1 and R2. This ensures that the oscillator is completely cut off. In this state no drive is applied to the transmitter and the receiver is operative.



R22

Fig. 1. Blocking circuit for keying transmitter and muting receiver. Action is explained in the text.

Now, on pressing the key and earthing point D, the grid of V2 is at zero bias, and hence the oscillator works and the transmitter functions. At the same time, a current flows from bias negative through R2 and R1 to point D which is earthed via the key. As the resistors mentioned are proportioned one-third and two-



R23

Fig. 2. Method of connecting the VFO; the grid resistor must go to the anode of V2, Fig. 1.

thirds respectively, it follows that one-third of the bias voltage will appear across R2 and hence at point C which is the grid of V1. This bias is positive with respect to point A, hence the difference between the residual negative bias of 28 volts and the newly applied voltage, 40 volts positive, is 12 volts positive bias actually applied between grid and cathode. This causes current to flow from point A through R3, the valve V1 and the resistance R5. The bias to block the receiver RF stage is thus developed across R5. The valve current flowing through R3 is so small that it does not affect appreciably the bias situation on V1.

The conditions are now completely reversed, the transmitter being operative and the receiver muted.

Precautions

The VFO should be connected as shown in Fig. 2. If the grid return resistor is taken direct to earth and not as shown to anode of V2, then a huge cathode bias will build up across V2 and in all probability the oscillator will NOT!

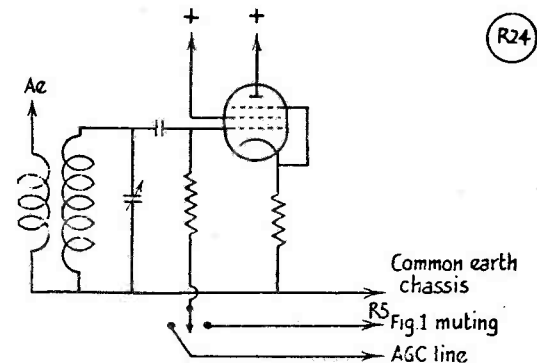
Also, the method of supplying bias to the receiver RF stage should be arranged so as not to have any large capacity, i.e., AGC decoupling condensers, across the bias supply from R5, Fig. 1. If this happens, then the build-up of the grid bias will not be instantaneous, as it must be for noiseless operation, and a pronounced thump will be heard at the beginning of each character of code sent.

A suitable arrangement of receiver connections is suggested in Fig. 3.

Conclusion

The system has been in operation now for eighteen months or so at the writer's station and it has given good click-free operation without attention—that is, apart from periodical cleaning of the bug key contacts.

Contact wear is also brought to a minimum by this system of keying as the current broken is less than one milliamp.



R24

Fig. 3. To use the circuit of Fig. 1, the receiver first RF stage should be modified as shown here.

INFORMATION, PLEASE

From W1QZR, Mill Road, North Hampton, New Hampshire, U.S.A., we have a request: He would be glad to hear from readers who own or operate a B.28 receiver, for which he is in particular need of the circuit diagram and/or an instruction manual, in order to clear faults and apply modifications. Anyone who can assist him is asked to write to the address given.

YOUR new precentor assumes the VHF mantle with a due sense of humility and a slight feeling of inadequacy, having been out of touch with the correspondence for some time—but that will be rectified as the months roll on and, with more than 30 reports on the hook for this issue and quite a number of matters to discuss, the process of re-indoctrination has already started.

Broadly speaking, the news is good, and no active VHF operator will need to be told that the spell of fine weather commencing about May 12 brought with it a period of good—but by no means consistently good—conditions lasting at least till May 18. Curiously enough, this corresponds with a somewhat similar spell over the period April 12-19. For the month or six weeks until May 20, the best nights appear to have been April 16-18, 25, May 12-18. By this is meant that signals from the North and North-West were coming down into the South Midlands and the London area, that Continentals were being heard as far north as the Midlands, and that propagation was good and fairly steady in an East-West direction across the southern half of England. This can, of course, only be a generalisation, based upon observation and the particular dates mentioned in the correspondence.

At any rate, the signs and portents for another excellent VHF season are all there. Activity is high, and many new stations are appearing on the two-metre band—some with OT calls, but the majority of new ones are in the more-recently licensed category. In fact, it is estimated that in the Greater London area alone there are now nearly 300 stations equipped for VHF working. (The pins sprouting on our two-metre activity map certainly suggest that this could be so, and we have by no means heard them all yet.)

Some /P Notes

In last month's Calls Heard, a list appeared for GW5MA/P at Llanybyther, Carmarthen. This month it is for GW5MA/P in Merionethshire, working from a point on the Llangynog-Bala road, 1500 ft.

VHF BANDS

A. J. DEVON

**Better Conditions and Higher
Activity—**

Stations out Portable—

Some Technical Points—

More About QSL'ing—

Reports Round the Country—

a.s.l., and just inside the county boundary, as confirmed by GW2ADZ on his visit during the week-end May 10-11. Bob Munday packed his gear and himself into his car and soldiered all the way over from Ashted, Surrey—a road distance of about 230 miles—expressly for the purpose of adding interest to the field event on May 11, and giving the VHF clan a new county in that direction. His gallant effort was frustrated by bad weather and poor conditions, only three stations over 100 miles distant being worked (G3BW, G3EHY and G5YV). Though the total of different stations raised was 19 and a new county given to most of them, nothing was even heard from the London area, where there was much activity with many hopeful beam-shoots in the direction of Merionethshire. Nevertheless, G5MA, who is an old hand at this /P game, is going to try again and is determined to find a site in this rare county that will work!

Conditions for the /P event on

May 11 are reported generally as having been "poor" or "not good"—which mean much the same thing! Stations out portable totalled about 25, but no great distances were worked. In the southern part of the country, stations like G3ERD/P and G6XM/P were good and strong all day and were getting plenty of contacts at distances up to 100 miles or so. The best GDX mentioned in the reports so far is G3BK-GW5BM/P, but even that would be less than 150 miles.

Another "alternative site" expedition was that of G6NB, who on May 13 worked EI2W from a location in Herefordshire. And just as this piece went down, news came that GD3DA/P was to be there from May 16, with hopes of extending some of the 70-centimetre ranges.

Technicalia

The Northumberland chaps have struck an awkward snag—G4LX explains that their Zone frequency area and the Holme Moss TV sound are nicely in harmonic relationship, and as they are very much on a fringe up there, local two-metre activity is being somewhat discouraged. It is difficult to see what can be done about this, as any radical changes in the Zone frequencies would upset too many crystals and, apart from being impracticable at this stage in the proceedings, would undoubtedly produce the same problem in some other area!

During a recent test with G3EHY (Banwell), a station in London tried a 4-over-4-over-4 against a single 4-element Yagi. Conditions were good, with S9 signals off the multi-element array. The change to the simple Yagi brought no lowering of QRK whatever. This, says G3EHY, seems to have been *not* because the 4-over-4-over-4 was badly mismatched, but that under really good conditions practically anything will radiate successfully. (In this connection, it is instructive to try a long-wire aerial against a beam when signals are coming in well from all directions; in some, the long-wire will do better than the beam). Here it might also be added that the whole argument



The console layout at G2FQP, Ramsey, Hunts., an active VHF station in a sought-after county. The 2-metre receiver is a crystal-controlled G2IQ converter into an S.640, shown here, and the transmitter runs 20 watts to an 832 on 144.72 mc.

for height above sea level can always be vitiated by the fact that, when conditions are good, stations apparently very badly placed can do well in terms of GDX; that is to say, their lack of height ceases to be a serious disadvantage, and even severe local screening can be overcome—repeat, *under good conditions*. Where height must count, of course, is when conditions are poor or below average; then, a station at height has its effective line-of-sight-and-beyond range increased compared with a low-lying station, even if the latter is unshielded. But even at that, height did not enable the /P stations on May 11 to beat the conditions!

G3E1Y (Cheltenham) has a

modification problem on his hands, in connection with which he would like advice or assistance. The receiver is a variant of the ASB8, having three GL446A's, with a Lecher line oscillator that will tune to about 470 mc. What G3E1Y wants is information about how to change the pot-tuned RF and mixer circuits, and what is the first IF set at—can anyone advise?

From G5YN (Salisbury) comes an interesting note on his experiences with the construction and setting up of a G2IQ-type converter, first described in the August 1949 issue of *Short Wave Magazine*. Looking at the original circuit, for C4 he is using a 6 + 6 μF split-stator condenser, and his IF coil is a winding 1½ inches

long, of 20 SWG, on a 1-in. diameter former, tuned by a 30 μF ceramic trimmer; this is right for the 7 mc IF he is using. Because the first-stage current draw seemed excessive at 20 mA, R1 was increased to 470 ohms, and the valve now runs 5 mA plate current. Neutralisation proved easy with the aerial connected and, when tested in the London area, the converter "gave" at the first attempt, using a bit of wire indoors as aerial. C1 and C4 were adjusted for maximum signal and background "sharsh" and C17 set to give coverage on C16. A large number of birdies were evident as the oscillator was tuned, so its plate resistor R10 was increased to 10,000 ohms, effecting a complete cure. The next snag was bad

modulation hum, with a rough, very rough, note on all signals. By trial and error (and luck) G5YN discovered that a .01 μ F condenser between the HT + ends of the stabiliser valve and the rectifier — that is, across the smoothing choke and main dropping resistor — practically cured hum over the 144 mc band. The nett result is a converter which seems to be working well, and it is giving good results on local signals. The problems now put by G5YN are: Is he losing gain by having a large cathode resistor in the first stage? Should this stage neutralise with the aerial off? How can he clean out the residual modulation hum? In fact, how does one get an absolutely T9 beat from the oscillator? As the answers to these queries would probably be of general interest, we would like to give them in this space if those who are with us thus far would care to make suggestions.

Station Reports — North

Actually, we could do with many more, and from much further north, too. What is happening in GM, and how are they faring in GI? Indirect reports of activity in these areas are few, but the improvement in conditions will probably have brought the northerly GDX in again before this is in print.

G4LX (Newcastle) had his first contacts on Two since October last, when he worked GM3EGW (Dunfermline) on May 13 and 14. The locals active in the Newcastle district are G2BCY, G2DKH, G3CYY, G3EGF, G4LX himself, and G3GEA building. G4LX is there every evening for 15 minutes from the TV close-down, and hopes to scoop in his 100 cards for VHFCC this season; more than enough stations have been worked, of course!

EI2W (Dublin) asks us to say that his frequency is 144.144 mc, and mentions several stations worked first time, including GW8UH, of Cardiff. On May 14, conditions were good for the 250-mile distances, with G3WW and G5YV strong signals. EI2W now has 82 stations worked in 40 counties, which is a very fine performance from his location. He suggests that G's calling him

TWO-METRE ACTIVITY REPORT

G5AM, Ipswich, Suffolk NGR 62/179509.

WORKED: G2BCB, 2FQP, 2HDZ, 3AJP, 3ANB, 3BK, 3CFK, 3DAH, 3DIV, 3FIJ, 3FQP, 3GDR, 3HAZ, 4VP, PA0AD, 08P, 0FB, 0WI.
HEARD: G2FTS, 2HIF, 2UJ, 4OT, 5RW, ON4BZ, PA0EO, 0LU, 0NL.
(April 11 to May 12).

G2HDZ, Pinner, Middlesex.

WORKED: G2ANT, 2BCB, 2FKZ/P, 2FTS/P, 2PU, 2XC, 2XV, 3ABA/P, 3BPM, 3BPM/P, 3CWW, 3DIV/P, 3EHY, 3FGT, 3FSD, 3FUM, 3FUW, 3FXG, 3GZM, 3M, 3WW, 5AM, 5BM/P, 5DS, 5HN, 5TP, 5YV, 6XM/P, 8HY, 8OU, GW3FYR, 5BM/P, 5MQ, ON4BZ, PA0FP.
HEARD: F8AA, G2DLJ/A, 2FNW, 2HGR, 2IQ, 3ANB, 3APY/P, 3DO, 3ENS/P, 3GEN, 3GHO, 4GR, 5UD, 8SB, PA0BP, 0FB, 0NL, 0WI.
(April 14 to May 12).

G3HII, Liverpool, 12 NGR 33/417934.

WORKED: G2BNZ, 2CBR, 2DCI, 2HCJ, 2HCJ/P, 2HGR, 3AGS, 3ATZ, 3BOC, 3BPJ, 3BW, 3CSC, 3DA, 3DH, 3EHY, 3FMI, 3GSS, 3GUV, 3HWC, 5YV, 6JD, 6LC, 6MI, 8SB, GW3ENY, 5MQ.
HEARD: EI2W, G2ASR, 2JT, 2OI, 3A0O, 3AYD, 3BLP, 3GZM, 3IAI, 3QV, 3WW, 5JU, 6NB, 6XX.
(March 9 to May 9).

GW5MA/P 6 miles South East of Bala, Merionethshire.

WORKED: G2HCJ/P, 2HGR, 2OI, 3AYT/P, 3BOC, 3BPJ, 3BW, 3DA, 3EHC, 3GUU, 3GZM, 3HWC, 3MA/P, 5YV, 8SB, GW2ADZ, 3FYR, 5BM/P, 5MQ. (May 10 to May 11).

G2DHV, London S.E.13. NGR 51/384776.

WORKED: G2AHP, 2MV, 3CWW, 3BPM, 3EYV, 4HT, 5UM, 6AG, 6UH, 8DV/A.
HEARD: G2A, 2BRR, 2FVD, 2MQ, 3APY/P, 3BEX/P, 3BLP, 3EDD/P, 3ERD/P, 3FD/P, 3FRB/P, 3FXG, 3GBO/P, 3GSE, 3HSC, 3IIR, 5MP/P, 6JK, 6NB, 6XM/P, 6YP.

G5DS, Surbiton, Surrey.

WORKED: G2ANT, 2FTS, 2FKZ/P, 2HCG/P, 2HDZ, 2IQ, 2OI, 2PU, 2UN, 3ABA/P, 3AJ/P, 3APY/P, 3BEX/P, 3BPM, 3BRX/P, 3COJ/A, 3DIV/P, 3DJQ, 3EDD, 3ENS/P, 3ERD/P, 3FD/P, 3FEX/P, 3FUM, 3GBO/P, 3GHO, 3GSE, 3HSC, 3HWJ, 3HXS, 3WW, 4HT, 4IB/P, 4OT, 5HN, 5LC, 5MA, 5ML, 5UD, 6TA, 6XM/P, 6YU, 8CK, 8HY, 8OU, F8AA, 8GH, PA0NL.
HEARD: G2AHP, 2AIW,

2AJ, 2BN, 2BRR, 2DLJ, 2DIO, 2FKZ, 2FNW, 2FZU, 2HCG, 2HIF, 2HIF, 2KF, 2KI, 2MQ, 2MV, 2NH, 2TP, 2UJ, 2XC, 2XV, 3ABA, 3AVO/A, 3BK, 3BLP, 3BPM, 3BPM/P, 3BUN, 3BVG, 3CCP, 3CFH, 3CGQ, 3CVO, 3CWW, 3DIV, 3DIX, 3ECA, 3EDD/P, 3EHB, 3EHY, 3EYV, 3FD, 3FEX, 3FGT, 3FMI, 3FMI/P, 3FUL, 3FRB/P, 3FSD, 3FUI, 3FXG, 3FZI, 3GBO, 3GDR, 3GGJ, 3GHI, 3GOZ/A, 3GTH, 3HAB, 3HQB, 3HXO, 3IAI, 3IIR, 3MI, 4CI, 4CI/P, 4FB, 4HQ, 4KD, 4MR, 5DT, 5LK, 5RD, 5RW, 5OL, 5TP, 5UM, 5YV, 6AG, 6CE, 6CI, 6GR, 6LL, 6NB, 6NF, 6OH, 6PR, 6ON, 6RH, 6UH, 6WU, 8QV, 8QY/P, 8SK, 8VZ, GW5BM/P, GW5MQ, F8NW, ON4BZ, PA0WI. (April 14 to May 12).

G2HIF, Wantage, Berks. NGR 41/404855.

WORKED: EI2W, F8AA, G2COP, 2FQP, 2HCG, 2MQ, G3AVO/A, 3BK, 3CCP, 3EHB, 3EHY, 3FIH, 3FUM, 3GHO, G4AP, 4MR, 4SA, G5YV, G6NB, G8DM, 8HK, 8KL, 8MZ, 8PX, 8VZ, GW5MA/P. (April 1 to April 30).

G3IBY, Lancing, Sussex. NGR 51/186060.

WORKED: F8AA, 8GH, 8NW, 9DI, G2FTS, 2HIF, 2MC, 2UN, 2XC, 3ABH, 3ARL, 3AUS, 3BEX, 3BNC, 3CFR, 3FAN, 3FEX, 3HCU, 3HVO, 5RO, 8DV/A.
HEARD: F8BY, 8EC, 8LO, 8NH, 8OL, 8OX, G2AVR, 2DSW, 3CGE, 3DIV, 3GOP, 3HCK, ON4UV. (April 11 to 27).

G2OI, Eccles, Lancs. NGR 33/993753.

WORKED: G2BMZ, 2HGR, 2XC, 3AVO/A, 3AYT, 3CFR, 3DA, 3EHY, 4HT, 5DS, 5JU, 5RW, 6NB, 6YU, 8DV/A, 8ML.
HEARD: EI2W, G2CBR, 2HCG, 3AGS, 3A0O, 3BIJ, 3BLP, 3BOC, 3BPJ, 3BW, 3CCH, 3CVK, 3CKD, 3DIQ, 3ENY, 3FAN, 3FD, 3FGT, 3FMI, 3GHO, 3GUD/P, 3GUU, 3GZM, 3HDZ, 3HII, 3HWC, 3IAI, 3QV, 3WW, 5YV, 6GD, 6GR, 6JD, 6LC, 6QT, 8PX, 8SB, GW2ADZ. (April 1 to April 30).

G2BRR, London, E.18.

WORKED: F8AA, G2BN, 2CD, 2DIO, 2FTS, 2UJ, 3AJ, 3BRX, 3BWS, 3CNF, 3CWW, 3BEX/P, 3DAH, 3DIV, 3ECA, 3FMI/P, 3GBO, 3GHI, 3HSC, 3IIR, 4FB, 4HT, 4IB/P, 5LK, 5UM, 6LL, 6RH, 6TA, 6XM/P, 6YP, 8LN, 8OA/A, ON4BZ.
HEARD: G2A, 2AVR, 2FKZ/P, 2MV, 2NH, 2PU/P, 2XV/P, 3APY/P, 3ARL/P, 3BLP, 3BTC, 3EDD/P, 3FD/P, 3FRB/P, 3FUL, 3GBA/P, 3GSE, 3HAB, 3HUQ, 4CI/P, 5CD,

5QN/P, 5RD, 5TP, 6AG, 6VX, 68HY, 8SK, 8SM, 8VR, 8DV/P, GW5BM/P, PA0AD, 0WI. (April 1 to May 11).

G3BVG, London, W.5. NGR 51/181817.

WORKED: G2ANT, 2BN, 3BPM, 3BTC, 3FIH, 3GBO, 3GTH, 3HCU, 3HSC, 3HWJ, 5DS, 6QN, 8HY, ON4BZ, PA0BF.
HEARD: F8AA, G2AHP, 2AJ, 2AVR, 2AIW, 2BRR, 2DIO, 2FVD, 2HDZ, 2XC, 3CCP, 3CNF, 3CVO, 3DIV, 3EDD, 3EHB, 3EHY, 3EYV, 3FAN, 3FEX, 3FSD, 3FQS, 3GHO, 3GOZ/A, 3GSE, 3GWR, 3HAB, 3HVO, 3MI, 4CI, 5LK, 5LN, 5MA, 5QL, 5RP, 6RW, 6LL, 6TA, 6VX, 6WU, 8VR, GW5MA/P, PA0AD, 0FB, 0WI. (April 4 to May 4).

G6FO, Buckingham. NGR 42/717344.

HEARD: F8AA, G2AHP, 2AJ, 2AOK/A, 2FKZ/P, 2FTS, 2FVD, 2HCG/P, 2HDZ, 2HIF, 2MV, 2NH, 2PU, 2XC, 2XV/P, 3ABA/P, 3BEX/P, 3BLP, 3BNC, 3BPM/P, 3BWS, 3CGQ, 3CWW, 3DIV/A, 3DIV/P, 3ENS/P, 3ERD/P, 3FAN, 3FD, 3FD/P, 3FQS, 3FUL, 3FUM, 3FKX, 3FZI, 3GBO/P, 3GDR, 3GHI, 3GHO, 3HSC, 3HFO, 3HXS, 3VM, 4CI, 4HT, 5DX, 5DS, 5MA, 5RP/P, 5SK, 5TP, 5UM, 5VP, 6AG, 6GR, 6JK, 6NB, 6VX, 6XM/P, 8DV/A, 8HK, 8IL, 8OU, 8VR, 8VZ. (May 9 to May 15).

G3EHY, Banwell, Somerset

WORKED: EI2W, G2AHP, 2COP, 2FNW, 2FTL, 2FZU, 2HIF, 2HX, 2IQ, 2OI, 2PU, 3BGR, 3BK, 3BW, 3CC, 3CCH, 3CVK, 3DJX, 3DLU, 3ENS, 3ERD/P, 3FIH, 3FMI, 3FRE, 3FRY, 3FUM, 3GEN, 3GZM, 3HAZ, 3HBW, 3HII, 3HSD, 3HWC, 3WA, 3MA, 3MA/P, 3MY/P, 3WW, 4MR, 4RK, 4SA, 5BM, 5DF, 5ML/P, 5RW, 5YV, 6NB, 8GL, 8ML, 8OU, 8QY/P, 8SB, GW2ADZ, 3BNQ, 3ENY, 3FYR, 5BM/P, 5MA/P, 8UH. (April 13 to May 13).

G2XC, Portsmouth, Hants., NGR 41/670069.

WORKED: G2AIW, 2ANT, 2DSW, 2FTS, 2HDZ, 2HIF, 2UN, 2YC, 3ABH, 3APY/P, 3ARL, 3ARL/P, 3BEX, 3BIV, 3BH, 3CGE, 3CE, 3DIX, 3DHS, 3CEQ/P, 3EYV, 3ERD/P, 3GHO, 3GVC, 3HCU, 3HXS, 3WW, 5LK, 5RO, 5YV, 6CI, 6JK, 6NB, 6VX, 6XM, 8IB/P, 8IL, 8PX, 8QY. (April 18 to May 12).

should make it snappier, signing their own calls more often and his less frequently; what he likes to do is to line up the beam while he is being called, so as to put down a better signal for the caller. EI2W is on at 1130-1230 BST, when conditions are good, and welcomes reception reports at any time. He adds that GI2HML (Comber, Co. Down) is a "potent signal" and should do well when the band really opens.

G3HII (Liverpool, 12) fixed himself a new beam and worked G3EHY, whom previously he had never even been able to hear. GW5MQ (Mold, Flints.) has struck a few of the brighter openings, pushed his score up to 46C, and claims some "firsts" for GW not previously noted in our lists. (These will be included with the next appearance of that particular table.)

From G5RW (Ilkeston, Derbys.) we have a first report, though he has been a regular performer on Two, with 120 different stations worked. Of interest as indicating the consistency of an established two-metre link is the fact that he has kept a weekly schedule with G3CXD (Newcastle, Staffs.), over a distance of 50 miles, for 2½ years; there has never been an occasion when two-way phone working was not possible.

As many southern operators know, G2OI (Eccles) is in circulation again with new beams up, and is looking forward to the GDX season; he is there practically every night.

Midlands and East

Brian of G6CI (Kenilworth) is on again with a new 8-ele. stack and a cascade converter; he also goes up a bit in the Tables. G3EDD (Little Abington, Cambs.) ascribes his hefty signal to a 3-over-3-over-3-twice, all-metal constructed, with its top at 62 feet, about which we may have more to say in a future issue.

G8NM (Lincoln) remarks that the last time he wrote to A.J.D. for this column was in August, 1939—that awful month when we did our piece wondering if we should ever write another. He is back on VHF now, and on Two most evenings and week-ends; the first five QSO's were with stations

in five different counties, G6NB (Aylesbury) being about his best DX so far. The transmitter at G8NM is a converted S.440B with an 832 doubler output, shortly to be reinforced by a straight PA; his receiver is a 6J6 job into an R.1481 as IF strip, and the aerial a Lazy-H, only 18 ft. high and 50 ft. a.s.l. Never mind, good conditions will balance out the height factor! G8NM says that there seems to be no other two-metre activity within 20 miles of Lincoln.

G3FKO (Rugby) was /P on May 11, hearing 30 stations and working 15, using QRP with 3½w. of phone and 4w. on CW; this seemed to get them out to about 75 miles in most directions. Only two London fixed stations, G3BLP and G4HT, were heard at their /P site that day; an interesting contact was GW3BNQ, of Cardiff, opening up on the band.

G5AM (Ipswich) worked his first PA on April 16, but is having receiver trouble with a creepy oscillator, so cannot do much with weak CW until that is rectified.

Sitting on his knob on the Isle of Ely, G3WW has been having a good time, though QSB was bad on most occasions when the GDX was coming through. Several stations, either new to G3WW or new on the band, have been heard or worked during the period, notably G2AIW (Twickenham), G2ALL (Comberton, Cambs.), G2BCB (Colchester), G2CG (Bassingbourn), G2FCL (Shipley, Yorks.), G2YB (Reading) and G3GMW (Peterborough). On April 17, PAØEO and PAØOP were worked, and on the 18th Richard had an encounter with F8AA, in French—this seems to have caused some hilarity locally, and the phone regulars now make a point of signing off with G3WW in French! His new beam is a 3-slot stack at 40-ft., inspired by a visit to G2HCG (Northampton); tests so far indicate a marked improvement on the 5-over-5 at 63 feet. G3WW asks us to remind the newer operators on the band that he and G3BK are in Cambridgeshire, not Cambridge itself, and that they are actually 23 miles north of that city. G3WW is regularly active, phone

and CW, and is good for a contact with any station beaming his way.

Reports from the South

Johnnie of G3BLP (Selsdon) goes to the top of Counties Worked with 55, the new one being Cardigan with GW3FYR, of Aberporth—heard and called by many distant stations, incidentally.

G3FAN ("Fanny Annie Nanny") of Ryde, I.O.W., from whom we are also very glad to hear again, writes to bring his scores up to date. He puts out a phenomenal signal to the North when conditions are right, and is an easy contact from the South Midlands. G3EHY (Banwell) is another

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH Only

Worked	Station
55	G3BLP (535)
54	G2OI, G3EHY (350)
52	GW5MQ (186)
48	G2AJ (408)
47	G2NH, G3BW, G5WP, G6NB, G8SB
46	G4HT (476), G5BY, G5YV
45	G6XM (356)
44	G2XC, G3ABA (222), G4CI, G5MA
43	G3COJ, G3WW, G5DF, G5DS (348)
42	G5BD
41	G3BA, G3BK, G3DMU, G5BM
40	E12W, G3CGQ, G8OU
39	G2IQ, G4SA, G5LI (285)
38	G3APY, G3VM (207), G6YU (140)
37	G2FNW, G2HDZ (270), G3FAN (253), G8IL
36	G3CXD, G6CB (312), G8IP
35	G2FQP
34	G2AHP, G3AVO/A, G3HAZ (113), G4RO, G5JU
33	G3FZL
32	G6CW, G8QY
31	G2HIF, G3HBW (115), G5RP
30	G5NF
29	G6CI (101)
28	G5ML
27	G2FVD, G3BNC, G3DAH, G3GSE, G3HCU, (152) G6GR
26	G3CFR (125), G3FIH, G4MR (170)
25	G5SK, G8VR
24	G3FD, G3FXG, G3GBO, G8KL
23	G5PY
22	G3AEP, G3BPM, G3CWW (221), G3GOP (100), G8IC, GM3BDA
21	G3AGS, G5MR, G6XY
20	G3EYV, G6TA (123)
19	G3SM, G5LQ (176)
18	G4LX
16	G2AOL, G3FRE, GC2CNC, GM3EGW
15	G2DVD
14	G3CYY, G3FEX

Note: Figures in brackets after call are number of different stations worked. Starting figure, 100.

who remembers your precentor from the old days (when he was an SWL, incidentally) and puts in his usual detailed survey. Outstanding signals with G3EHY have been G3BW (Whitehaven, Cumberland, and a considerable step from Banwell) and EI2W. The first three weeks of May gave better signals and more activity from all parts, and other interesting contacts for him were G3CC (Hull), GW5MA/P and G8GL (Northallerton, Yorks.)—all of which shows that the Banwell magic still works, proving G3EHY to be one of the most consistent and successful DX operators on the two-metre band.

Now we come round to Ted, G2XC, who sends in a very useful report in proper form—and if he doesn't know the form, who does!—including a Calls Heard list with all the call signs in the right order (though even the Editor got his own nearly right this time!) Down in Portsmouth, things were not very exciting up till May 12, with April 25 as perhaps the best night, when G3FGT (Birmingham) was worked. The centre of greatest activity during this period was Sussex. And then, after the 12th, conditions improved sufficiently to make Midlands and Northern signals workable again. The activity list from G2XC shows 12 stations on regularly in Hampshire, three in Dorset and eight in Sussex. Thank you, Ted!

G2BRR (London, E.18) is on every evening between 1900 and 2030, and mentions that G3BRX, the Wanstead and Woodford Club station, comes up on 144.75 mc most Tuesday evenings. 2100-2200 BST, looking for QSO's. G2HDZ (Pinner) goes up in the Tables, as does G5DS (Surbiton), who also sends a very interesting Calls Heard list. G3BVG (London, W.5) missed part of the good period due to being involved in a holiday, and feels he may have made a mistake in trying to raise F8AA by calling him in French—well, that is what he says! G3BVG is doing nicely with 127 different stations worked, and is regularly active. G2AHP (Perivale) is another who gains places in the Tables, and on April 29 he managed G5BM/P for a new

county. The latter was called by a great many stations in the London area, and this, says G2AHP, shows that there is a lot of silent listening going on when the band seems unoccupied—people are always QRX for something new or interesting. On May 11, G2AHP did well, in view of the prevailing conditions, to work 14 /P's, including GW5BM/P and G3ENS/P.

G3AJP (Fritton, Norfolk) is one of the most-easterly stations on Two, and has a 4-over-4 at 34 ft.; he has worked PA's, and DL3VJ/P on 145.65 mc. Locals active are G3CFK and G4PV, and between them they intend to put East Anglia on the 2-metre map—with, it is to be hoped, the help of G3VM. G3AJP, like many others, is all for more activity during "off-peak" periods; on this point, what G2AHP says above is probably near the truth. So what we want is more calling of "CQ" when the band seems flat. (Stations we notice who do this already are G3BLP, G3CGQ, G3GHO and G6NB—this does not mean they are the only ones, but are those we have heard doing so on many occasions).

G2HIF (Wantage) keeps busy and now has his cascode converter in operation—with very encouraging results, and a noise-factor of 5.6-5.9 dB. He feels that he is hearing all there is to hear at his QTH. G2HIF remarks on the "spectacular consistency" of EI2W. G2IQ and G5YV, less troubled by QSB than many stations at half the range. On April 16, he worked F8AA, though missing ON4BZ and the PA's that evening.

Down in Worthing, G3IBY is now available and hopes to be a regular performer. The gear is an SCR-522 transmitter and the converter an EF54-EF54-9002 arrangement into a Bendix RA10 on 10 mc, with a 4-element close-spaced Yagi 30 ft. up. Though 200 ft. a.s.l., with a clear view across the Channel, G3IBY is badly screened to the North. On April 25, stations in the Paris region were S9 on phone, but fading badly. The call-signs mentioned as being consistent at G3IBY on the evenings of April 25 and 26 are

F8AA, F8GH, F8NW and F9DI. Along the coast, G3AUS and G3HVO were worked.

The Seventycem Report

This band seems to be languishing a little, though there is quite consistent activity in the London area. A number of stations are equipped, or are about to become equipped, for 430 mc over the country as a whole, and we very much hope that the new season will see some fresh records and a more voluminous mail. If the pressure warrants it, we would be very pleased to run a separate section of "VHF Bands" devoted to 70 cm. In the meantime, every operator who is actually able to transmit or receive on 430 mc is asked to let us have details of activity, including the call-signs of the locals known to be on.

G2QY (Pinner) dusted off his 70 cm converter after a shift of QTH and other disturbances and found it worked perfectly on G2DD without the slightest hesitation—nor did he need to ring up beforehand to make a schedule, which, says G2QY, seems to be the prevailing impression about 70 cm QSO's. Andy expects to be /P from a good site in the Chilterns on June 22, 435.16 mc, and hopes to be able to work into London and the Midlands. He invites correspondence about schedules

TWO METRES COUNTIES WORKED SINCE SEPTEMBER 1, 1951 Starting Figure, 14

Worked	Station
47	G3EHY
46	GW5MQ
41	G5YV, G3WV
39	G3BK
38	G5DS
36	G2HDZ, G4HT, G5MA
35	G2XC
34	G3FAN
33	G4SA
32	G2NH
29	G2AHP, G6YU
27	G2FNW, G3VM
26	G2FVD, G2O1, G3AVO/A, G8IL
23	G5ML
21	G3BNC, G6CB
20	G2FQP, G4MR, G6TA
19	G3CWW, G3GHO, G3HCU
18	G8VR
16	G3FIH, GM3EGW, G6CI
15	G3GOP

Note: This table will run for one year until August 31, 1952.

for the occasion—write him at: 56 Latimer Gardens, Pinner, Middlesex. He will also have a small 160-metre rig with him for the convenience of cross-banding, if required.

G3ARL (Sandown, Dorset) and G4XB (Portsmouth) are trying to QSO using SEO gear (no success so far), and other South Coast stations on 70 cm with stabilised equipment are G3ABH, G3CGE and G3GOP—who are getting contacts.

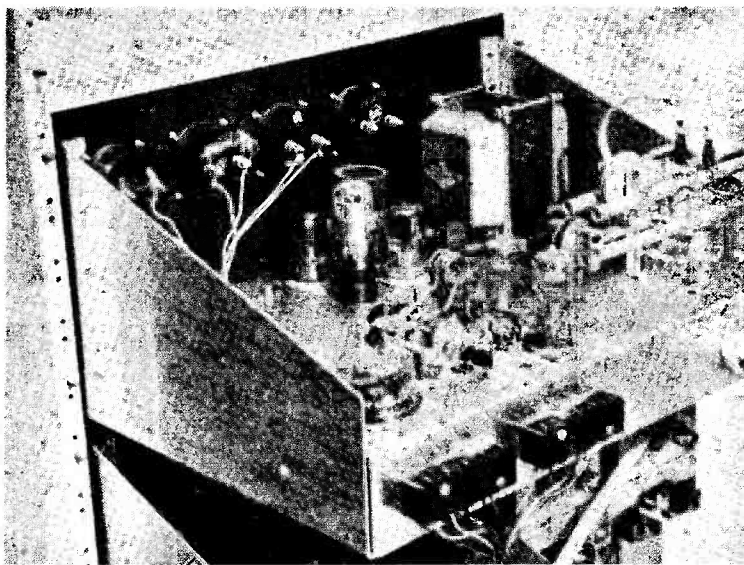
G2OI (Eccles) has a stack of four folded dipoles-with-reflectors for 70 cm, spaced $\frac{1}{2}$ -wave; first tests have been encouraging, with "all usual signals" up to 3-4 dB. So G2OI is anxious to test with more distant stations. G2JT has gone up from S7 to S9 + 10 on this beam, and the third harmonic from GW5MQ is very much in evidence.

At GW5MQ (Mold, Flints.) the regular 430 mc schedule with G3APY (Kirby-in-Ashfield) has been maintained; this is a good stretch in terms of distance, and shows what can be done. G2OI and G3DA (Speke, Liverpool) are also worked from GW5MQ—but, generally speaking, 70 cm activity is low. G3HII (Liverpool) has been cross-banding with G3DA on 70 cm.

We feel there must be many more 430 mc operators whose doings, and in particular their equipment, would be well worth recording in the general interest, so we hope that they will report.

The QSL Situation

The quick answer here seems to be that all operators should, in duty-bound, QSL if asked (and they agree) to do so, and that everybody ought to QSL on receipt of a card, even if not asked for and unwanted. That looks simple enough, and is what most people would agree on, but the facts are that too many stations still owe cards for too many contacts. In some cases, it is evident that the hold-up is in the bureaux, perhaps because all addressees are not bothering to keep envelopes on file. The right answer seems therefore to be: Because it is VHF, and the other chap wants your card quickly as part of his



RF chassis of the two-metre transmitter at G2FVD, Morden Park. The final is a pair of 8012's in push-pull, with a long-lines tank circuit. The drive sequence is Squier EC52 24 mc—EF50 72 mc—TT11 144 mc—832 144 mc.

fun, send it by direct mail.

This month's comments about QSL'ing are as follows: "I have found a station recently who has not had a card from me; I QSL 100%, so if anyone has not received mine, will they please let me know and it will be rectified at once" (G3BVG) . . . "I have been at the receiving end of complaints recently; in spite of being bang up-to-date with my log, repeat requests have been coming in. I suggest lists of QSL's outstanding" (G2HIF) . . . "At the moment we have no cards, but when they arrive we will QSL 100%" (G3IBY) . . . "The boys can take me off their black lists; I have QSL'd all contacts made on 144 mc" (G2BRR) . . . "I am quite satisfied with my 73% return for cards sent, but I wish the 28 owing me would turn up so that I can stake my claim for VHFCC. I have sent a card direct by post to every station worked" (G6CI) . . . "My QSL result is around 95% and there has not yet been time for several to arrive" (G5RW) . . . "I am doing fairly well with 63% return, but you can form your own opinion about the black-legs" (G3HII) . . . "Do PA stations ever QSL? I am waiting for cards dating back to the first

openings three years ago" (G4LX) . . . "I have just received a QSL card from PAØFP confirming a QSO on June 4, 1951; this card, bearing no other useful information, is surely meant for some other G, as I do not operate on two metres. The station awaiting this QSL can have it by writing to me" (G8JC).

This and That

The two new claims in for the DX Marathon (from G2FCL and G5DS) will be included in the next appearance of this Table—in the meantime, we would like to have the necessary information from other operators who may have worked over 400 miles. DL6RQ (Schwarzenbach) asks in a general way for "information on receiving and transmitting gear for 70 cm"; to start with, we suggest his best contact would be DL3FM (QTHR). G3EJL, who did that 430 mc converter design in the June 1950 issue of *Short Wave Magazine*, is now in Aden. The PA and ON stations are said to hear many G's chatting round the band on a Sunday morning, but cannot attract their attention. G8NM says that his only regret about the two-metre band is that nothing appears to happen much

before 10.30 p.m., just as he is going to bed. OQ5FG used to be ON5G on Five in the '48/'49 period; he is now chief cameraman with a film unit operating in the Belgian Congo, but his heart is in VHF, with which he keeps in touch through this column; Gaby hopes to be back in Brussels at the end of the year, and will start up forthwith on 144 mc "to help ON4BZ handle the band."

Welcomed as new members of the VHF Century Club are G5RW (Certificate No. 104) and G6TA (No. 105). New members of the Fiveband Club are G3IBY and G3AJP (No. 193).

Finally

And that, we hope and believe,

is a fair summary of all the reports and information reaching us for this issue. Our grateful thanks to those who have written specially, to those who have been kind enough to wish your new precentor a fair passage, and (on behalf of Ted Williams) his thanks for the generous references to his own past efforts.

This feature lives on its correspondence, and so your A.J.D. looks forward to a big mail next month—for which the closing date is, unfortunately, very tight. It must be first post on **Friday, June 13** (yes—and at the office), and for those who may have to miss this, for the issue following it will be *July 18* certain, which is a bit easier.

Address all your VHF news,

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

- 12 G3BLP (DL, EI, F, G, GC, GD, GI, GM, GW, ON, OZ, PA).
- 11 G5YV (DL, EI, F, G, GD, GM, GW, ON, OZ, PA, SM).
- 10 G2HDZ, G5DS, G6LI, GW5MQ.
- 9 G3WW, G5BD, G6XM.
- 8 G2AHP, G2FQP, G2XC, G3ABA, G3BK, G3EHY, G3VM, G6BY, G5MA, G5UD.

views, comments, complaints, ideas, and suggestions to: **A. J. Devon**, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. With you again on July 4, all being well.

Thanking You

By "JORU"

This article is written by a Blind Amateur.—EDITOR.

FAME, so long denied me, has deigned to glance shyly in my direction. No longer need I feel envious of those whose autographs are sought and later displayed with pride to other and less fortunate hunters. No longer am I impressed by the fact that Mr. X, of Beverley Hills, Cal., or Miss Y, whose name throws even more light on the Great White Way, N.Y., keep three secretaries for coping with the mail received from their admirers.

I, too, have a fan; in fact, I have two. They arrived one Saturday morning during the peak period for callers, appearing between the milkman and the greengrocer, or the other way round.

I was on the air when the front door bell rang, and my wife, now becoming selective in her mode of greeting those who ring the bell and ask if G-Zero Blank is at home, and would he mind not transmitting during TV time, was a little reserved at first. Soon, however, she ushered the callers into the lounge, just as I was finishing a QSO.

As I turned round, a voice said, "I'm Norman." As it did so, another voice said "I'm Chris." Simultaneously they then said, "Are you G-Zero Blank?" I cautiously admitted that I was indeed no other, and sat back to await developments.

Developments followed, and I luxuriated in complete forgetfulness of TV, and the fact that neighbour G-Zero Asterisk had worked two hundred countries with 38 Zones confirmed.

Structurally, my fans do not loom very large. They would pass unnoticed in any group of average schoolboys. They *are*, in fact, schoolboys. As stock-breeders and other gentlemen who wear breeches, hacking jackets of noticeable pattern, and horseshoe tiepins, have been known to say, Norman and Chris are "rising thirteen." But their enthusiasm is in inverse ratio to their years, and their use of their families' broadcast receivers speaks volumes for their parents' indulgence. Considering that they must have the normal amount of homework to cope with, Norman and Chris

must get the school chores done at speed in order to keep such well-filled logs as theirs.

Oh, yes, they keep logs. During our first few minutes of talk together they told me the stations with whom I had been in contact on Christmas Day, and on many occasions since. Chris thanked me very warmly for "getting him" a YI, and Norman was equally grateful for my "getting him" a ZL one morning, time duly noted; also the S4 report. "Jolly good for seventeen watts!"

They informed me of their sorrow that G-Zero Cipher was laid up with a strained back, and that G-Zero Dash would be week-ending in Hampshire.

When I asked them if they received me reasonably well or poorly, Norman and Chris replied in concert, "Do we receive you well? Why, you come through like the X!X!X!" No, I will not repeat it. You may have heard the same things yourselves, and it is not my wish to infringe any copyright. Still, they said it.

Going On the Air

On being asked if they would care to make the radio welkin ring as they were accustomed to hearing it ring by G-Zero Blank, Norman and Chris said "Rather," and stood by at the ready.

The time being propitious,

G-Zero Oblique made a snappy come-back. I could not have chosen better, and Norman and Chris, entirely un-self-conscious, carried on as though they had been doing nothing else for years.

G-Zero Oblique was eminently the right person for them to meet on the air, and a very good time was indeed had by all.

But let it not be thought that I claim an exclusive right in my fans. They have visited others, and will, I expect, continue to do so. After all, G-Zero Hyphen did get Chris the DU for whose attention I had called in vain. We must be generous about these things, and I am not a little comforted that telephone calls at threepence a time from a public call-box cannot figure very frequently in the income and expenditure accounts of Norman and Chris, and I have had quite a few breathless comments on the transmission of someone with whom I have been in contact or was actually working at the time.

Remonstrance as to the cost of these much-appreciated evidences of fraternal feeling are useless. "But it's worth it" in the rising pitch of a fresh young voice, made one realise it really was so. On another occasion, "But

Mummy paid for the call, and Grandma said I was to say she likes listening to you" have decided me to say no more about "Wasting your money like this." Still, Norman and Chris are saving to buy their heart's desire, an Eleven Fifty-Five, and I might take that line. Or perhaps not. For their pleasure is so manifest, bless them.

The other evening the 'phone rang. It was Chris. "Will you please QSY. There is a broadcast station on you and we can't hear!" I changed frequency, for I too have listened on a BC receiver.

The Magic Spell

I am often tempted to speculate as to the proportion of radio amateurs who have been drawn into the magic of beating the bounds of the Great Circle because of the so-apparent friendliness of the majority of licence holders. And the wonder of it all is that it is not limited by country or social distinction. With a reversion to passportless international travel, what a factor in international understanding and reconciliation Amateur Radio could be!

I am grateful to the world of

Amateur Radio to an extent I find it difficult to express, for apart from its technical interest and the fascination and adventure of reaching new countries, and forging new links with old ones, there is the incalculable joy—and to me that is no exaggeration—of making new friends.

And these new friends are by no means limited to licensed operators. In common with most amateurs, I receive cards and letters from listeners who seem to derive much interest and entertainment from sharing silently in local amateur rag-chewing. Some of these contacts have grown into friendship of a deeper quality than will, I trust, be enduring.

It is a commonplace for radio amateurs to describe themselves as "a crazy gang." Maybe there is something of truth in this, for the toxin of the radio bug is potent as is that of no other hobby I know. But to me, at any rate, it is well worth succumbing to its effect.

Fellow-amateurs, I am grateful to you, and to you listeners who follow day and night the exultation and despondency of your favourite ham. The world would, for me, be a less happy place without you.

STORY FROM CEYLON

G8VG (Dartford) sends us an interesting cutting from the *Colombo Observer* describing how VS7RSC—the station of the Radio Society of Ceylon at the Colombo Plan Exhibition—was able to get the first message through to this country regarding the fatal accident to Mr. D. S. Senanayake, the late Prime Minister of Ceylon. Peter Windle, VS7XG and G8VG's son, had a hand in this, and his ready co-operation is acknowledged in the newspaper report of the occurrence.

SIMPLIFIED RECEIVER DESIGN

The June issue of our *Short Wave Listener & Television Review* includes an article which will awaken the memories of many a reader who cut his first teeth on a simple receiver built on the edge of the kitchen table. It is titled "Beginner's 0-V-0" and describes in full detail an Rx of this type, capable of giving excellent results, even in these days. In the same issue, there is the first part of a constructional article on a much more elaborate general-purpose unit, incorporating a quality audio amplifier for record reproduction, a TRF fix-tuned

local station receiver, and a short wave wide coverage superhet; the audio amplifier is the common output channel in all three applications. Copies of this issue are available at 1s. 7d. post free, of The Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

GOING TO JERSEY?

G8JC writes that as he and his wife will be spending a fortnight in Jersey from June 16, he would like to hear of any other amateurs who might be there during that time, with the object of arranging a meeting—perhaps also a gathering with some of the GC's. Write: J. Morris-Casey, 4 Kennels Road, Station Road, Fernhill Heath, Worcester.

NEW QTH's

Readers are reminded our "New QTH" columns are open to all who care to send us their call-sign/addresses, as issued (or changes of address) for appearance not only in *Short Wave Magazine* but also in the *Radio Amateur Call Book*, the only directory covering all amateur stations throughout the world.

NEW QTH's

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

E12B, H. L. Wilson. The Chalet, Plunkett Avenue, Foxrock, Co. Dublin.

G3AWY, Lt. R. Sharpe, A.M.I.N.A., A.M.Inst.B.E., 293 Milton Road, Milton, Southsea, Hants.

G3BOD, C. D. Jones, 38 Mason Street, Wolverhampton, Staffs.

GM3BWG, Cpl. A. P. Drysdale (ZE3JK), 42 Married Quarters, R.A.F. Middle Wallop, Stockbridge, Hants.

G3EHB, Dr. A. H. Walker, 38 Woodhall Drive, Pinner, Middlesex.

G3HQS, C. J. Baker (ex-D2IQ), 246 High Street, Rochester, Kent.

G3HTT, W. T. Cheeseworth, 21 Tower Street, Launceston, Cornwall.

G3HTU, J. Dobson, 33 Thompson Avenue, Ormskirk, Lancs.

G3HVR, W. R. Lupton, M.Inst.M., 17 Heyburn Road, Liverpool, 13.

G3HWV, F. J. Walton, 104 Warren Way, Woodingdean, Brighton, 7, Sussex. (Tel.: Brighton 25730).

G3HXI, R. G. Ashman, 43 Dudley Wood, Cradley Heath, Staffs.

G3HXM, H. Barnes. A.A.I.A., 30 Le Strange Terrace, Hunstanton, Norfolk.

G3HXW, B. E. Hasler, 25 Templar Road, Summertown, Oxford.

G3HYZ, H. C. Hartwell, 7 Sunderland Avenue, North Way, Oxford.

GD3IBQ, K. Holt, Balmoral, South Promenade, Ramsey.

GM3IBU, A. W. Wright, Craigmount, Bridge of Weir, Renfrewshire. (Tel.: Bridge of Weir 223).

G3IBW, Cpl./Tech. W. Tennent (ex-ZBIBS/MD2GO), Signals Section, R.A.F., Middle Wallop, Stockbridge, Hants.

G3ICA, G. H. Adams, 22 Rosebery Park, Dursley, Glos.

G3ICF, F. C. Redfern, The Cedars, Cressage, Shropshire (Tel.: Cressage 29).

G3ICH, P. N. Pitt, 103 Bellshill Crescent, Belfield, Rochdale, Lancs.

G3ICL, Cpl. G. Cockrem, 36 Westfield Terrace, Allerton Bywater, nr. Leeds, Yorkshire.

G3ICO, G. W. Davis, 1 Homefield Terrace, Milborne St. Andrew, Blandford, Dorset.

G3ICQ, D. Wigington, Sherwood Hotel, Belgrave Road, Torquay, S. Devon.

G3ICX, E. O. Wright, A.C.T. (Birm.), A.M.I.Mech.E., 345 Walmley Road, Sutton Coldfield, Warks. (Tel.: Sutton Coldfield 3319).

G3IDC, Sgt. F. Johnston, RAF-ARS, R.A.F., Locking, Somerset.

G3IDD, R. H. Lamb, BM/MP.XH, London, W.C.1.

G3IEO, W. B. Johnston, 17 Carleton Street, Portadown, Co. Armagh.

G3IES, B. Sutherland, 44 Margetson House, London, N.16.

G3IEX, Sgt. D. J. Roper, 294.F Married Quarters, R.A.F., Henlow, Beds.

G3IFV, W. P. Lewis, 33 Fourth Avenue, Northville, Bristol, 7.

G3IGA, G. A. Evans, 160 Greenleach Lane, Worsley, nr. Manchester, Lancs. (Tel.: Swinton 2937).

G3IJC, J. Charlesworth, 23 Craven Lane, Gomersal, nr. Leeds, Yorkshire.

G3ILC, L. C. Carter, 35 Barnfield Gardens, Kingston-upon-Thames, Surrey.

G3ISA, A. Roy-Smith, 10 Brabourne Rise, Beckenham, Kent.

CHANGE OF ADDRESS

E12W, H. L. Wilson; *QSL to:—The Chalet, Plunkett Avenue, Foxrock, Co. Dublin.*

G2APW, A. D. Narraway, Little Croft, Maesbrook, Oswestry, Shropshire.

G2BUJ, P. H. Greenwood, 60 The Circle, Pinehurst, Swindon, Wilts.

G2CVB, W. E. Gibbs, Southfields, Station Road, Styal, Cheshire.

G2DBA, F/Lt. P. M. S. Hedge-lan d, M.B.E., B.Sc.(Eng.), A.C.G.I., A.M.I.E.E., 28 Pickersleigh Avenue, Malvern Link, Wores. (Tel.: Malvern 1609).

G3BXI, J. C. Farlow, 55 Mount Pleasant Road, Chigwell, Essex.

G3CEW, W. Sansom, 137a High Street, Slough, Bucks.

G3DRP, W. Fletcher, 23 Wesley Place, Stapleford, Notts.

G3DTT, H. V. Bickers, 12 Priory Road, Grange Road Estate, Netley Abbey, nr. Southampton, Hants.

G3EGX, L. Roberts, 18 Croxteth Avenue, Liscard, Wallasey, Cheshire.

G3FIT, N. E. Ashman, 29 Laburnum Road, Weston-super-Mare, Somerset.

G3FZW, E. A. Matthews; *QSL via BCM/QSL, London, W.C.1.*

G3GYD, G. Robertson (ex-GM3GYD), 5 Parkland Avenue, Langley, Slough, Bucks.

G3HAX, M. K. Hare (ex-MS4FM), 49 Calverton Road, Stony Stratford, Wolverton, Bucks.

G3HDL, S. E. Kelly, 7 Strathmore Road, Newsham Park, Liverpool, 6. (Tel.: Anfield 2034).

GM3HUT, F/Sgt. M. Doubleday, R.A.F. Station, Dirleton, East Lothian.

G3SN, R. P. Ellis, 1 Station View, North Tawton, Devon.

CORRECTION

G3AIR, F/Sgt. J. F. Wort, RAF-ARS, R.A.F., Locking, Somerset.

G3DOS, D. F. Tatnall, 2 Westfield Road, Henlow, Beds. (re-licensed).

G3IRS, R.A.F. Locking Amateur Radio Club, R.A.F., Locking, Somerset.

G8FC, Headquarters Station, Royal Air Force Amateur Radio Society, R.A.F., Locking, Somerset.

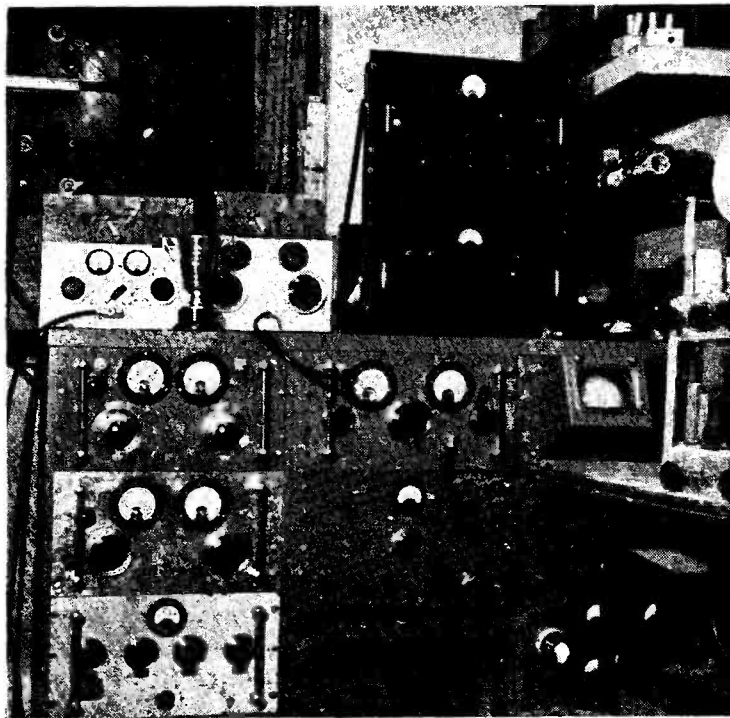
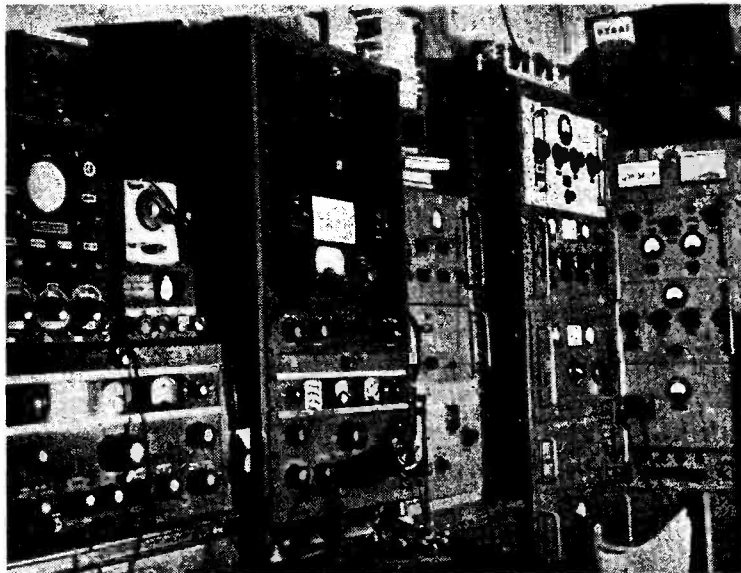
GW3FSP

The Other Man's Station

THE call-sign GW3FSP is so well-known in connection with Contests, DX and Top-Band work that it is hard to realise the operator took little interest in transmitting until 1949. In that year a local amateur told him that he was too old to learn Morse! But the outcome was the licensing of D. E. Davies, of Sunnyside, Castle Street, Skewen, Glam., in September, 1949.

The photographs show a station which is as outstanding for its equipment as for its signal and results. The upper view shows the receiving position (two AR88's) with scope, Q5-er and Panadaptor. The next rack beyond the receivers carries the 144 mc receiver (BC349 modified) and the Top Band transmitter, which is the VFO for other bands.

Beyond that, the big rack is a new transmitter not yet completed.



The rack facing the camera contains a T.1131 modified for 28 mc. with push-pull 808's in the final.

The lower photograph shows the remaining gear, on the right of the 1131. The left-hand rack contains (top to bottom) a 100TH PA for 14 mc. another for 28/21 mc. the 28/21 mc driver and a power pack. The next comprises the 813 PA for 14, 7 and 3.5 mc. the frequency multipliers, a switch, fuse and relay panel, and the mains corrector.

Various ancillary equipment is housed on the right. Up above are two aerial selectors and aerial tuners, the beam indicator and (on top) the 144 mc Tx and power supply.

The aerial systems need a page on their own; briefly, there are three 270-ft. Zepps, a 3-element Yagi for 28 mc. a 6-element for 144 mc and a 69-footer. The location is good. Dewi's main interests are construction, DX and Contests, CW being preferred to phone. Favourite bands—14 mc and Top Band.

The Month With the Clubs

Leicester Radio Society

On May 5 a well-attended meeting heard the first part of a lecture on F-M, by Mr. C. L. Wright, B.Sc. (Eng.); the second part will deal with the receiving end. A field day "try-out" was held on May 11, and the main topic of the next three meetings will be NFD—Before and After. Colour slides are being prepared of all the major events in the area. Meetings are on the first and third Monday, and full details of activities may be obtained from the Hon. Sec.

QRP Research Society

April was a record month for recruiting, members having been enrolled from Sweden, Israel and the Isle of Man! The new VHF section flourishes under the leadership of GC2CNC and some interesting work is anticipated. Badges are available to members, price 2s. 6d. There are no territorial boundaries to this Club, and SWL's are welcomed, as well as licensed members; the only essential to membership is an interest in QRP work, and the Hon. Sec. will send full details in return for a post-card.

Sutton & Cheam Radio Society

Sutton and Cheam were the winners in the recent Cullen Cup Contest—an inter-society affair between them and the Thames Valley Club. This cup, presented by G5KH, is to be contested annually between these two rival, but very friendly, societies. Club meetings now take place on the third Tuesday of each month at The Harrow, Cheam—8 p.m.

Most Clubs are now well into their summer programmes, with Field Days, D-F events and outdoor social gatherings taking the place of regular indoor meetings. Most Clubs, it is noted, prefer not to close down for any part of the summer season, which we take as a sign of healthy activity.

We have to acknowledge the following News Letters and broad-sheets: "QRP" (QRP Research Society); "Radio Link" (West Cornwall Radio Club).

There is still a requirement for as many good Club photos as possible; any illustrations concerned with meetings, Field Days, gear or personalities will always be welcome as a pictorial accompaniment to this feature.

Deadline for next month is somewhat earlier than usual. Secretaries please note the date: first post on June 11. For the August issue it will be July 16.

Notes, reports, photographs and anything else should be addressed to Club Secretary, SHORT WAVE MAGAZINE, 55 Victoria Street, London, S.W.1. And now for this month's news, from 25 reporting Clubs.

Army Apprentices' School Radio Club

A very successful First Anniversary Meeting was held in April. A buffet supper was served, and seven local amateurs helped to swell the attendance. There are hopes of permanent accommodation in the near future, in which case activities will be extended. The Club Tx, G3HOS, is on the air, and contacts with other clubs on 80 metres will be most welcome.

Medway Amateur Receiving & Transmitting Society

Meetings continue every Monday, and recent talks have covered modern Valve Developments, Radio Control, the Hypnotron, Microwave Spectroscopy, and the construction of a clock to show the time in all parts of the world! The Annual Hamfest will be held on July 6, 2 p.m., at the Co-operative Employees' Social Club, 207 Luton Road, Chatham. Tickets may be obtained from the Hon. Sec. or at the door. In the past this event has attracted more than a hundred licensed amateurs, and is usually one of the largest gatherings of its kind in the country.

Swanton Morley Amateur Radio Club

A team has started construction of all Club gear, two huts being in use every night—one as a workshop and one as a meeting room fitted with two operating cubicles.

The Club Tx, G3GLJ, is on the air each evening with 20 watts on 3520 kc—ex-members please note. Membership stands at 40, including some five licensed amateurs. Club night—Monday at 8 p.m., refreshments available and visitors welcome.

West Kent Radio Society

Meetings are held on the first and third Wednesday at Culverden House, Tunbridge Wells—7.45 p.m. A hearty welcome is extended to newcomers and visiting amateurs. A good programme of lectures, visits and so on is in progress, including a visit to Tunbridge Power Station during May. The society's stand at the local Hobbies Exhibition was a great success.

Grafton Radio Society

Preparation for field day participation is in full swing, and two stations will be working from Tumulus Field, Parliament Hill Fields. The ex-radar building has been commandeered by the chef, and electric light will be generated on the spot for both operating tents. Visitors will be welcomed.

Slade Radio Society

Recent events have been lectures on Electric Traction and Mobile VHF Communication. The first D-F Contest of the year has also

been held, and the first shots taken for a film about D-F. On June 20 there is an evening D-F test for beginners, and on June 28-29 a midnight D-F test in conjunction with the MARS' field week-end. Full details of these and other events available from the Hon. Sec.

Bedfast Club, W.F.S.R.A.

The matter receiving most attention now is the construction and provision of QRP equipment for members in hospital. The Book and Magazine distribution scheme is going strongly, having received 514 books up to date. Plenty more can be coped with. All those wanting further information about the Club are asked to get in touch with Ray Scarborough, 149 Averil Road, Leicester, who is the Records Secretary.

Hastings & District Amateur Radio Society

At a recent meeting the majority of members voted against a proposal to shut down for the summer months, and so activities will continue in full swing. Lectures, film shows and junk sales are held regularly, and the Club meets on alternate Tuesdays at the Saxon Cafe, Hastings.

Brighton & District Radio Club

Forthcoming events as follows: June 10, NFD Inquest; June 17, RSGB Debate; June 24, Tungsram Valve Co. (Mr. F. E. Lane)—Lecture. Holiday visitors welcomed at meetings, every Tuesday at the Eagle Inn, Gloucester Road, Brighton.

Bury St. Edmunds Amateur Radio Society

This Club has been re-formed and a new Club Station built. Several new portable transmitters for the 20- and 40-metre bands are available, as well as a number of new receivers and transmitter/receivers. Future meetings include talks on modulation, receivers and Top Band aerials. New members from the district will be welcomed by the Club Secretary (see panel for QTH).



G3HXF (left) and G5LP operated G5LP/A at the local Hobbies Exhibition in Wellingborough recently, using the two LF bands. About 3,000 visitors passed the Stand and great interest was shown in the Amateur Radio exhibit. This was arranged and set up by G5LP, assisted by G2AUA, G3HZF, G3IP and G4IN, as demonstration operators. A tape recorder contributed much to the success of the whole effort.

Midland Amateur Radio Society

This is the coming-of-age for MARS, and several interesting events are being planned, including an Annual Dinner on October 25, which promises to be a bumper affair. At the June meeting G2RQ will talk on Home-Built Tape Recorders, and at the July event Mr. T. R. Theakston will prove that "Mathematics is Easy." All meetings are on the third Tuesday at Imperial Hotel, Temple Street, Birmingham.

Romford & District Amateur Radio Society

The June meetings are as follows: June 10, NFD Post-Mortem; June 17, Junk Sale; and June 24, Brains Trust. All kinds of sticky problems are welcomed for the latter.

Reading Radio Society

At the recent AGM, Capt. Benbough was elected President; Mr. H. Woodhouse, Chairman; and Mr. L. Hensford, Secretary. A promising programme caters for enthusiasts in VHF. High-

Fidelity, Tape - Recording and Aerials. The instructional section is very popular, all branches of radio being discussed, and really first-class lecturers are available. The accent is on how to build, rather than buy, new equipment.

Clifton Amateur Radio Society

Attendances are averaging 27 members plus one or two visitors each club night. Activities have included lectures by S.T.C., G.E.C. and Avo, with a fine junk sale and a couple of general rag-chews. In the near future will be lectures on the CRO, contests, a D-F Field Day and normal evenings with discussion groups, Morse, technical instruction and so on. Meetings are held every Friday, 225 New Cross Road, S.E.14.

Hounslow & District Radio Society

The first issue of a society bulletin has been published, to keep members informed of past and future events. Technical notes are also included. Talks

have recently been given by G3AZJ on Practical Aerials: meetings are held fortnightly at Grove Road School, Cromwell Road, Hounslow, the first half-hour being devoted to Morse practice.

Liverpool & District Short Wave Club

Two outside visits have been paid: to Seaforth Radio and the GPO Coast Station, also to the Port radar installation. Both were much enjoyed by members. Meetings are well attended and the Club Tx, G3AHD, is on the Top Band every Tuesday evening. Any unattached transmitter or SWL will be welcomed to the Tuesday meetings, 8 p.m., at St. Barnabas Hall, Penny Lane, Liverpool, 15.

Spen Valley Radio & Television Society

Forthcoming events: June 18. Visit to Messrs. Brookes Motors, Huddersfield; July 2. Lecture on TVI (GPO Staff); July 16—to be arranged.

Torbay Amateur Radio Society

Members were re-elected at the AGM, with the exception of the Secretary, who retired on account of business pressure. A very successful winter session was reviewed, and summer activities are more of a portable nature. G5SY and G3FHI have offered to present a small new component, annually, to the winner and runner-up in the constructional contests—in addition to the Society's Cup, awarded to the winner. All summer visitors to the district will be welcomed—meetings are on the third Saturday, YMCA, Castle Road, Torquay.

Coventry Amateur Radio Society

A talk and demonstration by G3RF on Direction Finding, at

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

ARMY APPRENTICES' SCHOOL: A/T. B. C. Stocker, "A" Coy., A.A.S., Arborfield, Reading.
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HASTINGS: G. W. Spray, G3FXA, 255 London Road, Bexhill.
HOUNSLOW: J. Clarke, 124 Springwell Road, Heston.
KIRKCALDY: J. Taylor, GM2DBX, The Pharmacy, Methilhill.
LEICESTER: L. Milnthorpe, G2FMO, 3 Winster Drive, Thurinaston, Leicester.
LIVERPOOL: A. D. H. Looney, 81 Alstonfield Road, Knotty Ash, Liverpool 14.
MEDWAY: C. R. Hawkins, G3HWK, 9 Sanctuary Road, Gillingham.
MIDLAND: G. W. C. Smith, 84 Woodlands Road, Birmingham 11.
ORP: J. Whitehead, The Retreat, Ryden's Avenue, Walton-on-Thames, Surrey.
READING: L. Hensford, G2BHS, 30 Boston Avenue, Reading.
ROMFORD: D. L. K. Coppendale, G3BNI, 9 Morden Road, Chadwell Heath.
SALISBURY: A. G. Page, G3IVP, 32 Feversham Road, Salisbury.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
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TORBAY: L. D. Webber, G3DW, 43 Lime Tree Walk, Newton Abbot.
WEST KENT: F. R. Freeman, 11b Queens Road, Tunbridge Wells.
W.F.S.R.A. (Bedfast Club): J. Beavan, G3GBL, 298 Fore Street, Edmonton, N.9.
WORCESTER: J. Morris-Casey, G8JC, 4 Kennels Road, Station Road, Fernhill Heath, Wores.

the April 28 meeting, aroused such interest that it has been decided to form a D-F group within the society. The summer months will see the commencement of its activities. Club nights continue at the YWCA, Queen's Road, at 7.30 p.m., the next dates being June 9 (talk on "CW" by G5GR) and June 23 (Auction Sale).

Kirkcaldy & District Amateur Radio Society

At the AGM, on May 7, GM2DBX was re-elected Secretary and Treasurer. Meetings will continue on the first and third Wednesdays at 7.30 p.m., the Club premises being 285 Links Street, Kirkcaldy. All are welcomed on Club nights. A new aerial is being erected, and it is hoped that GM3GOL will radiate a better signal shortly.

Salisbury & District Short Wave Club

The AGM over, the club sum-

mer programme starts with a D-F day on June 15. The Club Tx is now operational on the low frequencies, and work is beginning on a 2-metre rig. Lectures, some with film illustrations, have been arranged for the second Tuesday of each month. Meetings are held every Tuesday at the Saw Mills, South Street, Wilton—members of H.M. Forces are always welcome.

Worcester & District Amateur Radio Club

The Club has been reorganised, and the meetings are now more interesting, but there are still vacancies in the rota of speakers for the monthly meetings. G3NL gave an interesting talk and demonstration with an SCR 522, dipole and field-strength meter. Readers living in or near Worcester are invited to "meet the gang" any Thursday evening in the clubroom—Public Library (basement), Worcester, at 7.30 p.m.

ZONE MAP REPRINT

Our *DX Zone Map* has been a steady seller since 1947, and adorns the walls of many an amateur station. The second printing now being exhausted, a third impression—with the Zone Area lists revised to date and all new prefixes brought in—has been

printed, and supplies are available at 6s. each. In five colours, on heavy linen-backed paper for wall mounting (size 21 in. by 35 in.) the *DX Zone Map* has been specially drawn for us and is copyright by Short Wave Magazine, Ltd.

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3-valve medium-wave dry battery operated receiver, housed in smart bakelite box, size 7" x 6 $\frac{1}{2}$ " x 5", with plastic carrying handle. T.R.F. circuit, using 3-L.T.4 valves, with reaction. Output to pair of lightweight H.R. phones, self-contained. Frame aerial in lid, provision for external aerial, S.M. dial. Powered by self-contained dry batteries, 1-WJ435 and 2-U2's. Supplied brand new, with valves and batteries. Open the lid and it plays. Covers whole M.W. band. Purchase Tax paid £4/10/0. Not ex-Govt. surplus. Postage paid.

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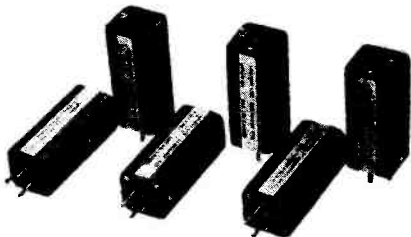
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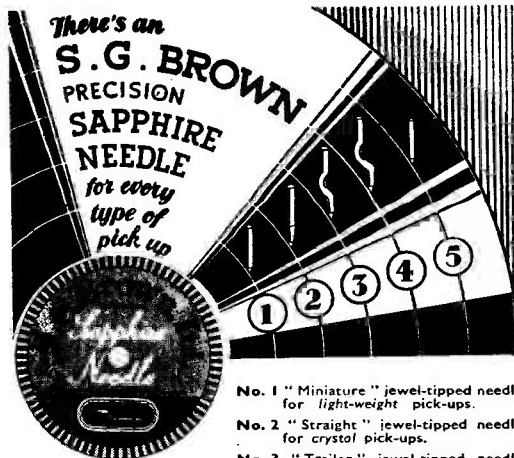
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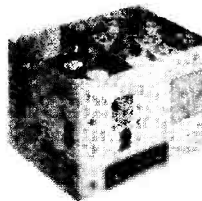
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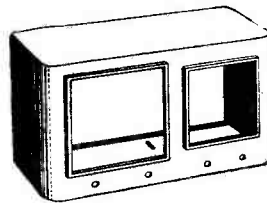
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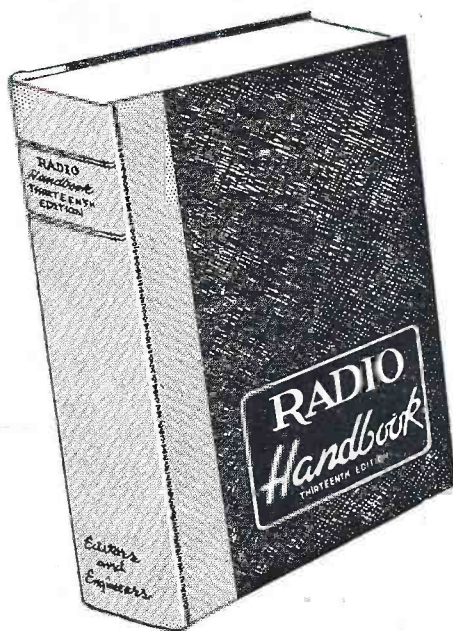
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BENDIX RADIO COMPASS RECEIVERS TYPE MN26C. These units complete with all valves (2-6N7, 1-6B8, 2-6J5, 1-6F6, 5-6K7, 1-6L7), in new and unused condition. PRICE £8 10s. 0d., carriage 6/-.

HAND GENERATORS TYPE C. In brand new condition and supplied in maker's transit cases. Generate 800v. D.C. at 30mA. and 6v. D.C. at 2.6A. Overall length 16ins. x 5½ins. max. dia. PRICE 30/-, carriage 4/6.

5-WAY CABLE. Each conductor composed of 9/012 Tnd. copper wire, rubber insulated and colour coded. Outside dia. approx. 5/16ins. PRICE 1/- per yard. (Min. by post 5 yards)

TRADE ANNOUNCEMENTS

ENQUIRIES INVITED for:—

INDICATOR UNITS, type 233
Air Min. ref. 10QB/6294.

TEST SETS, type 43.
Air Min. ref. 10SB/74.

MODULATOR UNITS type
64C/WW. Air Min. ref. 10DB/
8687

MONITORS type 28.
Air Min. 10/T/500

PLUGS AND SOCKETS. We should like to draw the attention of commercial users to the very wide range of R.A.F. and American types of plugs and sockets we stock. We specialise particularly in those covered by the 10H. and 5X. References in the British series and Amphenol in the American range. Enquiries invited for both bulk and small quantities.