60p

The SHORT WAVE Magazine

VOL. XLI JUNE 1983 NUMBER 4

remember the **KX2** now available the **KX3**

The KX3 is a wide range general coverage tuning unit specially developed for the short wave listener. Using high Q coils, and air spaced variable capacitors, the KX3 is designed to give additional front end selectivity as well as wide range impedance matching.

As a further feature, the range from 10 KHz to 500 KHz is provided with a low pass filter so as to allow listening below 500 KHz whilst rejecting strong medium wave stations in the 500 KHz to 1.5 MHz band.

Provision is made for using the tuning capacitors in the KX3 to resonate an external loop type aerial for medium wave directional reception.

Frequency range	10 KHz-30 MHz
Functions	10 KHz-500 KHz L.P.F.
	500 KHz-30 MHz Pi match
Number of bands	8
Input and output impedance	50-600 ohms
Size	220 x 66 x 154 mm

Both coaxial and wire aerials can be connected to the KX3.

KX3 RECEIVER ANTENNA TUNING UNIT £42.50 inc. VAT.

AF606K

AUDIO FILTER £63.25 carr. £2.00

From Diawa yet another aid to operating. In addition to the notch, SSB and CW filters, the AF606K is equipped with a PLL tone decoder; when the tone frequency of the CW signal and the free running frequency of the PLL tone decoder are the same a locked signal is generated. This locked signal keys an audio oscillator which then reproduces the received CW signal. However, there is a tremendous difference between the produced signal and the received one — no noise and, of course, no fading. **ANOTHER PIECE OF EQUIPMENT TO ENHANCE YOUR LISTENING.**

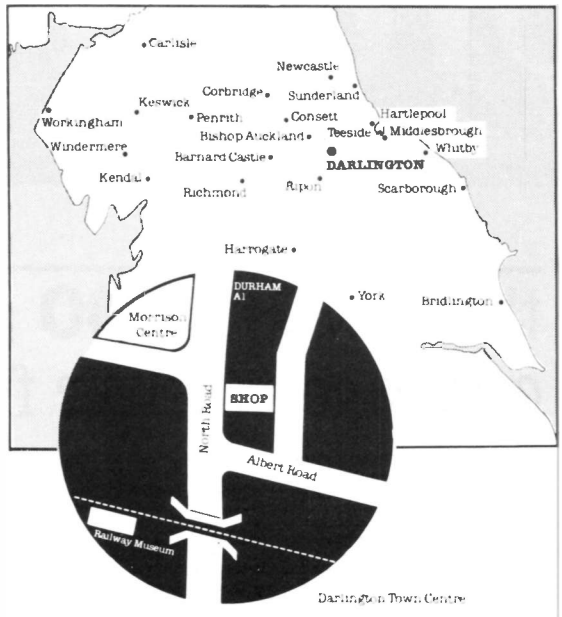
DK 210

ELECTRONIC KEYER
£47.00 inc. VAT carr. £2.25

With so many electronic keys and keyers on the market, it's hard to describe one that is better than the rest. Inevitably it is a matter of "feel", and the feel of the New Daiwa DK210 is superb. Being Daiwa, the quality of design and construction has to be of the best, but it's in use that the DK210 is so impressive. Designed to be used with an external paddle, to give greater personal choice, the DK210 is otherwise self contained, even to being battery powered (PP3). It offers a speed range of 10 to 50 w.p.m., built in sidetone, facilities for semi auto, or fully auto keying, and a tune position for adjusting your transmitter, but the outstanding feature is the adjustable "weight" control. This control gives an amazing improvement in the character of the sending, and completely removes that mechanical sounding "electronic morse" characteristic. Those experienced CW users who have tried out the DK210 have all said how good it sounds — and have usually purchased one. So will you if you try it out.

DK210 from DAIWA — A truly nice keyer.

LOWE ELECTRONICS IN THE NORTH EAST



A huge free car park, a shopping complex which has within it a large supermarket, a wine and spirits shop, a bistro restaurant and convenient banking facilities has nothing at all to do with amateur radio.

However, as all these facilities are to be found across the road from our new amateur radio shop in the North East of England, then you will appreciate that we take great care in positioning the Lowe Electronic shops to help both you and other members of your family. The shop is in Darlington, 56 North Road, that is on the A167 road to Durham, only a few minutes from the town centre. Darlington is a delightful market town with extremely good links to the A1 north or south and to the west and east. Indeed, Darlington is easy to get to from towns such as Scarborough, Bridlington, York, Harrogate, Penrith and Carlisle. To the fortunate Radio Amateurs of the North East, then you have Lowe Electronics in your own backyard.

A Lowe Electronics' shop means the opportunity to browse, to try out, without sales pressure, a new or second hand piece of equipment before you buy it. And not only that, the shop will stock all the usual accessories, aerials, swr meters, cables, rotators, tuning units, plugs, sockets, etc. All equipment bought from the Darlington shop will carry the now well-known Lowe after sales service. It is a fact that today's equipment, although very reliable, is extremely complex and although not beyond the amateur, the expensive test equipment required for the repair leave most of us in the hands of the person who sold us the rig.

With Lowe Electronics not only are the hands helpful but technically able

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★ 150(W) x 50(H) x 176(D)mm.!!
★ Up/down, memory/band scanning.
★ Easy "write-in" memory channels.
★ Memory back-up "5 year" lithium cell.
★ Ten memories with priority functions.
★ Supplied with scanning microphone.
★ Illuminated "any angle" LCD display.
★ Display to 100's of Hz and functions.
★ Two completely independent VFO's.
★ Operation between memory and VFO.
★ Full reverse repeater function.
★ Manual and automatic tone burst.
★ Large "full sound" internal speaker.
★ Concentric volume and squelch.

2 or 70!

FT230R £255 inc. VAT @ 15% & SECURICOR

★ 144-146 MHz (extensions possible).
★ 25W RF output, 3W on low.
★ 25 and 12½ kHz steps provided.
★ ±600kHz repeater split, 1750Hz burst.
★ Tx; 5A. Rx 300mA (standby).

★ 430-440MHz (440-450MHz possible).
★ 10W RF output, 1W on low.
★ 25 and 100kHz steps provided.
★ ±1.6MHz repeater split, 1750Hz burst.
★ Tx 3A, Rx 300mA (standby).

FT730R £299 inc. VAT @ 15% & SECURICOR

★ Multimode USB, LSB, FM, CW
★ 100Hz backlit LCD Frequency display
★ 10 memory channels '5 year' backup
★ Any Tx/Rx split with dual VFOs
★ Up/down tuning from microphone
★ AF output 1W @ 10% THD
★ Bandwidth 2.4kHz and 14kHz @ −6dB
★ LED's; 'On Air', 'Busy'. m/c meter; S, PO.
★ 58 (H) x 150 (W) x 195 (D) (1.3kg)

SMC2.0C	Nicad 2.0A/hr "C".....	£2.35
SMC8C	Slow Charger (220mA)..	£8.80
MMB 11	Mobile Mount.....	£22.25
CSC1A	Soft carrying case.....	£3.45
FL2010	Linear Amplifier 2m 10W.	£59.00
FL7010	Linear Amplifier 70cms..	£91.00

6 or 2 or 70!

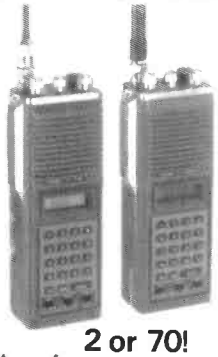
FT290R £285 VAT @ 15% & CARRIAGE

★ 144-146MHz (144-148) possible
★ 2.5W PEP, 2.5W RMS/300mW out
★ FM: 25kHz and 12.5kHz steps
★ SSB: 1kHz and 100Hz steps
★ ±600 kHz repeater split 1750kHz burst
★ Integral telescopic antenna
★ Rx, 70mA, Tx; 800mA (FM maximum)

FT790R £349 VAT @ 15% & CARRIAGE

★ 430-440MHz (440-450 alternative)
★ 1W PEP, 1W/250mW FM/CW out
★ FM: 100kHz and 25kHz steps
★ SSB: 1kHz and 100Hz steps
★ 1.6MHz shift with input monitor
★ 1750Hz burst
★ Rx; 100mA/200mA. Tx; 750mA max
★ BNC Mounting ½ flexi antenna

★ Keyboard entry of frequencies/splits
★ LCD digital display with backlight
★ Any split + or − programmable
★ Ten memory channels '5 year' back up
★ Up/down manual tuning. Memory scan
★ Manual or auto scan for busy/clear
★ Priority channel with search back
★ Scan between any two frequencies
★ Auto scan restart. 1.750Hz tone burst
★ Built in condenser microphone
★ 500mW to int/ext speaker
★ External speaker/mic. available
★ 168(H) x 61(W) x 39(D)mm
★ C/w Quick change NiCad pack, helical



2 or 70!

FT208R £199 VAT @ 15% & CARRIAGE

★ 144-146MHz (144-148 possible).
★ 12.5/25kHz synthesizer steps.
★ ±600kHz repeater split.
★ 2.5 or 0.3W RF output.
★ Rx: 20mA squelch 150mA max. AF.
★ Tx: 800mA at 2.5W RF.
★ 0.25μV for 12dB SINAD.

FT708R £229 VAT @ 15% & CARRIAGE

★ 430-440MHz (440-450 option).
★ 25kHz synthesizer steps.
★ ±7.6MHz EU split standard.
★ 1W or 100mW RF output.
★ Rx:20mA squelch, 150mA (max AF).
★ Tx: 500mA at 1W RF.
★ 0.4μV for 12dB SINAD.

★ USB-LSB-CW-FM (A3j, A1, F3).
★ 30W PIP A3j, 10/1W but A1, F3.
★ Any Tx Rx split with dual VFO's.
★ Four easy write-in memory channels.
★ Memory scanning with slot display.
★ Up/down tuning/scanning from mic.
★ Priority channel on any memory slot.
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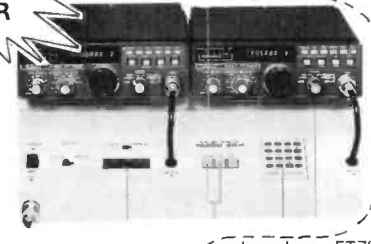
★ Satellite mode allows tuning on Tx.
★ Semi break in with side tone.
★ Very bright blue 100Hz digital display.
★ Display shows Tx & Rx freq (inc RIT).
★ String LED display for "S" and PO.
★ LED's; "On Air" Clar, Hi/Low, FM mod.
★ Size (Case): 8.3" D, 2.3" H, 6.9" W.

SPECIAL OFFER



*Limited Offer

FT780R £389 inc. VAT @ 15% & SECURICOR

★ 430-440MHz (440-450 possible).
★ GaAs Fet RF for incredible sensitivity.
★ FM; 100kHz, 25kHz, 1kHz, steps.
★ SSB; 1,000, 100, 10Hz steps.
★ FT780R 1.6 fitted 1.6MHz Shift £399inc.

FT480R RIP

Sadly Yaesu has discontinued the FT480R. As a mark of respect on this dark occasion, to complete your VHF/UHF station, if you originally bought your FT480R from S.M.C. and you buy a FT780R we will give you a free SC1 matching station consol/power supply worth £138.00. Alternatively, anyone buying a FT780R will get a free FP80A matching power supply worth £55.00.

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★ COMING SOON HF MODULE 21, 24, 28MHz ★

★ NEW ★

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*Option

- ★ 3 Bands*! 2 metres. 70cms* (10MHz) & 6M* plug-ins.
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- ★ SSB-CW-FM! All optimumly catered for, clarifier all modes.
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- ★ Separate channelised VFO! (for FM operation).
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- ★ Repeater splits! programmable *and* preset.
- ★ Instant reverse! *and* + & − splits *and* A/B.
- ★ Twin meters; PO/DISC, S/ALC. Duplex switchable.
- ★ Switchable; AGC, CW bandwidth,* dial lock, noise blanker.
- ★ Priority channel operational split mode end split band.

FT726R(2)	Transceiver c/w 144 MHz	£699.00
430T726	430-440 MHz module	£230.00
50T726	Six meter module	£170.00
SAT726	Full duplex unit	£90.00

- ★ 2M. 12 VDC compact $2\frac{3}{16}$" x $6\frac{3}{8}$" x $7\frac{3}{16}$".
- ★ 25W (+ adjustable low power), 12½kHz steps.
- ★ 10 ''year long'' memories for ''crystal control''.
- ★ Display reads to 100's of Hz *or* channel number.
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- ★ Single knob frequency selection. 20 steps rev.
- ★ Rapid QSY button, end to end in a single turn.
- ★ Digital RIT 1kHz steps, adjusted from main tuning.
- ★ 2, 5 slot memories, simplex, cross or 600kHz split.
- ★ Memories entered by pushing main tuning knob.
- ★ ± 600kHz split. Instant repeater input monitor.
- ★ Band scan between front panel selectable, limits.
- ★ Scan stop requires squelch open *and* centre zero.
- ★ Scanning and up/down tuning on the microphones.
- ★ Reprogrammable; steps, tone, splits, and coverage.
- ★ C/W mic. ''Easy out'' mobile mount and handbook.

KDK 2030 £199 inc. VAT @ 15% & SECURICOR

★ EXCEPTIONAL VALUE ★

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				£	£	£
JAYBEAM						
4Y/4M	Yagi 4 element	2.3M	7dBd		29.90	2.20
LW5/2M	Yagi 5 element	1.6M	7.8dBd		14.37	2.50
LW8/2M	Yagi 8 element	2.8M	9.5dBd		17.82	2.50
LW10/2M	Yagi 10 element	3.55M	10.5dBd		24.15	2.50
LW16/2M	Yagi 16 element	6.54M	13.4dBd		35.07	3.20
14Y/2M	Yagi 14 element	5.34M	12.8dBd		36.23	3.20
PBM10/2M	10 ele Parabeam	3.93M	11.7dBd		44.85	3.20
PBM14/2M	14 ele Parabeam	5.95M	13.7dBd		55.77	3.20
Q4/2M	Quad 4 element	1.5M	9.4dBd		29.32	2.50
Q6/2M	Quad 6 element	2.5M	10.9dBd		39.10	2.50
Q8/2M	Quad 8 element	3.54M	11.9dBd		44.85	2.50
D5/2M	Yagi 5 over 5 slot	1.6M	10dBd		25.30	2.50
D8/2M	Yagi 8 over 8 slot	2.8M	11.1dBd		34.50	2.50
5XY/2M	Yagi 5 ele crossed	1.7M	7.8dBd		28.17	2.50
8XY/2M	Yagi 8 ele crossed	2.8M	9.5dBd		35.65	2.50
10XY/2M	Yagi 10 ele crossed	3.6M	10.8dBd		46.00	2.50
PBM18/70	18 ele Parabeam	2.8M	13.5dBd		32.20	2.50
PBM24/70	24 ele Parabeam	4.5M	15.1dBd		42.55	2.50
LW24/70	Yagi 24 element	5.1M	14.8dBd		27.02	2.50
MBM28/70	28 ele Multibeam	1.25M	11.5dBd		21.27	2.50
MBM48/70	48 ele Multibeam	1.83M	14.0dBd		35.65	2.50
MBM88/70	88 ele Multibeam	3.98M	16.3dBd		48.87	2.50
8XY/70	Yagi 8 ele crossed	1.5M	10dBd		42.55	2.50
12XY/70	Yagi 12 ele crossed	2.6M	12dBd		52.90	2.50
CR2/23CM	Corner reflector	0.76M	13.5dBd		40.25	2.50

SMC-HS					
SMCGDX1	Discone 80-480MHz 3dB¼	3.3'	40.25	2.50	
SMCGDX2	Discone 50-480MHz 3dB¼	6.2'	49.45	2.50	
GDXA	Discone 100-440MHz 3dB¼		33.75	2.50	
SMCVHFL	Discone 65-520MHz Rx only	5.0'	15.70	2.50	
SMCGP23	Colinear 2M 3 x ⅝ wave 7.8dB¼	14.6'	39.85	2.50	
SMCGP144W	Colinear 2M Multi ⅝ wave 6.5dB¼	10.2'	27.60	7.50	
SMCGP2M	⅝ wave c/w ground plane 3.4dB¼	4.6'	18.00	2.50	
SMCSQ144	2M Swiss Quad for vertical mounting		57.60	2.50	
SMCGP432X	Colinear 70cm 3 c ⅝ wave 6.8dB¼	5.6'	29.90	2.50	
SMC702V	Colinear 2.8dB¼ 2M, 5.7dB¼ 70cm	3.6'	29.90	2.50	
SMC2H86	6M H89CV 2 Driven elements		19.95	2.50	
SMCHS770	144/432 Duplexer 50W 30dB isolation		15.35	1.50	

ANTENNA ROTATORS

		£	£
KR500	Kenpro, Elevation Meter calb. ± 90°	112.12	Free
9508	Channel Master, offset	80.21	Free
9502B	Channel Master, offset	56.92	Free
KR250	Kenpro, Bell type	54.91	Free
AR40	CDE, Turn and Push control	90.85	Free
KR400RC	Kenpro, Round meter 360°	114.94	Free
CD45	CDE, 8 x 4cm meter readout	136.85	Free
KR600RC	Kenpro, Round meter 360°	163.30	Free
Ham IV	CDE, 8 x 4cm meter readout	258.75	Free
T2X	CDE, 8 x 4cm meter readout	327.75	Free
KR2000RC	Kenpro, Heavy Duty Round meter 360°	314.52	Free

ROTATOR ACCESSORIES			
9523	Support Bearing Upper type	15.81	2.50
KS050	Rotary Bearing Kenpro takes 1¾" mast	13.74	2.50
KS065	Rotary Bearing Kenpro takes 2" mast	20.12	2.50
KC038	Lower Mast Clamp for KR400, KR600	12.07	2.50
RC5W	5 Way for AR30, AR40, 8T1, KR400RC p/m	0.37	
RC6W	6 Way for KR250/400/500/600RC p/m	0.51	
RC8W	8 Way for CD45, Ham 4, T2X, KR2000RC p/m	0.55	

Carriage on Rotator cable £1.80 up to 20 mtrs, over 20 mtrs £2.40.

ANTENNAS VHF MOBILE

SMC20W	Element 144MHz ¼ wave	2dB¼	2.30	1.50	
SMC2NE	Element 144MHz ⅝ wave	3.0dB¼	6.90	1.80	
SMC2VF	Element 144MHz ½ wave	3.0dB¼	11.50	1.80	
SMC78F	Element 144MHz ⅞ wave	4.5dB¼	13.80	2.00	
SMC78B	Element 144MHz ⅞ wave	4.5dB¼	13.80	2.00	
SMC88F	Element 144MHz 1 wave	5.2dB¼	18.80	2.00	
SMC258	Element 432MHz 2 x ⅝	5.5dB¼	12.65	1.80	
SMC358	Element 432MHz 3 x ⅝	6.3dB¼	16.85	1.80	
SMC70N2M	2M 2.7dB¼ 70cm 5.1dB¼		16.35	1.80	
SMCHS770	144/432 duplexer 50W 30dB isolation		15.35	1.50	
SMCGCCA	Gutter clip 4 mtrs Cable		9.95	1.80	
SMCSOMM	Magnetic base c/w 4M cable		9.95	1.80	

★ BARGAIN CORNER ★

CPU2500

		£
CPU2500RK	FM25W Keyboard Mic Scanner 25kHz	189.00
CPU2500RKS	FM10W Keyboard Mic Scanner 25kHz	179.00
FT227RKS	FM10W Scanner 25kHz	179.00
FT2025	FM25W Scanner etc	179.00
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FT207R	FM2.5W Handheld keyboard, scanner set	149.00
FTV650B	Matching 6m transvertor FT101 series 'B' 'E'	99.00
YK901	Keyboard	89.00
AMU101Z	AM unit MK3 101Z	10.00
DIGT225 / OSC225	Digital modification kit for FT225	55.00
Mobil mount	FT101 series to E, FR/FL101	12.00
Mobil mount	for FT's 107, 901, 221, 225, 301, FRG7, 7000	10.00
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MML144/25	3W-25W amplifier + pre-amp	49.00
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MMC70/18	Convertor 70MHz to 18MHz	19.00
MMC1296/28	Convertor 1296MHz to 28MHz	25.00
MMC1296/144	Convertor 1296MHz to 144MHz	25.00
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Bearcat 220	Scanning Receiver	169.00

Most items are new or ex demo stock lines. All carry 6 mth. warranty.

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SHORT WAVE MAGAZINE

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CONTENTS

Editor: **PAUL ESSERY, G3KFE/G3SWM**
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AUTHOR'S MSS

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

Morse

There seems to be an almost perpetual chorus of complaint in the amateur radio press and club newsletters about the continuance of the Morse test for a Class-A licence. The first thing to be quite clear about is that the matter is out of the hands of the British Government and very firmly in the hands of the ITU — the ultimate licensing authority.

But that is rather an academic point when one considers that the spectrum available in the bands below 144 MHz is grossly overcrowded: there are some 158 countries affiliated to the ITU and most have amateur radio activity. There are, roughly, 1,250 SSB channels available without mutual QRM on the HF bands, and probably in excess of one million operators. Some means of limiting the numbers able to use these channels is clearly required — and what more simple limiting factor could be asked for than the Morse test? It requires no more than a bit of application to pass, and is untainted with any racial, political, educational or similar divisive status test. What better restriction could there be?

The alternative would be to increase the numbers and width of the amateur bands to the point where we had all the space between 1.5 and 30 MHz to the exclusion of everyone else. But 'everyone else' includes not just broadcast stations (which, arguably perhaps, could be thinned out considerably), but essential services to ships and aircraft, international communications traffic and much else besides, and all of which we have to recognise as being far more important than amateur radio.

G3VA has it right in his comments in 'Technical Topics' in the May issue of *Radio Communication;* anyone who disagrees is indulging in no more than wishful thinking.

So let us have no more of this ill-informed moaning about abolishing the Morse test, unless the moaners can come up with another, similarly egalitarian, solution to the numbers problem.

G3KFE.

VHF BANDS

NORMAN FITCH, G3FPK

A Six Metres First

CONGRATULATIONS to Ken Ellis, G5KW, and Jimmy Bruzon, ZB2BL, for completing the first G/ZB2 6m. QSO. For the record book, it took place on May 6 at 0645 GMT and on CW, RST 339 reports were exchanged with RS 53 reports from both stations on SSB. Ken suggests that the propagation was a mixture of tropospheric and trans-equatorial, since the signals had the watery and fluttery sound characteristic of TEP mode. He reports that conditions peaked around the 3rd, 4th and 5th May with the Gibraltar beacon audible from around 0500 through dusk. G5KW is currently operating from Cornwall so has about 750 kms. of sea path to northern Spain. Almost certainly there has been some useful sea ducting to enable him to copy 50 MHz signals from Gibraltar when they have not been reported by inland stations. The distance is 1,556 kilometres.

Capacitor Hunt

John Nelson G4FRX, is building high power amplifiers for the VHF and HF bands for the RSGB's Headquarters station, GB3RS. Those who have read his definitive articles on amplifiers and power suppliers in the *Magazine* will know that John favours conservative designs that will give years of trouble-free service. In building the PSUs, he needs oil-filled paper capacitors, ideally, of about 50μF at 3,000 volts working. Size is unimportant. Electrolytics are not wanted since they are less reliable and, what many people overlook, their ripple current rating is usually inadequate. G4FRX can be contacted at RSGB Headquarters in Potters Bar and the telephone number is Potters Bar 59015.

Contest Notes

Further sessions of the 10 GHz *Cumulatives* are scheduled for May 29 and June 26, the latter date also being the one for the 3.4 GHz leg of the *Microwave Contest*. The times for these are 0900 to 2000 GMT. The 70 MHz Tx and *s.w.l.* contest is on June 12, 0900-1600 GMT. There are two sections; fixed and all-other. All permitted modes, usual RST, serial number, QTH locator and QTH exchanges with radial ring scoring. As an equipment proving exercise, the *BATC* has organised an *ATV Summerfun Contest* for June 19 from 1000 to 1700 GMT for the 435, 1,260 MHz and 10 GHz bands with scoring at 2, 8 and 16 points *per* kilometre respectively, and half points for one-way QSOs. Exchanges to consist of callsign, QTH locator, report and serial number on either voice or video, with a code group to be exchanged on video only. The code group to be the entrant's own postal code — home one if out portable — and for each subsequent contact the postcode received from the participant's previous two-way QSO. It does not say what to send if you do not have a postal code, though.

On June 26, from 1400 to 2100 GMT, there is a phone contest on 432 and 144 MHz for WAB enthusiasts. Exchange reports and serial numbers plus WAB area. Scoring is 5 pts. *per* completed QSO with multiplier depending on number of different WAB areas worked and "DXCC" countries. Contest log sheets from G4FQO at 12 Chestnut Avenue, Cranwell, Sleaford, Lincs. NG34 8HT on receipt of large *s.a.e.* Better ask for the rules. A reminder that the weekend July 2/3 is VHF NFD, the full rules for which were in the April issue of *Radio Communication*. The 70 MHz section is again in two parts with CW from 1400 to 2200, close down then till 0600, then phone from 0600 to 1400. There is a 25w. p.e.p. restricted section with antenna height 35ft. or less and only one antenna *per* band.

Finally, the second *AGCW-DL VHF Contest* is on Saturday, June 25 from 1900 to 2300 GMT in the band 144.010 to 144.150 MHz. There are three classes; "A" is less than 3.5w. RF, "B" is less than 25w. and "C" over 25w. Exchanges to comprise RST and serial number, class and QTH locator, *e.g.* 559001/C/ZL60j. The scoring is:— Class A with another Class A, 9 pts.; A with B, 7 pts.; A with C, 5 pts.; B with B, 4 pts.; B with C, 3 pts. and C with C, 2 pts. Contacts with stations not sending a complete contest report count one point only. There are multiplier points comprising one for each QTH locator square, *e.g.* ZL, worked and 5 for each DXCC country worked, the final score being QSO points times the total of multiplier points. Entries to Edmund Ramm, DK3UZ, P.O. Box 38, D-2358 Kaltenkirchen, Fed. Rep. of Germany.

Satellite News

Latest work from Ron Broadbent, G3AAJ, of *AMSAT-UK* concerning the launch of the *ARIANE* vehicle carrying the *Phase 3B* satellite was that an unofficial meeting of interested parties was due on May 10, and a formal one to make a final decision about a June 3 to 5 launch, on May 20. That launch window depends upon the satisfactory solution of some problems with *ARIANE*.

At the time of editing, *U-O-9* was still in a purposely induced, complex spin mode in an effort to free the fouled cable so that complete gravity gradient boom extension can be attempted. The 145.825 MHz telemetry frequency is sometimes "clobbered" by a few London FM stations. FM activity persists in the 145.800 to 146.000 MHz part of 2m. which, under the internationally agreed band plan, is supposed to be exclusively for space use. Some operators are quite obviously pirates but licensed amateurs are often on in the evenings and their signals get into the *RS* transponders.

On the operational side, Adrian Chamberlain, G4ROA, (Coventry) used a *GPV-5* vertical antenna with 25w. of RF and managed to keep his regular *O-8* sked with W2GAX in New Jersey on April 30. The contact lasted six minutes and illustrates what can be achieved with a makeshift antenna system.

Japanese radio amateurs have received approval from their space agency for their *JAS-1* project. The satellite will be launched into a 1,500 km. circular orbit, inclined 50°, by a Japanese *H-1* launch vehicle. A Mode "J" type transponder is envisaged and a *PACSAT* digital transponder, too, but no indication as to when all this may happen.

DX-Peditions

Last month, operation from the Principality of Liechtenstein by five Dutch amateurs was mentioned from June 10 to 12. A further letter has been received from Piet van den Bos, PA3BZO, giving more details. The 2m. station will comprise an *Icom* IC-260 and 75w. amplifier, with a 16-ele. *Tonna Yagi*. A *Yaesu* FT-780R will be used on 70cm. with perhaps a borrowed amplifier, the antenna being a home made 23-ele. long *Yagi*. As access to the intended site is by foot, they cannot consider high power MS type set-ups. All gear will be powered from car batteries.

VHF operation from Market Reef, OJ0, is planned for 7 to 10 days from July 22, but again no MS activity is contemplated. More details next month, hopefully.

Ken Osborne, G4IGO, has passed along a letter from OH2BBF about a VHF/UHF/SHF meeting at Tuliranta (KU19b) in Finland from June 10 to 12. Overseas visitors are welcome to attend this event backed by the *SRAL* and arranged by OH1AA and OH1AU. Activities include MS demonstrations in the hours 1500-1800 GMT only. They will run maximum legal power to a stack of four *Tonna Yagis* with elevation control and they hope to use a *Commodore* VIC-20 computer to control the station. 750 *l.p.m.* for transmitting and 1,000 *l.p.m.* for reception would be worst cases and they are looking for CW proposals for one hour skeds in five minute periods with potent stations. Correspondence should

go to Erkki Heikkinen, OH2BBF, Myrskytie 3, SF-10900 Hanko, Finland. His office telephone number is 010 358 11 81244 and his home number, after 1330 GMT, is 010 358 11 85167, from the U.K. The station OH1AU will be QRV *via Ar* and *E's* if available, and on 144, 432 and perhaps 1,296 MHz, *E-M-E,* the satellites and 10 GHz!

Sporadic E

Each year, the Spanish national amateur radio society, the *U.R.E.*, publishes a booklet listing *E's* contacts made on 2m. by some of its members. The 1982 one was received recently, thanks to José Mª Gené, EA3LL, the VHF Manager of the Society. The season was from June 5 to August 18, virtually the same as for this country. The June 5 opening was a major event lasting from 1630 to 2013 covering LA, OZ and SM, D, Y, ON and PA, HB, OE, OK and HG. On June 8 there was another event from 1610 to 2020 to D, Y, ON and PA, I, OE, YU, OK, HB and HG, and towards the end to GM, GI and EI.

On June 18, there was an hour long opening to F, I and YU variously, reported by stations in VD, YA and XX squares, while on the 23rd, between 1706 and 1756, F, G, GJ and GWs were worked from XX and WX locators. The next event, on the 26th, lasted one and a half hours from 0830 when D, OE, I, HB, YU and HGs were contacted from EA3, 4 and 5 areas.

July 9 saw two openings, the morning one, from 0944 to 1056 was confined to 9H and I8, while from 1753 to 1920 the opening was again narrowly defined to IT9, 9H, IS0, I8 and I0. However, in a late hour, at 2000, EB7KU listed having worked G4DHF (ZM). Other minor events were recorded on July 16 and 18, the next major affair being on the 21st, from 1414 to 1705 during which FC, I, IS0, IT9 and YU stations were worked. The *Grand Finale* was a day-long event lasting from 0957 to 1458, on-and-off, with D, PA, OZ, SM, I, OK and YU worked, but with EA3XU (BB41e) also listing G4BAH/4(?) at 1155 and GI8TVK (WO34d) at 1346.

Computer Topics

Few can doubt that computers are to be found in a large number of amateur radio stations now. One hears QSOs on 2m. FM between dedicated computer addicts, to whom amateur radio is merely a substitute for the telephone, for they seem to have little, if any, traditional interest in the hobby. This subject was aired during the AGM of *AMSAT-UK,* wherein it was stated that a fair proportion of inquiries now come from computer operators who merely wish to use satellites to enable their computer to communicate with someone else's in a distant country.

Undeniably, computers can be of considerable benefit to amateur radio operators and have been used for some years to assist in contest logging, calculating distances and scores, etc. There is current interest in using them to produce orbital predictions for satellites and Moon programs for *E-M-E* operation. Provided sufficient RAM is available, lists such as our Annual Four Band, and Squares Tables can be stored and amended to eliminate the drudgery of doing this manually.

From time to time, it is proposed to devote a few paragraphs to amateur radio orientated computer topics in this feature, so that readers may "keep with it", as they say. In a recent QSO with OZ1EKI on the 20m. VHF net, Tom mentioned he has a *Commodore* VIC-20 machine and has programs for QTH locator distances, *E-M-E* and RTTY and would like to contact other readers to swap information.

To illustrate one use for computers, Roderick Clews, G3CDK, (Surrey) has mentioned experiments he has carried out recently with Jeremy Royle, G3NOX, (Essex) on 2m. They have programs which have enabled them to transmit high definition slow-scan colour TV pictures over their sixty miles path. One program at 300 *Baud* rate took 13½ minutes to send, and another at 1,200 *Baud* took 8½ minutes. Rod uses a *BBC* machine, by the way. These experiments are ideally suited to the VHF and UHF bands since they offer longer periods of QRM-free reception than is ever possible on the HF bands.

ANNUAL VHF/UHF TABLE

January to December 1983

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	23 CENTIMETRES Counties	23 CENTIMETRES Countries	TOTAL Points
G3UVR	31	6	67	23	46	10	—	—	183
G8TFI	—	—	52	13	47	14	8	1	135
G2AXI	24	3	51	14	33	8	*6*	*2*	133
G3BW	15	5	43	10	24	5	—	—	102
G4ARI	15	2	64	14	1	1	—	—	97
G4MUT	14	2	39	11	22	6	—	—	94
G4NBS	12	1	28	8	33	11	—	—	93
G4ROA	—	—	35	6	33	7	9	3	93
G8ULU	—	—	36	12	27	9	4	1	89
G4FRE	27	4	6	2	39	11	*3*	*2*	89
G6HRI	—	—	53	9	21	6	—	—	89
G8PNN	—	—	29	10	32	9	3	5	88
G6DER	—	—	48	8	24	5	—	—	85
G6ECM	—	—	60	19	—	—	—	—	79
G3FIJ	17	1	38	10	10	2	—	—	78
G3FPK	—	—	60	15	—	—	—	—	75
GD2HDZ	21	3	19	8	17	6	—	—	74
G8FMK	—	—	18	4	18	6	20	4	70
G3PBV	*2*	*1*	20	13	19	9	5	3	69
G8KAX	—	—	17	8	35	8	—	—	68
GW6JDK	—	—	52	14	—	—	—	—	66
G4DEZ	—	—	39	22	—	—	—	—	61
G8VFV	—	—	40	12	—	—	—	—	53
G8RWG	—	—	42	8	—	—	—	—	52
G8XTJ	—	—	36	7	—	—	—	—	43
G6TTU	—	—	35	6	—	—	—	—	41
G6HDD	—	—	29	10	—	—	—	—	39
G4NRG	4	1	16	7	3	1	—	—	32
G4FKI	7	1	20	2	1	1	—	—	32
GM4CXP	—	—	18	12	—	—	—	—	30
GW4HBK	21	4	—	—	—	—	—	—	25
GW4HUY	—	—	17	5	—	—	—	—	22
G2DHV	4	1	2	1	3	1	—	—	12

Three bands only count for points. Non-scoring figures in italics.

Six Metres

There are now 40 licensees again with permission to use the 50-52 MHz band. As most readers will know, GM4ELV and GW4BCD are no longer participating in the experiment, their places having been taken by GM4IGS and GW3MHW. In spite of claims to the contrary, *no other licensees* have permission to operate on 6m. in the U.K. than those listed on page 41 of the March issue. As things stand at the moment, the *Home Office* has confirmed that all other Class "A" licencees can conduct crossband QSOs with the 6m. group. This is not the case with Class "B" licensees, however. Nevertheless, it seems that the *Home Office* appreciates there are anomalies since the experiment would make more sense if more people participated in it. After all, Class "B" operators are not barred from using Mode "A" satellites whereon their signals are transponded to 29 MHz. Reading between the lines, it would seem that a favourable solution could occur in the not-too-distant future. Suffice it to report that considerable liaison exists between the *RSGB* and the *HO* in the drafting of the new Licence Schedule, with both parties wishing to create a fair, sensible and unambiguous document.

On the subject of licensing, Danish amateurs have to get special permission to make crossband QSOs with 6m. stations.

OZ1EKI reports that OZ9VQ in Copenhagen has a 10/6m. permit, and that the OZs need permission to *listen* on 6m! With a new band, there are "firsts" of one kind or another being reported all the time. For example, the first *Auroral* QSO between Wales and Scotland is being claimed by GW3LDH and GM3WOJ in the late evening of April 25 with RST 51A reports each way. The first CW QSO between Scotland and Ulster is claimed by GM3WCS and GI3ZSC on April 14, and the first England/Jersey contact by G6XM and GJYHU took place on March 16.

Paul Turner, G4IJE, (Essex) has worked GJ3YHU for a new country on the band and regular tests with GM3WCS and GM3WOJ continue with 100% success. He has sent a 6m. converter to YU3ES and hopes to conduct more 6/2m. crossband MS experiments. Dave Lewis, GW4HBK, (Gwent) is now using a *Yaesu* FT-620B transceiver and is looking for crossband QSOs with others on 4m., 10m. or 80m. During April, he worked G2AOK, G3COJ, G3LTF, G4GLT and G6XM, and also GU2HML crossband. Heard were G3NOX, G3PWK, G4CUT, GW3LDH and GW3MHW.

Four Metres

Dave Robinson, G4FRE, (Suffolk) added GW3MHW (Dyfed) for a new county and country on 4m., ". . . in the final throes of 4m. activity for some time". He was beaming towards Yorkshire at the time, though. GW4HBK found things very quiet on the band in April with just one new station, GU2HML, worked, besides the regulars. G4IJE carried out a 4/2m. crossband MS test with CT1WW (WB) on May 6, which was completed in less than 30 minutes from 0730. Paul's solid state PA failed, so he re-tweaked a 6m. PA with a QQV07-50 valve instead, so now has a PA for either band. CT1WW told Paul he received a four minutes burst at S6, suggesting E-layer ionisation. Tiago uses a 2-ele. *Quad* antenna on 4m. Terry Hackwill, G4MUT, (Berks.) found things very quiet in April, but reports the first *E's* signals from Polish broadcasters on May 2.

Denis Jones, G3UVR, (Merseyside) spent most of April monitoring the band for illegal base/mobile car telephones, where the base station connects to the *British Telecoms* phone line and calls may be received by, or dialled from, the mobile station. In his area, on FM mode, there are base stations on four frequencies; one each on 70.185 and 70.225, two on 70.370 and several on 70.365 MHz. One identified signal on 70.370 MHz is radiating a strong signal over 35 miles! The mobiles seem to be on about 110 MHz. The local R.I. people were not aware of these highly illegal activities, but are now investigating. If any other readers have similar complaints they should be passed on to their local RIs, particularly since the 70 MHz band is, in effect, "owned" by the *Ministry of Defence*.

Two Metres

Tropo conditions have, not unexpectedly, mirrored the miserable, low pressure type weather patterns, which the British Isles seem to have been stuck with for many weeks. This is reflected in a paucity of correspondence, no doubt coupled with the early deadline and the Bank Holiday.

The April 17 CW contest saw a lot of activity as monitored from the London area. It brought another 15 counties for the year for Frank Howe, G3FIJ, (Essex) plus the Isle of Man for another country. G3UVR worked down to G4PEK in Devon, from Merseyside, on SSB on the 16th, with GW6JHK/P in South Glamorgan the next day. Using the key in two *Auroras*, Denis caught GM3XOQ (ZT) in Shetland and LA7KK (FU) on Apr. 25, and GM4SGB in Central Region, on the 29th.

One of the attractions of MS mode is that QSOs are possible even though tropo conditions are at rock bottom. One who takes regular advantage of this fact is G4IJE. Paul completed CW QSOs with SM5CBN (HS) on Apr. 16 and with YU3TSB (HF) and OZ2KZR (IJ) on the 22nd. FC square is rather rare, but he had a successful sked on the 30th with IW5AVM on SSB. He runs 200w. to two 10-ele. *Yagis* and is a reliable station. Skeds with him can be arranged *via* I5YRD on the 20m. VHF net, as the "W" stations cannot operate on the HF bands. On May 5, Paul worked SM5MIX (HS) again, ". . . just for fun", and on the 8th took only 40 minutes to complete with a DX-pedition station, SK5AJ/0 in JS, a new square.

G4ROA took down all his antennas after the high winds of the last few months had bent the pole. Adrian has now refurbished everything, with new mounting brackets bolted through the wall into the roof space. New *Pope* H-100 coaxial cable has been fitted to give an extra 12% of power at the antenna on 2m. He intended to give everything a good try-out during the May 7/8 contest weekend.

Derek Brown, G8ECI, (Lincs.) was active from AN square in the *Lyrids* meteor shower and had a successful SSB QSO with UC2AA (NN18d) — ex-UC2ACA — on Apr. 24. Reflections were described as awful and the distance was 1,804 kms. The UC2 was running 100w. input, using a solid state amplifier, with single 16-ele. beam. From Northumberland, Gordon Emmerson, G8PNN, lists five more 1983 counties worked on Apr. 12 being: G8FRB/P (Beds.), G6LNS (Lancs.), G8AKB (Leics.), G6PCJ (Staffs.) and GW4PUH (Clwyd).

Kelvin Weaver, GW6JDK (Gwent) also found the band quite dead in April and managed only four new counties, namely G6CGY (Cleveland) on the 14th, the 17th bringing GW6ORF (Powys), G3UVR (Merseyside) and G8FYQ/P (W. Yorks.). Permission for a 60ft. tower has been refused, so a new application for a 40ft. version is contemplated.

John Nelson, G4FRX, has recently installed some outdoor antennas at his Hampstead QTH in ZL40g. His site is 85m. *a.s.l.* and the 2m. 14-ele. *Parabeam* is 23m. above ground. The installation was carried out by a professional rigger and from a sketch John sent, it would seem to be very safe. At the time of editing, the power output on 2m. from the home built transverter is about 9w. Some reasonable DX has been worked and reception of GB3CTC and FX0THF would indicate that the site is excellent in those directions. There is a question mark over the NW direction, though. By the time this appears, full legal power should be available, so your scribe's S-meter will probably go round twice.

On the *Ar* scene, there was a weak event in the afternoon of Apr. 14 and SM4GVF worked OZ4VV, but nothing at all heard in London. Eddi Ramm, DK3UZ, telephoned your scribe at 1400 on the 15th, but again, no *Ar* signals were noticed at G3FPK. Eddi called again at 1500 on the 26th to report an event in progress in EN square, but again nil in London. Another event was discovered at about 1600 on the 29th and lasted till around 1900. SM4IVE and GM4IPK were good copy at G3FPK, but no real DX was heard being worked.

Seventy Centimetres

The only new one worked in the month by G3UVR was GM4JLY (YR) in Grampian Region and Denis comments

QTH LOCATOR SQUARES TABLE

Station	23cm.	70cm.	2m.	Total
G3JXN	57	98	155	310
G3COJ	36	87	150	273
G3XDY	30	86	131	247
G8PNN	30	70	108	208
LA8AK	25	62	200	287
G8FMK	21	59	74	154
G3PBV	18	86	163	267
G8KAX	17	57	82	156
G8VRJ	16	38	101	155
G8ATK	15	81	129	225
G4NBS	13	75	92	180
GD2HDZ	13	46	91	150
GJ8KNV	12	76	191	279
G8HHI	12	70	133	215
G2AXI	9	76	121	206
G4BVY	9	72	—	81
G4ERX	7	53	131	191
G4ROA	7	45	58	110
G3BW	6	36	204	246
G4NQC	5	32	136	173
GW3CBY	5	16	79	100
G8KBQ	4	91	172	267
G8FUO	3	86	80	169
GJ8SBT	3	—	161	164
G8ULU	2	66	98	166
G4RSN	2	19	72	93
GJ4ICD	1	103	225	329
G3VYF	—	117	307	424
OZ1EKI	—	101	314	415
G3POI	—	—	393	393
G3IMV	—	62	325	387
DK3UZ	—	—	311	311
G4IJE	—	—	293	293
EA3LL	—	30	261	291
SP2DX	—	—	280	280
G4IGO	—	19	246	265
G4ERG	—	16	235	251
G4DEZ	—	—	236	236
GW3NYY	—	48	185	223
G3UVR	—	45	182	227
G8VR	—	3	224	227
G3CHN	—	—	225	225
G4RZP	—	76	147	223
G8RZO	—	75	148	223
9H1BT	—	11	210	221
GM4COK	—	26	194	220
G4MCU	—	50	163	213
G8CXQ	—	63	146	209
G4JZF	—	68	140	208
G4PCI	—	28	167	195
G3KEQ	—	—	194	194
G4OAE	—	28	165	193
G3FPK	—	—	193	193
GM4CXP	—	26	163	189
GW4EAI	—	—	187	187
G3NAQ	—	58	128	186
G8TFI	—	95	82	177
G4NFD	—	36	138	174
G4HMF	—	32	140	172
G8WPD	—	24	139	163
G4HFO	—	59	102	161
G4NQX	—	47	113	160
G6ADH	—	27	131	158
G8LFB	—	—	150	150
G6HKT	—	60	89	149
G4MUT	—	57	84	141
G6ECM	—	—	141	141
GM4IPK	—	—	139	139
G4KUX	—	30	105	135
G6ADE	—	64	70	134
G6DDK	—	11	122	133
G8TGM	—	—	133	133
G3HIJ	—	29	92	121
G4MJC	—	12	108	120
GM8OEG	—	—	115	115
G8XIR	—	—	115	115
G4MEJ	—	—	114	114
G8ORP	—	37	76	113
G8WPL	—	30	79	109
G8SRL	—	21	83	104
G4GHA	—	—	104	104
G6DER	—	27	76	103
G8WUU	—	27	72	99
G4MWD	—	—	95	95
G8VFV	—	—	94	94
GM8BDX	—	33	53	86
G8RWG	—	—	84	84
G6HTJ	—	17	66	83
G8XQS	—	4	76	80
GW6JDK	—	2	77	79
G6ABB	—	—	75	75
G4NRG	—	11	61	72
G6ELQ	—	—	69	69
G4PEM	—	—	63	63
G6CNX	—	—	63	63
G8XMP	—	—	62	62
G6DFT	—	—	60	60
G8XTJ	—	—	48	48
G6HRI	—	13	34	47
G8ZYL	—	—	46	46

Starting date January 1, 1975. No satellite or repeater QSOs. "Band of the Month", 23cm.

upon the generally poor conditions. For G4FRE, the Easter holiday weekend produced some English activity including G6OYL in S. Yorks. and G8NDF/P in N. Yorks. on Apr. 4, and G4KUX (Durham) the following day. G4FRX has had reasonable success with his present 11w. to a 21-ele. *Tonna Yagi* which is about 6ft. above the 2m. beam. When the central heating engineers have done their thing, John should be able to add a few more dB. to the signal from North London.

G4ROA now finds he has 20% more power at the antenna *via* the new, H-100 cable so was eagerly looking forward to the May 7/8 contest weekend to give the system a thorough testing. Martyn Jones, G8CXQ, (Warks.) wrote in to up-date his table total to 63 squares, the two new ones being G4LIP/P (AN) and G4PEC/P (YP), both worked in the Apr. 3 contest. G8PNN has added another eight counties and one country since his last report. Gordon lists G8WPL (Gtr. Mchstr.), G3GJL (Here. & Worcs.), G8NDF/P (N. Yorks.), G6BKX (Staffs.), G4MRS/P (Suffolk), G3SHK (Wilts.) and GW8TFI (Gwent) all on Apr. 3 in the contest, plus G3OUT (Leics.) on the 14th.

During a session on the 20m. VHF net, your scribe spoke to OZ1EKI and Tom said he had worked 101 squares on 70cm. using just 45w. to a 21-ele. *Yagi*. He reckons he made the first OZ to GI contact on the band. OH0NC then broke in to say he had worked 109 squares so they are obviously a keen crowd in Scandinavia.

Gigahertz Bands

G8PNN now has a home made 2C39A amplifier on 23cm. giving 14w. Gordon's antenna array consists of a pair of home built, 28-ele. *Quad Loop Yagis* up at 40ft. He enclosed a log extract for Apr. 24 when nine continentals were worked in an hour from about 1950. These were: PA0GUS (CN79f), PE1EVX (CM15h), PE1HQO (DN71a), PA3BGL (CN70a), PA0JUS (CM25d), DC0HW (DN48a), PE1CQQ (DM01e), PA0WWM (CM63g) and PE1EBV (CM29c).

G4FRE has had his 23cm. beam fixed to the east while the 4m. beam was on the mast and lists PA0FRE (CL) worked. Also contacted was G3ZEZ (Essex) at 90° off the main lobe. On Apr. 24, Dave was out portable from Walton-on-the-Naze (AL17a) for the 13cm. leg of the *Microwave* contest. G3LQR (AM) was worked using 300mw. of SSB and a 1.2m. dish antenna. Using CW and 3w. to a 42-ele. *Q-L-Y*, G4LOJ (AM), PA2DOL and PA0FRE, both in CL, were contacted.

Miscellaneous Notes

Your scribe has been a subscriber to the German quarterly magazine, *VHF Communications,* since it was first published in the English language version in 1969. For those who have not seen a copy, it is a commercially printed, A5 production running to some 256 pages *per* annual volume. It contains a varied selection of articles exclusively concerned with VHF/UHF/SHF matters, including test equipment and more esoteric things like a digital storage and scan converter for weather satellite images, for example. PCBs, partial and complete kits of parts are available from the publishers for many of the projects.

VHF Communications has has two previous agents, the last being the now-defunct *Catronics* firm. Existing subscribers have recently received the much-delayed issue no. 4/1982. The rate for Volume 15, for 1983, is DM22 and U.K. subscribers can order through the new agent, *Radio and Electronics World,* 200 North Service Road, Brentwood, Essex CM14 4SG. With the fluctuating exchange rate, better check the Sterling amount first, though.

Many of us are all too familiar with TVI and BCI and with irate neighbours banging on the door just as you are about to work a UB5 *via E's,* demanding immediate shut down so they can watch some soap opera. Another manifestation happened to your scribe recently. The telephone rang; it was the young lad next door complaining he could not load a program into his *BBC Micro* because of the 2m. transmissions from G3FPK. It was pointed out to him that the fault was with his cassette deck, so he had better get it fixed. In any case, the rubbish from his computer creates considerable interference from "DC" through 146 MHz at least, in the form of nasty burbling noises, more than sufficient to blot out weaker signals. Have other readers suffered from this two-way RFI from computers and if so, what have they done about it?

Deadlines

Let us hope that June will bring far better conditions and some nice *E's* openings. Remember the *9H Falcon Contest* from June 1 to 15, details of which were given on page 74 of the April issue of the *Magazine*. All your news, views and claims by the **very early date of June 1,** and for the next issue, by July 6 to:— "VHF Bands", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ. *73 de G3FPK.*

STOP PRESS

Rainer Bertelsmeier, DJ9BV, telephoned at the 11th hour to advise of another trip to the island of Helgoland in DO square from July 2 to 7. Operation will be on 70cm., 23cm., and for the first time from DO square, on 13cm. No 2m. operation is planned and this will be NFD weekend, of course. As previously, the call will be DK0IK/P and there is a telephone in the shack. The number from U.K. is 010 49 472 5310.

VHF ANTENNA GAIN OR THE NUMBERS GAME

N. A. S. FITCH, G3FPK

IN the LF and HF bands, it is quite possible to achieve satisfactory results working DX, using random length wire antennas, provided an antenna tuning unit is used to bring the system to resonance and match it to the transmitter. However, if you want to work more than line-of-sight distances on VHF and UHF, some kind of directional antenna is essential. On the 50, 70, 144 and 432 MHz bands, this requirement of gain is almost exclusively satisfied by a *Yagi* type of parasitic antenna. This article discusses what gains are possible from this class of antenna.

What is a Yagi?

A Yagi antenna is a parasitic beam consisting of a half-wave dipole driven element and one or more un-driven, close-coupled elements which are parasitically excited by the current produced in the driven element. This principle was first described in 1928 by the Japanese, H. Yagi[1] who later developed it with S. Uda. It would be fairer to refer to this kind of antenna as a *Yagi-Uda*. They range from the simplest two element beam, comprising a driven element plus either a reflector or director, to very long UHF monsters with dozens of directors and one or more reflectors.

How Does a Yagi Work?

If you make a half-wave dipole for 145 MHz, for example, and feed some RF into it, it will radiate a signal of equal intensity at right angles to its length if in free space. If you now place another element of similar length parallel to the dipole and about 30cm. away, you have made the simplest parasitic antenna of the Yagi type. The two elements will be *mutually coupled* and a *mutual impedance* will exist between them, so a current flowing in the driven, dipole element, will induce a current in the parasitic one. The magnitude of this induced current and its phase relationship to the driven element current will depend upon the *tuning*. Tuning is usually accomplished by adjusting the physical length of the parasitic element. Increasing the length by a few per cent will lower the resonant frequency and result in some gain in direction "A" in Fig. 1(a), while shortening the length will raise the frequency and provide some gain in direction "B" in Fig. 1(b). The maximum gain of a simple two-element Yagi compared with a dipole is about 3.3 times or 5.2dB. Those who like to delve into the realms of abstruse mathematics will find Dr. J. D. Kraus's classic tome, *Antennas*[2], satisfying reading.

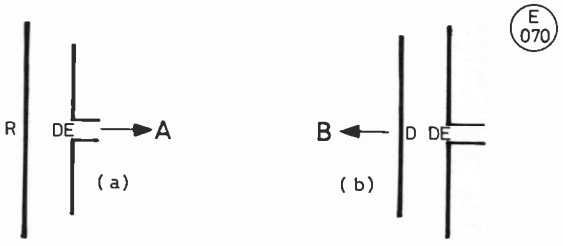
Directivity and Gain

The terms *directivity* and *gain* are sometimes confused. The only antenna not possessing any directivity — *i.e.* it would radiate energy equally in every direction — is an *isotropic* one. However, as this cannot be constructed, it follows that all practical antennas must exhibit directional properties. *Directivity* is based solely upon the shape of the radiated power pattern, or *polar diagram* as it is often described, such as the familiar one for a half-wave dipole shown in Fig. 2. *Gain*, however, must take into account antenna losses, since no structure can be 100% efficient. Indeed some simple beam antennas may be so lossy that they show little gain over a dipole.

Expressing Gain

When considering making or buying a Yagi antenna, the parameter of greatest interest is usually its claimed gain. There are two ways of expressing this, the first being by reference to a half-wave dipole, which is easy to comprehend. The other way is by reference to the aforementioned isotropic source. An isotropic radiator, if placed at the centre of a sphere and fed with a power of W watts, would produce the same field strength per square unit at every point on its surface. If a 100% efficient half-wave dipole were substituted and fed with W watts, the maximum field strength would be 1.64 times as great.

This figure of 1.64 is derived from a complex expression for calculating the *maximum effective aperture* of an antenna. It includes the figures representing the *intrinsic impedance of free space*, 377 ohms, and the *cosine integral* used to establish the *radiation resistance* of an antenna. (*See* Kraus[2] Ch. 3, pp. 50-52). $10 \log_{10} 1.64 = 2.15$dB, so it follows that antenna gain referred to isotropic is 2.15dB more than that compared with a dipole. The terms "dBi" and "dBd" are commonly used so, when studying manufacturers' literature, note how the claimed gain is expressed since 12.15dBi looks more enticing than 10.0dBd, even though they are the same!



(a) R=Reflector, longer than driven element, DE.
(b) D=Director, shorter than DE
Arrows A and B show direction of maximum radiation

Fig.1 TWO ELEMENT YAGI

Design Objectives

The two objectives in Yagi antenna design are to achieve the maximum gain for a given boom length and to cover all, or a reasonable proportion, of a particular band. That sounds simple until you consider the variables, *viz:*—

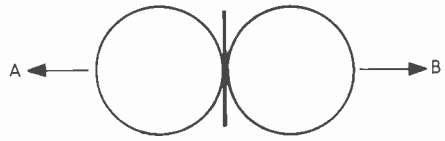
1. The type of boom: *i.e.* conducting or insulated.
2. The diameter and length of the boom in wavelength terms.
3. The diameter of the elements in wavelength terms.
4. The spacings of the elements.
5. The lengths of the elements.
6. The method of matching the feed to the driven element.

The ideal Yagi, which has yet to be designed, would have one forward lobe with no side lobes or radiation to the rear. The approximate gain of this perfect, lossless Yagi would be given by the equation derived by Kraus on page 25 in reference [2] and which is:—

$$G_i = 10 \log_{10} \frac{41{,}253}{h \times v} \text{ dBi}$$

where G_i is the gain in dB referred to isotropic, h is the horizontal beam width between half power points, v is the vertical beam width between half power points, both expressed in degrees. The derivation of the constant, 41,253 is given in Appendix A.

The Kraus equation shows that the gain, or more correctly the directivity, depends only upon the half power, or −3dB, beam widths. Note that neither boom length nor the number of elements are included. This infers, for example, that a well



Maximum directivity in directions A and B i.e. at right angles to the radiator, forming a "doughnut" pattern in free space.

E 071

Fig. 2 HALF WAVE DIPOLE POLAR DIAGRAM

designed six-element Yagi with a 1.5λ boom could have the same directivity as a poorly designed and/or constructed ten-element one on a 2.5λ boom.

Design Data

Anyone wishing to design and build a Yagi antenna now has a great deal of published data to consult. Very significant advances have been made since the ubiquitous computer has been used in the quest for the ultimate Yagi. Much of the earlier literature was devoted to empirical designs and their subsequent refinement, but nowadays computer programs have been developed to account for all the variables noted in the previous section. Some of this data will now be discussed.

The N.B.S. Yagis. Probably the best known data are those from the United States' *National Bureau of Standards,* published in December, 1976[3] and based upon work done in the early 1950s. Six different length Yagi designs were investigated from 0.4λ to 4.2λ boom lengths, and optimum designs evolved, a task which aggregated nine man-years. An excellent article by Joseph Reisert, Jr., W1JR, based upon the N.B.S. work, was later published in *Ham Radio.*[4] The tabular and graphical data therein enable the standard designs to be adapted to suit available materials.

The six designs described are for boom lengths of 0.4(3), 0.8(5), 1.2(6), 2.2(12), 3.2(17) and 4.2(15) wavelengths, the figures in parenthesis denoting the number of elements. In all designs, the spacing between the driven element and reflector is 0.2λ. The spacing of all other elements from each other is constant at 0.2λ for the 3, 5, 12 and 17 element versions, and 0.25λ for the 6 and 15 element designs. The claimed gains of the six Yagis are 7.1, 9.2, 10.2, 12.25, 13.4 and 14.2dBd respectively and some of these models have been offered by antenna manufacturers.

Non-uniform Yagis: The Chen Cheng approach. The original Yagis were "uniform" types with constant element spacing as in the N.B.S ones. H. W. Ehrenspeck and H. Pöhler[5] investigated such types and concluded that maximum gain would be reached with a 6λ boom, with a law of diminishing returns for greater boom lengths. However, parasitic antennas do not have to be uniform types and nowadays non-uniform Yagis are as much in evidence as the N.B.S. sort.

As the description suggests, non-uniform Yagis do not necessarily have constant director spacing and the launcher elements — those closest to the driven element — are usually close-spaced. The interaction of element spacing, length and diameter leads to an infinite number of designs, so practical experimentation can be very tedious, time-consuming and confusing. Two researchers into optimised Yagis are C. A. Chen and D. K. Cheng[6] and they describe a computer calculated method in their paper which included a numerical example of a six-element beam. In a recent issue of *VHF Communications,*[7] Leif Åsbrink, SM5BSZ, published a practical realisation of this 1.7λ design for the 144 and 432 MHz bands. Gain calculations made by integration of the plotted radiation pattern and actual measurements showed this design to be about 1dB up on other Yagis with the same boom length.

Very Long Yagis. Although the earlier Ehrenspeck work suggested a maximum boom length of about 6λ Günter Hoch, DL6WU, has recently published information[8] on the measured performance of 432 and 1,296 MHz antennas carried out in October, 1981, showing that there seems to be no upper limit to the theoretical length of an optimised Yagi. His paper includes a graph of boom length on a logarithmic scale, plotted against gain in dB on a linear scale which shows a straight line relationship. According to this graph, a 1λ Yagi has a gain of 9.2dBd and a 20λ one, 19.3dBd.

Hoch adopts a logarithmic taper approach in his search for a "universal formula" which would permit stopping at any desired array length without altering the optimum frequency. The article includes practical designs for a 23-element, 432 MHz *Yagi* and a 49-element, 1,296 MHz one with measured gains of 16.0 and 18.8dBd respectively.

Unwanted Lobes

No Yagi so far built has been free of unwanted lobes of radiation to the sides and rear although, in some of the better designs, the magnitudes of these can be quite low. It should be obvious that the power in these unwanted lobes is wasted, leaving less available for the main, forward direction. This leads to the statement, "The cleaner the radiation pattern, the greater the gain." Some idea of the polar diagram of your antenna can be gleaned by lining it up on a steady signal, such as a nearby beacon, and noting the S-meter reading, then rotating the beam in small increments and noting the fluctuations in strength. If you have a reliable signal generator, you can calibrate your S-meter and draw a graph plotting "S" readings against RF microvolts input. However, it is more useful to use decibels for the latter. *E.g.*, if one microvolt was arbitrarily made 6dB, then 2μV would be 12dB, 4μV 18dB and so on. Most beams will reveal several side lobes and some deep nulls, and the front-to-back ratio can be determined effectively if the S-meter is calibrated in dB.

Measuring Gain

The gains claimed by some Yagi antenna manufacturers are decidedly optimistic, and in some instances you would need *two* in practice to realise the gain claimed for one! Inflated claims are likely due to:—

1. Sub-standard measuring equipment.
2. Inadequate measuring range.
3. Deliberate attempts to deceive to achieve more sales.
4. A combination of any, or all, the above.

Reputable antenna makers now have precision equipment to take care of *1*, and should have their own, proper measuring range or use of somebody else's.

To compare gains of various antennas it is essential to try to reproduce "free space" conditions, so that the receiving antenna only picks up the direct wave from the antenna under test. Any waves that arrive by other routes, such as reflections from the ground or nearby obstructions, will falsify the readings. So-called ground enhancement can often be demonstrated by anyone using a telescopic antenna support and it does not necessarily follow that you will get the best signals when the antenna is at its greatest height.

A common method of measuring antenna gain is to compare the strength of signals received on precision field strength measuring apparatus from a reference antenna, with the antenna under test. The test range at Ånnaboda in Sweden was described in "VHF Bands" in the May, 1982 edition of *Short Wave Magazine*, on page 134. To re-cap, the target, or reference, antenna was a German *WISI* UY10, with a professionally measured gain of 9dBd and an exceptionally clean pattern and very low VSWR over a wide band. Two wire fences with absorbing, resonant dipoles and beams on top, were sited between the two masts carrying the test and target antennas to eliminate any ground reflections. The power fed to the test antennas was constant and due allowances were made for any mismatch

between the feeder and driven element of the test antenna. *Hewlett-Packard* measuring equipment was used at the receiving end.

Claimed Gains and Likely Gains

When one well known antenna company claims two or three dB more for the gain of its antennas than can be realised in practice, other manufacturers are at a disadvantage. The less-questioning customers will probably opt for the one with the highest claimed gain, so the more honest makers will lose out. However, it seems that claimed gains are now more realistic with some manufacturers now specifying less gain than they were for the identical products a few years ago. It is instructive to calculate the possible gains of some well-known antennas, using the Kraus equation and these are tabulated in Table 1, based upon the stated vertical and horizontal half-power beamwidths. The column "dBdÅ" refers to the gains, referred to a dipole, measured in the 1980 Ånnaboda tests. It must be emphasised, too, that the effects of minor lobes must be taken into account as explained in the following section.

". . . I expect you're getting one of my big lobes. . . ."

The Effects of Minor Lobes

It must be remembered that the Kraus equation relates to an ideal beam with no minor lobes whatever, so it is worth investigating the effect of one such side lobe on a typical Yagi. For example, let us take the basic *H.A.G.* 413. Using the specified 31° and 33° half power beamwidths, the Kraus gain is:—

$$10 \log^{10} \frac{41{,}253}{31 \times 33} - 2.15 = 13.90\text{dBd}$$

Now assume one minor lobe 40° off the main axis, 10° wide between half power points and 15dB down on the main lobe. Using the method described[9] the gain reduction works out to be 0.38dB. Further, if we assume a front-to-back ratio of 20dB and a 20° beamwidth, the rear lobe would equate to another 0.17dB. so the final gain becomes:—

$$13.90 - (0.38 + 0.17) = 13.35\text{dBd}.$$

Long Yagis invariably have more than one minor lobe. For example, the polar diagram of the 7.3λ, 23-element, 432 MHz beam by DL6WU[8] reveals at least eight, whilst his 17λ, 49-element, 1,296 MHz array seems to show about 16. For well designed 3.2λ Yagis it is suggested that the "Kraus" gain be reduced by at least 0.5dB, but that a deduction of around 0.75dB be made to account for all the minor lobes and other losses. Applying this philosophy to the *KLM, Tonna, Jaybeam, H.A.G.* and *Cue Dee* antennas in Table 1, we arrive at gains of 13.9, 12.9, 13.3, 13.2 and 13.4dBd respectively. The *KLM, Tonna* and *Cue Dee* beams were tested at Ånnaboda, 1980.[10]

Hoch's graph[8] indicates that each time the boom length is doubled for logarithmic Yagis, the gain increases by 2.35dB. From this can be derived a simple formula:—

$$G_{dBd} = 9.2 + 7.75 \log_{10} L_B$$

where G_{dBd} is the gain referred to a dipole and L_B is the boom length in wavelengths.

Maker	Type No.	Boom length		−3dB beamwidth in degrees		Gains dBd		
		mtrs.	λ	hor.	vert.	Claimed	Kraus	dBdÅ
KLM U.S.A.	13LBA	6.54	3.16	28	31*	15.5	14.62	12.6
Tonna France	20116	6.40	3.09	32	34	13.85	13.64	12.2
Jaybeam U.K.	LW16/2M	6.54	3.16	30	33	13.4	14.05	—
H.A.G. F.R.G.	413	6.72	3.25	31	33	13.45	13.90	—
Cue Dee Sweden	15144A	6.45	3.12	30	32	14.0	14.18	12.6

Table 1. Comparisons of two-metre Yagi antennas.

Notes:— * assumed value from Ref. 9, as not stated by KLM.
λ is referred to 145.0 MHz.
Horizontal and vertical −3dB beam widths taken from manufacturers' literature.
dBdÅ is the dBd gain measured at Ånnoboda 1980.[10]

More Reflectors?

Most UHF television antennas of the 10dBd or more gain category have more than one reflector and four are quite common. The layman is told that these, "eliminate ghosting", which in amateur radio parlance infers they have a cleaner polar diagram than simpler Yagis. Some commercial Yagis for the VHF/UHF amateur bands have two reflectors — such as the Tonna and Jaybeam designs — while the latest Tonna 17-element beam, no. 20117, has three. The N.B.S. engineers[3] investigated *trigonal* reflectors and tests on a 4.2λ beam yielded a very worthwhile 0.75dB gain over the single reflector configuration. To put this in perspective, to achieve an extra 0.75dB gain with a 4.2λ 144 MHz Yagi using one reflector, you would need to add 2.17 metres to the boom to make the total length about 11 metres. So it would seem sensible to squeeze out more gain by such a multiple reflector method. However, due allowance must be made for the element diameter to wavelength ratio.

Conclusions

In compiling this article, the author has consulted some very fascinating literature, in particular the Kraus volume, "Antennas", kindly loaned by Ted Honeywood, G3GKF. The main conclusion is that it appears very unlikely that anyone is going to come up with, for example, a 3.2λ Yagi showing a properly measured gain 2dB over the best of the present designs. It has to be stated that some U.S.A. manufacturers claim gains in excess of the maximum theoretical gain given by the Kraus equation for the "perfect" Yagi. This was noted in 1981 by *muTek Limited* in tabular form.[11] However the gains claimed for Tonna antennas quoted therein have now been reduced by 1dB in most cases. The gains claimed by European amateur antenna makers now seem to

be more realistic, the figures in the current Jaybeam catalogue, for instance, seeming very honest and realistic.

It has been pointed out that the performance of a precisely tuned, high gain Yagi antenna will soon deteriorate if it becomes corroded, so protection measures are essential. But the choice of protective solution has to be made with care. *Messrs. Ant Products,* makers of the "Silver 70" 432 MHz Yagi, emphasise that polyurethane lacquer should *not* be used on the driven element. In correspondence, they stated that this material caused the resonant frequency of the driven element to be lowered below the band edge. Instead, they suggest a clear varnish be used. It goes without saying that all connections, feeder cable and relays should be the least lossy you can afford. After all, there is not much point in buying an expensive, high gain beam and then using lossy connectors, dubious second-hand coaxial feeder and unsuitable relays, which could well introduce 4-5dB of loss.

It is hoped that this article, whilst not offering anything new, may have illustrated what can be expected of Yagi type antennas in the matter of practical and *realisable* gain.

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[9]"Yagi antennas. Principle of operation and optimum design criteria." Günter Hoch, DL6WU. *VHF Communications,* Vol. 9, No. 3. pp. 163-165.

[10]Ånnaboda 1980. "Resultaten fran antennmätningsarna vid Ånnabodamötet 1980." Oscar Backman, SM5CHK. *QTC Magazine* (Sweden) No. 4, 1981.

[11]Application Note No. AN09-81. *muTek Technology Limited,* Bradworthy, Holsworthy, Devon, EX22 7TU.

Appendix 'A'

Derivation of the constant, 41,253, in the Kraus formula for antenna directivity.

Consider an isotropic radiator fed with a power of W watts at the centre of a sphere of radius r = 1. The surface area of a sphere is $4\pi r^2$ which, when r = 1, simplifies to 4π. Then the average radiation intensity, U_o, at the surface of the sphere is,

$$\frac{W}{4\pi} \text{ watts per square radian.}$$

Consider now a directional antenna in place of the isotropic radiator, again fed with W watts, and which projects an area, B, on to the sphere's surface. Call the maximum radiation intensity so produced, U_m. Then, the directivity, D, is the ratio of these two intensities;

$$i.e.\ D = \frac{U_o}{U_m} = \frac{4\pi}{B}. \text{ Therefore, } B = 4\pi\frac{U_o}{U_m} \text{ square radians.}$$

$$\text{One radian} = \frac{360}{2\pi} \text{degrees, so the expression for B becomes:—}$$

$$B = \frac{4\pi \times 360^2}{4\pi^2} \times \frac{U_o}{U_m} = 41{,}253\frac{U_o}{U_m} \text{ square degrees.}$$

Specially built *Racal* antennas at the Science and Engineering Research Council's (SERC) Ditton Park Ionosonde facility are aimed skyward to direct powerful HF signals at the ionosphere — the 100 km.-high reflective layer that makes long-distance sky-wave HF communications possible. By measuring the intensity of the reflected signals over a wide range of frequencies, an accurate evaluation of HF propagation is possible; the data is used by broadcasting organisations and other HF users to calculate optimum transmission paths and frequencies. There are two rhombic arrays covering 3 to 16 MHz, and a delta array used for reception. Inset shows the Ionosonde equipment being prepared for another set of hourly measurements.

FURTHER MODIFICATIONS TO THE ICOM ICB1050

STEPHEN IBBS, G4LBW

SINCE the February issue of *Short Wave Magazine* appeared, many CB shops have been inundated with amateurs seeking the remaining ICB1050's, to convert to 10m. The original conversion enabled channels 9-34 to be used (35 being the band edge, and, because of a programming error inherent in the modification, channels 1-8 were simply repetitions of other channels).

After much consideration, and talks with the financial manager of the marriage, G4TCD, she agreed to the purchase of a unit. (I suspect because she has just passed the Morse test so will be able to use it!). It was soon working, after noting one or two errors in the article, and contacts heard showed that interest was developing rapidly. When the receive offset mod. was published in the April issue it started me thinking about a more substantial rearrangement of the data lines to gain more channels, *i.e.* to move the top few channels into the band and consequently all the others down, and to generate new frequencies for channels 1-8 as well as retaining the receive offset facility. This article is the result, and is offered for readers wishing to extend their 10m. FM capability. The 10m. band plan, however, should be noted, and priority given to other users as appropriate. This is particularly important in the satellite band.

It is necessary to understand how the programming works, and to do this we will consider channel 40. The switch actually counts from 40 (channel 1) to 79, so channel 40 represents a binary output from the switch wires of 1001111 *(i.e.* 79). The original article showed that if 250 was presented to the synthesizer, 29.70 MHz would be produced (the band-edge frequency). With only 79 coming from the switch, we need to add binary 171, which is 10101011 to obtain this frequency. The easiest way of doing this is to use two 4008 4-bit adders, which will add together two sets of binary inputs, in our case 171 and 79, to give the desired binary output of 250, which is 011111010. This is very simple to achieve, *but* a complication arises when we want to include the possibility of 100 kHz receiver shift to listen to the American repeaters. We need 181 (10 channnels at 10 kHz spacing = 100 kHz) to be added for receive, and 171 for transmit. The binary codes for 181 and 171 are reproduced below, and each data line has been given a letter.

Rx (180)	10110101
Tx (170)	10101011
	hgfedcba

It can be seen that to change from 171 to 181, *c* and *e* need to switch from 0 to 1, and *b* and *d* from 1 to 0. Fortunately the April *S.W.M.* issue revealed that a pin on the mic. socket goes low on receive, and so this is used to control two inverters of a 4001 (or 4011) to achieve the necessary level-switching. As pins 1, 2, go low, pins 3, 12, 13 go high (taking *c* and *e* high), forcing pin 11 low (taking with it *b* and *d*). On transmit the reverse occurs, ensuring that 171 is once more loaded, rather that 181. The line from pins 1 and 2 goes *via* a switch as recommended, to disable the receive offset function as required. In my case I used the Hi/Lo switch (Hi indicating receive 100kHz high) and this involved removing the yellow wire from the switch and discarding, removing the orange wire and attaching it to the red (+ve) lead on the volume control. The Hi/Lo switch is in fact a two-pole switch, so the red wire still remaining was left on one pole, and will eventually light a small LED to indicate that the offset is in operation. The wire thus goes from pins 1, 2 to the spare pole, and thence to pin 3 of the mic. socket, which has had the capacitor plus wire transferred to pin 2.

If readers have already modified their data lines as per the February article, these now need to be undone . . . *i.e.* remove the shorting links and the 10k resistor, then unsolder all the wires from pins 11-17, and clear the hole by pin 10. A PCB was made, and a design is given in Fig. 2. Mount all the components, and use *Veropins* for the necessary connections. Do not forget the two wire links. This board is eventually bolted to the side of the case, behind the channel switch, using two L-shaped brackets. The wires from the channel switch are connected as shown, colour by colour. 8-way ribbon cable then connects the outputs to pins 10-17 of the 145106. Make the connection from the 4001 to the Hi/Lo switch as indicated above, and attach two leads for supply and earth. For ease I soldered these to the actual pins of the 145106

Rx	
12dB SINAD sensitivity:	<0.2μV
Squelch open level:	1μV
Squelch close level:	<0.3μV
Image rejection:	∽60dB
Tx	
Output spectrum, 2nd harmonic:	−60dB
Spurii ± 1MHz of wanted output:	−50dB
29.600MHz VCO control voltage:	Rx, 1V Tx, 2.12V

Performance figures for a modified Icom ICB1050.

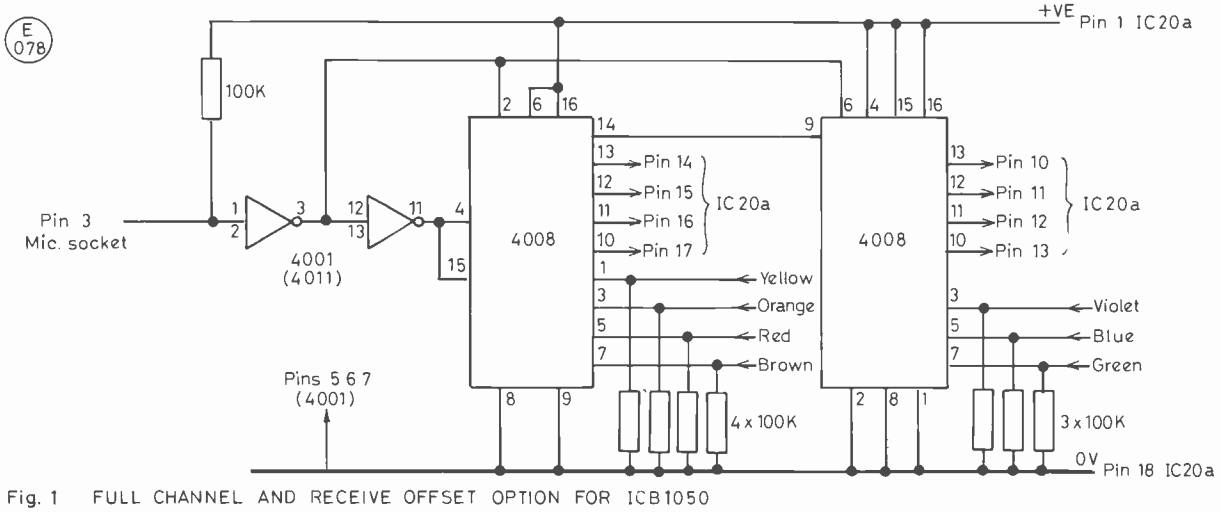


Fig. 1 FULL CHANNEL AND RECEIVE OFFSET OPTION FOR ICB1050

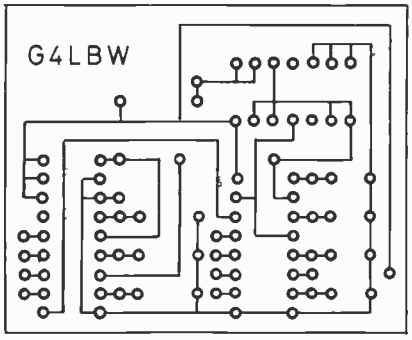


Fig. 2 (a) COPPER SIDE

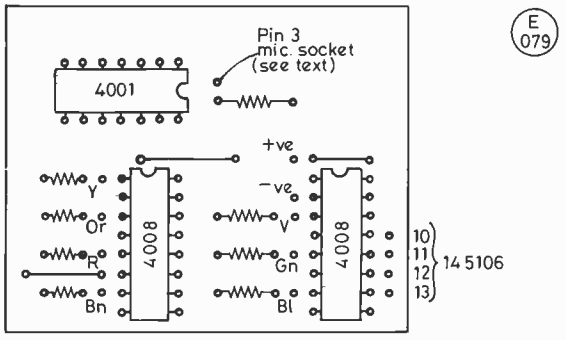


Fig. 2 (b) COMPONENT SIDE

(pin 1 for + ve, pin 18 for earth). *N.B.* The + ve required is *not* the same as the 13.8v. supply to the rig as a whole, and so should *not* be connected, for example, to the supply pin on the volume control.

That's it! The rig should now transmit and receive from channel one, 29.31 MHz, to channel 40, 29.70 MHz, with the receive offset option available for all channels. Other modifications are constantly coming to light, and Dave, G4HUP, and Sam, G4DDK, kindly told me of some ideas whch may be of interest. The ceramic filter CF101 could well be upgraded by inserting the 2-pole crystal filter (10.695 MHz) which looks like a crystal with three leads, available from *Ambit;* this is non-polarised and can therefore be inserted either way round. Similarly receiver performance will be improved by replacing C103 with 33pF and C106 with 10pF, and then retuning.

I have also heard of a booklet of modifications being produced by Bury RS, and Malcolm Pritchard, G3VNQ, tells me that these are available at £1.25 including post/packing from the Bury RS, c/o Mosses Centre, Cecil Street, Bury. Some people I know experienced difficulty initially finding the 29.6 MHz on a nearby HF receiver (channel 30 now, not 25). Readers may find it easier to monitor the voltage on pin 7 of the 145106, whilst unscrewing the core; it should be approx 1v. on receive, and 2v. on transmit.

The specification of a random sample set as modified by Dave and Sam indicates the very respectable performance obtainable from these rigs. My next move is going to be adding a pre-amp, possibly the *Ambit* model, and then to don the dirty raincoat again to haunt the CB shops for a blown 'burner' that might be recoverable.

MAGAZINE REVIEW

"LUNAR LETTER MAGAZINE"

IN MONTHLY features such as "VHF Bands," it is not possible to cover the more esoteric aspects of VHF/UHF operation in any depth. Consequently there is scope for publications dealing with the more specialised subjects. Probably the better known European, specialist magazines are *VHF Communications* and *DUBUS Informationen,* both of which originate in Germany and have U.K. agents. From the U.S.A. comes the **Lunar Letter Magazine,** now in its second volume.

The **Lunar Letter Magazine** is a monthly journal of American A4 size, that is about half an inch wider than this page. It contains a varied and balanced selection of articles on the design and construction of equipment and on operating, plus a correspondence column and swap and sell feature. It deals with the entire spectrum from 50 MHz upwards and is really intended for the "real DX-ers" who indulge in *E-M-E* operation on the various bands.

The March issue was sent for perusal and this typical issue includes the following in its forty pages: an article on the so-called "Maidenhead Squares," the preferred world-wide locator system; Contests and Awards; Satellite news; a VHF Terrestrial report; a cheap and easy 144 MHz *E-M-E* antenna array; a digital readout antenna *AZ-EL* position indicator; a 10w. PA for 1,296 MHz in solid state; A 432 MHz PA using a 7650 valve; How to calculate feed horns and a description of the WA9KRT, 16 times 7-ele. *Quagi* array for 144 MHz *E-M-E.* Some 14 pages are devoted to 144, 432 and 1,296 MHz *E-M-E* news and other items cover locator "field" listings, a page from SM5AGM listing the IARU Region 1 VHF/UHF/SHF distance records, correspondence and the swap and sell feature.

The text is properly printed in two columns per page format with justified right hand margins. The photographs are screen printed of similar standard to those in *Short Wave Magazine.* The diagrams are rather amateurish, though, some of them being the authors' own rough drawings. No doubt the information is all there but the publishers really need the services of a part time draughtsman. Nevertheless, it is doubtful if this criticism would put off the kind of enthusiast to whom this interesting magazine is aimed.

The U.K. distributor is a keen 144 MHz *E-M-E* operator, Doug Parker, G4DZU. The annual dues are £11.00 and copies are air mailed direct to Doug, in bulk, and then immediately posted to subscribers over here. Unlike the better known American amateur radio magazines, the news is very topical and not some three months old. Cheques should be made out to D. Parker and sent to: 14 Moorside Crescent, Drighlington, Bradford, W. Yorks., BD11 1HS. *N.A.S.F.*

EQUIPMENT REVIEW

TRIO TR-2500 TWO-METRE FM HANDHELD TRANSCEIVER and TRIO VB-2530 TWO-METRE POWER AMPLIFIER

THERE is a very large, worldwide market for compact, robust, handheld VHF two-way radios intended for short range communication. All the major international amateur radio manufacturers offer such equipment for the two-metre band and the **Trio TR-2500**, reviewed here, is a typical example.

Specification

The U.K. model covers 144.000 to 145.995 MHz in 5 kHz steps. The transmitter part provided either 2½ watts or 300 milliwatts of FM at ±5 kHz deviation. A 1,750 Hz tone burst facility is incorporated for initial repeater access and standard 600 kHz Tx/Rx split, or any non-standard split frequency operation can be achieved in addition to simplex working.

The receiver section uses IFs of 10.7 MHz and 455 kHz with a claimed sensitivity better than 0.2μV for 12dB SINAD. The −6dB to −60dB filter shape factor is better than 2:1. *i.e.* better than 12 kHz wide at −6dB and less than 24 kHz wide at −60dB. Squelch sensitivity is less than 0.25μV threshold, and audio output power more than 400mW into an 8 ohms load at 10% distortion. There are ten memory channels which are retained in the "off" mode using power from a small, internal lithium battery. Both memory scanning and general scanning in user-determined steps in 5 kHz multiples is possible. The power source supplied is a sealed, clip-on nicad re-chargeable battery pack giving a nominal voltage of 8.4, with a 400 mAH capacity.

Description

The **TR-2500** is housed in a robust grey plastic, two-part case measuring 175mm. high, overall knobs, 67mm. wide and 40mm. thick. It weighs 550 grammes with batteries, "rubber duck" antenna and hand strap. The general appearance can be seen from current dealer advertisements. The battery pack is sealed and slides into the bottom of the transceiver. Underneath the sixteen-key keyboard is a grill behind which is the small speaker, the *electret* condenser microphone being in the bottom left corner of the grill. The frequency display is a liquid crystal type incorporating memory channel address numbers and four status annunciators. To the left of this display are three slide switches, the top one for switching the LCD back light on and off, the middle one for inhibiting the push-to-talk switch and the bottom one for locking-in the frequency.

On the top panel is a BNC socket for either the short antenna or connection to another antenna or amplifier, a three position slide switch to select simplex or split frequency operation, a push button for listening on a repeater input frequency, a button for enabling the tone burst and another one to select high or low power. The two rotary controls are on/off and volume, and squelch. A 2.5mm. socket is provided for an external speaker next to a 3.5mm. one for an external microphone. A small LED is fitted to indicate battery discharge condition.

Accessories supplied include the "rubber duck" antenna, nicad battery pack, AC charger, hand strap and a little rubber plug for the mike and speaker jacks to keep out dust. Also listed, but not supplied with the review model, are plugs for the mike and speaker, and two rubber caps whose function is nowhere explained in the manual.

Access to the "innards" is by sliding off the battery pack, undoing three screws and removing the rear half cover; *see* Fig. 1. Fig. 2 shows the densely packed, double-sided fibreglass PCB behind the front panel. In all, there are 100 assorted transistors, diodes and ICs, plus the micro-computer. These boards must be a serviceman's nightmare, all the more so as there is no room on the boards for component identification.

The Instruction Manual

The Instruction Manual is a 28 page booklet, A5 size, the first page of which contains the specifications. Section 1 covers preparing the transceiver for use, while Section 2 identifies the controls and their functions. Keyboard operation is dealt with in Section 3 and describes how to enter frequencies, use the memories and set up scanning. Section 4 covers actual operation, while the last part is an illustrated list of the optional accessories.

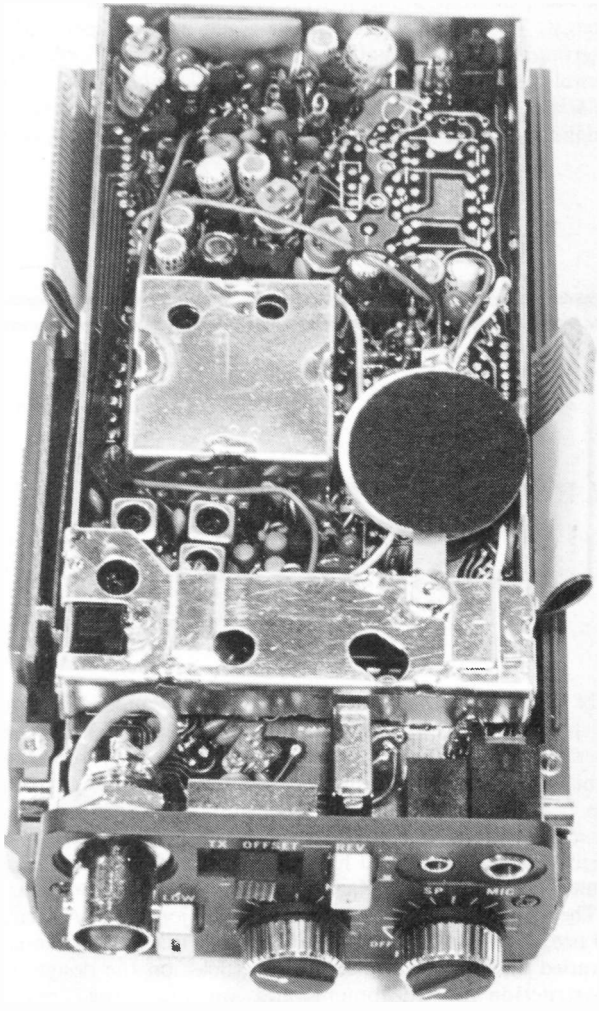


Fig. 1. View of the Trio TR-2500 hand-held FM transceiver with back cover removed. The PCB accommodates the mike amplifier, VCO and PLL circuits, the latter being an MC14155P IC under the piece of screening running across the board, a little behind the top panel. The other screening box houses the μPD7502G micro-computer, operated by the keyboard.

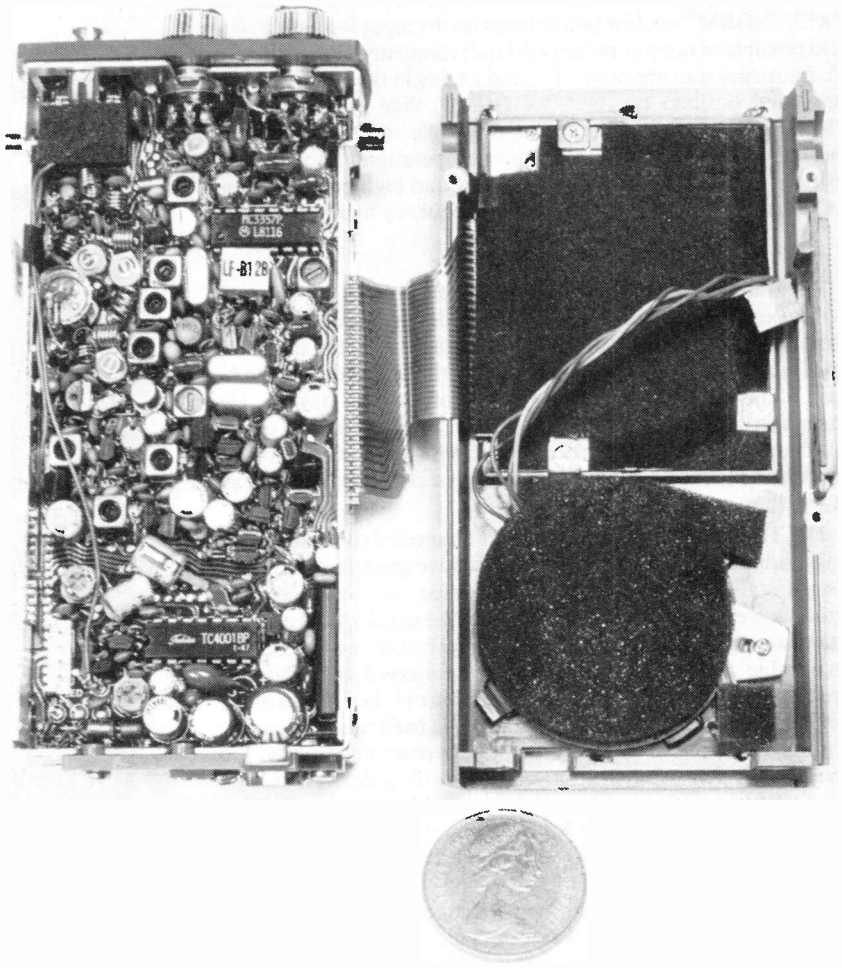


Fig. 2. View of the densely packed PCB behind the front panel, accommodating the basic RF circuitry for the receiver and transmitter sections. The opened-out front cover on the right houses the keyboard and LCD frequency and channel display, connected by a 25-way ribbon cable. The loudspeaker is under the round foam protector and the tiny condenser microphone is the square object at the bottom right. The loose plug mates with the four-way socket at the bottom left of the PCB. The 10p piece gives an idea of scale.

The last page of the manual is devoted to a block diagram of the **TR-2500.**

The Circuit

The circuit diagram is one side of a loose sheet and is split into three parts corresponding to the two, main PCBs and the keyboard and microprocessor section. Component values and transistor and IC types are marked on these diagrams, the main signal paths being picked out in heavier lines to coincide with the block diagram in the manual. This makes it much easier to follow. The receiver is a double conversion superhet with IFs of 10.7 MHz and 455 kHz. The signal from the antenna goes through a low pass filter, common to both receiver and transmitter, to a 2SC2026/2SC2668 cascode RF stage, then through a band pass filter to a 3SK76 dual-gate Mosfet mixer. Next *via* a 10.7 MHz crystal filter, through two IF amplifier stages, into an MC3357P IC, functioning as second mixer, 10.245 MHz second local oscillator, second IF amplifier and detector. The AF stages are in a TA7313AP IC.

The transmitter starts with the condenser microphone, followed by five, discrete amplifier and filter stages and this audio signal directly modulates the VCO. The PLL chip is an MC145155P IC with a 10.240 MHz crystal oscillator. The local oscillator crystal is 42.6 MHz. Unfortunately neither the block nor circuit diagrams give any clue as to the VCO frequencies. The 145 MHz part of the Tx comprises 2SC2026 and 2SC2053 driver stages and a 2SC1947 PA device. All functions, such as frequency selection, memories and scanning, are controlled by a μPD7502G CPU from the keyboard. All switching is solid state and no mechanical relays are used.

Using the TR-2500

The Instruction Manual was read thoroughly as a first step, after which it was easy to learn to operate this transceiver. At switch-on, the four figure LCD appears. Frequencies are entered by pressing the appropriate keys; *e.g.* to enter 145.550 MHz, you press 5550. To put a fequency in the memory you key in the desired one, then press keys marked "F" and "MR" finally pressing, say, key "2" if you want that frequency to go in memory no. 2. Up and down keys enable you to "QSY" at 5 kHz each push but if you keep either button depressed for more than a second, you will step tune the band at a fast rate, *e.g.* from 144.000 to 145.995 MHz in just over 30 seconds.

Memories are retained when the set is switched off as the microcomputer remains powered up by the internal battery. Local repeater frequencies were entered into the memories with the memory number corresponding to the "R" channel convention; for example 145.650 (R2) was entered into memory no. 2, etc. Memorised frequencies can be scanned at the rate of one per second by pressing a key marked "MS." Provided the squelch is set at threshold level, the scan will stop at an occupied memory; scanning is resumed two seconds after the signal has gone. In addition to memory scanning, all, or any desired section, of the band can be scanned in user-selected increments, such as 5, 10, 25 or 50 kHz. The Manual shows clearly how this is achieved and this program scanning is initiated by depressing the "F" and "PROG S" keys, the scan stopping at the first occupied frequency. All frequency-entering operations are verified by a "beep" tone so, if you press a key and do not hear a beep, then you probably did not press the key firmly enough.

For normal 600 kHz repeater operation the "TX Offset"

switch is set to "–" and a very useful button marked "REV/NORM" enables you to listen on the input frequency. It is also possible to operate on any odd split frequencies by setting the Tx frequency into Memory "O" and keying in the Rx frequency. A second position on the "TX Offset" slide switch, marked "M", activates this odd split mode, while the third position, marked "S," is for normal simplex operation. Other useful features of the **TR-2500** include the low and high power option, LCD backlight, the PTT inhibit and frequency lock switches.

Results

The transceiver was operated as a handheld from high ground on the North Downs to the south of London and access to all the local repeaters was easy. In normal daylight, the LCD was easy to read but in poor lighting, and at night, the backlight had to be used. This is situated at the right of the display so the "megahertz" figure was not very well lit. The PTT switch on the left hand side was quite robust and positive in operation. It activates a microswitch and the life of these components is at least one million operations.

The **TR-2500** was also used indoors connected to a 10-element Yagi, horizontally polarised at 35ft. above ground, and many distant stations and repeaters were copied this way. Received signals were of satisfactory quality from the small speaker and of adequate volume. Reports on the transmissions were generally favourable although some listeners commented on a lack of "top" indicating a "roll-off" in the response at the HF end of the audio spectrum. Similar observations have been made about the reviewer's HF transmissions using a condenser microphone, so perhaps this is an inherent short-coming of these devices. Using a 50 ohms dummy load and valve voltmeter with RF probe, the high power output worked out at 3.4 watts and the low power output, 250 milliwatts. The accuracy of these figures would be ± 15%.

A significant drawback of this transceiver is that you cannot use 12½ kHz channel spacing, now becoming popular due to increasing band occupancy. For example, there is a local net on 144.6875 MHz, but the nearest frequencies were either 144.685 or 144.690 MHz. While net members could be copied alright, there was some interference from other QSOs on either 144.700 or 144.675 MHz at times. Obviously, the **TR-2500** was made more for the U.S. market where multiples of 5 kHz are ideal. The other main criticism is of the rather high battery consumption leading to quick battery discharge. The specification reckons a 110 minutes "life" on a one-minute-transmit/three-minutes-receive cycle before re-charging which takes 10-14 hours with the supplied charger. The transceiver is rendered inoperative while being re-charged, but, if the ST-2 base stand, or MS-1 mobile stand accessories are bought, you can operate during re-charging. Impending battery failure is indicated by a flashing LED on the top panel, but this cannot be seen when operating the set in a normal manner. Listeners reported a clicking sound when this LED was flashing.

The Trio VB-2530 FM Power Amplifier

While one can have a lot of fun with a low power, handheld transceiver, especially from hilltops, the range with such sets using their small antennas in urban surroundings is inevitably short. However, by connecting them to a decent outdoor antenna and boosting the power by 10dB or so, more respectable "DX" becomes possible. The **Trio VB-2530** was specifically designed for the **TR-2500** and covers 144-148 MHz, FM mode. It measures 75mm. wide, 48mm. high and 192mm. deep overall the sockets. The general view of the "works" with the protecting bottom cover removed is shown in Fig. 3. The front panel has a BNC RF input socket, power on/off rocker switch and three LEDs for power on, on air, and protection indication. The rear panel has an SO-239 antenna socket, two-pin non-reversible power socket and another DC socket for connecting to accessories.

The RF amplifier is a single stage using a 2SC1946A transistor. Under stand-by conditions, the antenna is routed straight through from the input to the output socket. As soon as RF from the drive source is detected and rectified by a diode, then amplified, switching diodes are biased to break the by-pass connection. The amplifier is protected against antenna mis-match, this condition being indicated by a flashing LED; the **VB-2530** has to be switched off to reset the protection circuit.

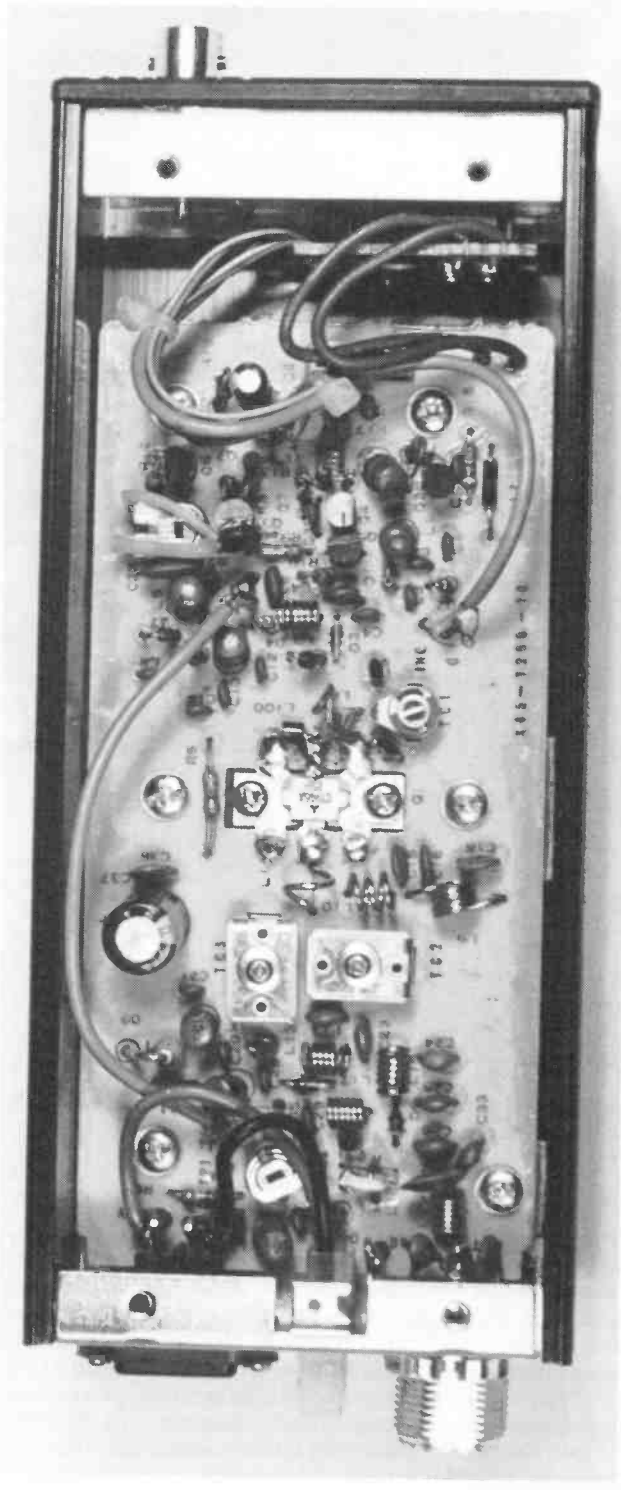


Fig. 3. Bottom view of the Trio VB-2530 amplifier with cover removed. Purpose designed for the TR-2500, this gives 25w. FM output for 2½w. of drive from a single stage circuit using a 2SC1946A device. The 50 ohms input connector is a BNC type on the front panel, the output socket an SO-239, on the rear.

The amplifier is supplied with 1½ metres of coaxial lead with BNC plugs, a similar length of remote control cable, a DC lead with in-line fuse assembly and a mobile mounting kit.

The specified drive power is 1-4 watts for 25 watts output. Using the calibrated S-meter on the station receiver, the measured gain was just about 10dB. Reports from other stations did not reveal any signal quality difference between the TR-2500 "bare foot" and the transceiver with amplifier.

The Instruction Manual is a simple four page affair covering operating instructions and specifications. It includes clear diagrams illustrating how to install the **TR-2500**, the **VB-2530** and accessories in mobile and fixed station situations. A circuit diagram is included but no description of operation is offered.

Mobile Operation

The **TR-2500** and **VB-2530** were not installed in the reviewer's car as no separate speaker/microphone was provided. For mobile operation, using the optional MS-1 mobile stand would enable the transceiver to be used while re-charging the battery pack from the car battery. However, the SMC-25 speaker/microphone is a necessity for this use.

Conclusions

Both items are well made, performing their intended functions satisfactorily and a comprehensive range of accessories is available, too. As to prices, that of the **VB-2530** is around £69, and the **TR-2500** is currently advertised at about £232. Now this seems rather expensive for a single band, single mode, low power transceiver when compared with what you get for about £560 in the shape of Trio's TS-130S, for example. That is an eight band, multimode, 200 watts HF transceiver with many more components and PCBs than the **TR-2500**, much more complicated to design, develop and manufacture. The same kind of price differentials are apparent from other manufacturers, of course, so it does seem that either the HF customers are getting very good bargains or the VHF fraternity is paying a disproportionately high price for modest handhelds.

Finally, thanks to *Messrs. Lowe Electronics Ltd.* for the loan of the above items for review. *N.A.S.F.*

CLUBS ROUNDUP

By *"Club Secretary"*

ONE of the objectives of running our 'three months' system of regular up-dates of club programmes and data is to save the clubs money; so it seems a little odd that some clubs send us two or more letters in the same month!

The Mail

First stop is at **Abergavenny and Nevill Hall**, where we see they have GB2NHF running on June 4 at Nevill Hall Fete, GB4AC at Abergavenny Castle Fete on July 24, and not to forget GB2ABC on July 30 at Abergavenny and Border Counties Fair to keep them well in the public eye. In addition there are weekly Thursday evening meetings at Pen-y-Fal Hospital in the room above Male Ward 2.

At **Acton, Brentford & Chiswick** it is June 21, for a 'New Members Forum'. This is at Chiswick Town Hall, High Road, Chiswick.

Looking at the **Aylesbury Vale** letter, we see they have a place at Stone Village Hall, where they are to be found on every fourth Tuesday from March 22 last; details from the Hon. Sec. — her details are in the Panel.

The Sands Hotel, Bangor, Co. Down is home to the **Bangor** group, where they foregather on the first Friday of each month. Again for details we must refer you to the Hon. Sec. — *see* Panel.

The **Basingstoke** chaps have a date on the second Tuesday of every month at the British Legion Hall, Crown Lane, Old Basing, and we understand that membership is on the upwards path with a good programme arranged.

Biggin Hill have an Antenna Evening, to include some film as well, laid on for June 14, at Biggin Hill Memorial Library.

Meetings of the **Brighton** club are on June 1, 15 and 29; the first date is still 'open' and the June 15 date has the intriguing title "Come and Tell us a Story." As for June 29, that is down for the Club Evening Rally. All are at the YMCA Centre in Marmion Road, Hove.

(A later note indicates that June 1 is down for a trip round the Shoreham lifeboat).

Turning to **Bristol**, we get it that they are putting their programme together — this was a computer release which calls it a 'program', incidentally! — and so we must refer you for the details to the Hon. Sec. — *see* Panel. On the other hand, why not go and visit them, any Tuesday evening, at the YMCA, Park Road, Kingswood?

The details of the **Bury** meeting on June 14 are still open at the time of writing; but every Tuesday evening they have an informal session at Mosses Community Centre, Cecil Street, Bury.

Now we come to **Cambridge**, where the venue is the Visual Aids Room, on the ground floor of the Coleridge Community College, Radegund Road, which is a turning off Coleridge Road in the south part of Cambridge. There are meetings every Friday unless the College is closed — but in that case, you can always get the latest from the Hon. Sec. — *see* Panel.

Cheltenham are settling into their new Hq at Stanton Room, Charlton Kings Library; for dates and details, contact the Hon. Sec. — *see* Panel for her address.

Every Wedneday evening the **Chesham** crowd head for the Stable Loft, Bury Farm, Pednor Road, Chesham, to arrive at 8 p.m. The Hon. Sec. says that new members are welcome, and anyone interested could contact him first — details in the Panel.

Over to **Cheshunt**, where June 1, 15, and 29 are all natter evenings; June 8 is, at the time of writing, still open, and on June 22 they will be out portable on Baas Hill Common. The Hq is at Church Rooms, Church Lane, Wormley, but we understand they are actively looking for a new place.

The Green Room, Fernleigh Centre, 40 North Street,

Names and Addresses of Club Secretaries reporting in this issue:

ABERGAVENNY: D. F. Jones, GW3SSY, 2 Dalwyn Houses, Llanover Road, Blaenavon, Gwent NP4 9HY. *(0495 791617)*
ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3. *(01-992 3778)*
AYLESBURY VALE: Mrs. C. Clark, 9 Conigre, Chinnor, Oxon. OX9 4JY. *(0844 51461)*
BANGOR: H. Squance, GI4JTF, 24 My Lady's Mile, Holywood, Co. Down,
BASINGSTOKE: D. Redmond, Touchwood, Greywell Close, Tadley, Basingstoke, Hants.
BIGGIN HILL: I. Mitchell, G4NSD, 37B The Grove, Biggin Hill, Westerham, Kent TN16 3TA. *(09594 75785)*
BRIGHTON: Ms. W. Firmager, 26 Brownleaf Road, Brighton.
BRISTOL: M. Goodfellow, G4KVQ, 99 Somerset Road, Knowle, Bristol BS4 2HX. *(0272 716093)*
BURY: B. Tyldesley, G6OKE, 4 Colne Road, Burnley, Lancs. *(Burnley 24254)*
CAMBRIDGE: D. Wilcock, G2FKS, 6 Lyles Road, Cottenham, Cambridge CB4 4QR. *(0954 505917)*.
CHELTENHAM: Mrs. G. Harmsworth, G6COH, 42 Leckhampton Road, Cheltenham, Glos. *(Cheltenham 25162)*
CHESHAM: J. Alldridge, G6LKS, 15 Wichcote Gardens, Chesham, Bucks. *(Chesham 786935)*
CHESHUNT: R. Frisby, G4OAA, 2 Westfield Road, Hoddesdon, Herts. EN11 8QX.
CHICHESTER: T. M. Allen, G4ETU, 2 Hillside, West Stoke, Chichester, Sussex PO18 9BL. *(West Ashling 463)*
CHILTERN: R. Ray, G3NCL, 21 Parish Piece, Holmer Green, Nr. High Wycombe, Bucks.
COLCHESTER: F. R. Howe, G3FIJ, 29 Kingswood Road, Colchester. *(0206 70189)*
CORNISH: J. J. Vinton, 'Cheriton' Alaxandra Road, St. Ives, Cornwall. *(Penzance 795860)*
CRAWLEY: D. L. Hill, G4IQM, 14 The Garrones, Worth, Crawley, W. Sussex. RH10 4YT. *(Crawley 882641)*
CRAY VALLEY: P. J. Clarke, G4FUG, 42 Shooters Hill Road, London SE3. *(01-858 3703)*
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London SE23 3BN. *(01-699 6940)*
DARTFORD HEATH: A. R. Burchmore, G4BWV, 49 School Lane, Horton Kirby, Dartford, Kent DA4 9DQ.
DENBY DALE: J. Clegg, G3FQH. 8 Hillside, Leak Hall Lane, Denby Dale, Huddersfield HD8 8QZ.
DERBY: Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. *(0332 556875)*
DUDLEY: N. Rock, G3RLY, 28 Conway Avenue, Kingswinford, Staffs. *(Kingswinford 277617)*
ECHELFORD: A. H. Othen, G8FSZ, 5 Millan Close, New Haw, Weybridge, Surrey KT15 3NP.
EDGWARE: H. Drury, G4HMD, 11 Batchworth Lane, Northwood, Middx. *(Northwood 22776)*
EXETER: G. Draper, 1 Carlyon Close, Heavitree, Exeter EX1 3AZ. *(Exeter 37170)*
FARNBOROUGH: I. Ireland, G4BJQ, 118 Mychett Road, Mychett, Camberley, Surrey. *(Farnborough 543036)*
FINGAL: G. Birkhead, EI9DZ, 103 Roselawn Road, Castleknock, Co. Dublin.
GLOUCESTER: A. J. Martin, 12 Redwood Close, Podsmead, Gloucester.
G-QRP: Rev. G. C. Dobbs, G3RJV, 17 Aspen Drive, Chelmsley Wood, Birmingham B37 7QX. *(021-770 5918)*
GREATER PETERBOROUGH: F. Brisley, G4NRJ, 27 Lady Lodge Drive, Orton Longueville, Peterborough. *(0733 231848)*
HARROW: C. D. Friel, G4AUF, 17 Clitheroe Avenue, Harrow, Middx. HA2 9UU. *(01-868 5002)*
HASTINGS: G. North, G2LL, 7 Fontwell Avenue, Little Common, Bexhill-on-Sea. *(Cooden 4645)*
HAVERING: A. Negus, G8DQJ, 17 Courtenay Gardens, Upminster, Essex RM14 1DH. *(Upminster 24059)*
HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. *(Hereford 273237)*
IPSWICH: J. Tootill, G4IFF, 76 Fircroft Road, Ipswich, Suffolk. *(0473 44047)*
I.R.T.S.: S. Nolan, EI7CD, 68 Ratoath Estate, Ratoath Road, Dublin 7.
ISLE OF MAN: J. D. Melling, GD4MNS, The Round House, Ballamoar Castle, Ballamoar, Jurby, Isle of Man.
KIDDERMINSTER: A. F. Hartland, G8WOX, 22 Granville Crescent, Offmore Farm, Kidderminster. *(Kidderminster 61584)*.
LINCOLN: Mrs. P. Rose, G8VRJ, Pinchbeck Farmhouse, Mill Lane, Sturton-by-Stow, Lincoln LN1 2AS.
MEDWAY: P. J. Poole, G4EVY, 5 River Drive, Strood, Rochester, Kent ME2 3JW.
MIDLAND: N. Gutteridge, G8BHE, 68 Max Road, Quinton, Birmingham *(021-422 9787)*
MID-WARWICKSHIRE: Mrs. C. Finnis, G6LKP, 37 Stowe Drive, Southam, Warks. CV53 0NZ. *(092681 4675)*
NORTH DEVON: H. G. Hughes, G4CG, Crinnis, High Wall, Sticklepath, Barnstaple, Devon EX31 2DP.
NORTH WAKEFIELD: S. Thompson, G4RCH, 3 Harlington Court, Morley, LS27 0RT. *(0532 536603)*
R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 9 Rannoch Court, Adelaide Road, Surbiton KT6 4TE.
REIGATE: C. S. Barnes, G8FEE, 25 Hartswood Avenue, Woodhatch, Reigate, Surrey RH2 8ET.
ROYAL NAVY: M. Puttick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants. PO8 8SQ. *(Waterlooville 55880)*
ST. NEOTS: S. Foote, G4FOH, White Knights, 10 Old Farm Close, Needingworth, Huntingdon PE17 3SG.
SOUTHDOWN: T. Rawlance, G4MVN, 18 Royal Sussex Crescent, Eastbourne.
SOUTH ESSEX: D. V. Pritchard, 55 Walker Drive, Leigh-on-Sea, Essex.
SPALDING: I. Buffham, G3TMA, 45 Grange Drive, Spalding, Lincs. PE11 2DX. *(Spalding 3845)*
STC (Sidcup): P. J. Poole, G4EVY, 5 River Drive, Strood, Rochester, Kent ME2 3JW.
STEVENAGE: T. Bailey, G6CRF, 187 Archer Road, Stevenage, Herts.
STOURBRIDGE: M. Davies, G8JTL, 25 Walker Avenue, Quarry Bank, Brierley Hill. *(Lye 4019)*
SUNDERLAND: A. Everard, G8PCD, 19 Roker Park Road, Sunderland, Tyne & Wear.
SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR. *(01-642 9871)*
SURREY POLICE: R. J. Hook, G8LVB, c/o Operations Room, Surrey Police Hq. Mount Browne, Sandy Lane, Guildford, Surrey GU3 1HG.
SUTTON & CHEAM: G. Brind, G4CMU, 26 Grange Meadow, Banstead.
THAMES VALLEY: J. Axe, G4EHN, 65 Ridgway Place, Wimbledon, London SW19 4SP. *(01-946 5669)*
THANET: I. B. Gane, G4NEF, 17 Penshurst Road, Ramsgate, Kent. *(Thanet 54154)*.
TORBAY: Mrs. M. Rider, 7 Kingston Close, Kingskerswell TQ12 5EW. *(08047 5130)*
UK FM GROUP (SOUTHERN): T. Emery, G3KWU, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL.
UK FM GROUP (WESTERN) G. L. Adams, G3LEQ, 2 Ash Grove, Knutsford, Cheshire WA16 8BB.
VALE OF WHITE HORSE: I. White, G3SEK, 52 Abingdon Road, Drayton, Abingdon, Berks. *(0235 31559)*
VERULAM: E. Bailey, G4KLQ, 50 Bettespow Meadows, Redbourn, St. Albans, Herts. AL3 7EW. *(Redbourn 3291)*
WACRAL: L. Colley, G3AGX, "Micasa", 13 Ferry Road, Wawne, Hull HU7 5XU.
WEST KENT: P. Reeve, G4GTN, 2 Court Road, Tunbridge Wells, Kent. *(Tunbridge Wells 24689)*
WORCESTER: A. G. Lindsay, G4NRD, 11 Durcott Road, Evesham, Worcs. WR11 6EQ *(Evesham 41508)*
WORTHING: Mrs. J. Lillywhite, 41 Brendon Road, Worthing, Sussex BN13 2PS.
YEOVIL: A. Denning, G4BJH, 19 The Park, Yeovil. *(0935 23873)*.
YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

Chichester, is the home of the **Chichester** crowd; they have a meeting there on June 7, and on June 16 they have the annual club barbecue evening up on Trundle Hill, Goodwood.

Every second and last Wednesday sees a gathering of the **Chiltern** group, in the Science Block of the Sir William Ramsey School, Hazlemere, High Wycombe, and all are welcome.

June 9 at **Colchester** is down for a talk on RAEN, and on June 23 they have a chat by G3FIJ on the amateur satellites; both are at the Colchester Institute in Sheepen Road.

The **Cornish** P.R.O. is a young man of sixteen, who sent us the details of the results of the AGM — he now has lumbered himself with three offices! Somebody should explain the meaning of the word 'NO' that the YLs use . . . The June meeting is on 2nd and features G3NPB on repeaters and the difference in use between various ones. As usual it will be at the SWEB Clubroom, Pool, Camborne.

The **Crawley** newsletter doesn't want to let us into the secrets of their meetings for June — so we must refer you to the Hon. Sec. for the detail. The venue is Trinity Church Hall, Ifield.

The same goes for **Cray Valley** — but no doubt the Hon. Sec. will be pleased to give you all the details if you care to contact him — *see* Panel.

After some 35 years of service, the **Crystal Palace** club is to pension off its old duplicator in favour of a new one, in the hopes of clearer reading. The meetings are always given in the newsletter — third Saturday in the month, All Saints Parish Room, Upper Norwood, which is at the junction of Beulah Hill and Church Road, opposite the old ITA mast.

The **Dartford Heath D/F** crowd have their Hq at the "Malt Shovel" at Eynsford, where they meet four days before a Sunday hunt — the snag is we don't know the dates for hunts, which will be settled by the new committee elected at the AGM. Hence — refer to the Hon. Sec; *see* Panel for his details.

June for **Denby Dale** naturally centres round the Pie Hall which

is their Hq; June 8 is a talk on home brew equipment, June 15 the final pre-Rally meeting, then the **Denby Dale Mobile Rally** on June 19. June 22 is the Rally inquest (a great help to programme organisers, these rallies!) and on 29th there is a trip to Moorside Edge TV station.

Every Wednesday evening sees the **Derby** crowd heading for the club Hq on the top floor of 119 Green Lane. June 1 is a junk sale, and on June 8 they have a talk and demonstration of narrow-band television. G3SZJ takes the 15th with RSGB as his theme, while on 22nd they have a night on the air. June 29 rounds it off nicely with the club barbecue at Drum Hill, Little Eaton, which lies just north of Derby. On a different tack we hear that G2CVV has been under the weather after so many years as Hon. Sec. (and other offices, locally and nationally!) and we hope to hear he is well on the mend before long. In fact we only recall the club having two Hon. Secs. — G2CVV and G4EYM — since WW2!

We head now for **Dudley** which means second and fourth Tuesdays at Dudley Central Library. More details from the Hon. Sec. — *see* Panel.

A new Hon. Sec. takes over at **Echelford** after the AGM, and his details are in the Panel. Meetings are on the second Monday and the last Thursday in each month, at the Hall, St. Martins Court, Kingston Crescent, Ashford, Middx.

At **Edgware** they have a talk on crime prevention by local Police and on 23rd there is an informal. The venue is as always the community centre of 145 Orange Hill Road, Burnt Oak, Edgware, Middx.

In addition to the monthly 'proper' meeting, the **Exeter** crowd have weekly sessions, on Mondays, at the Scout Hut, Emmanuel Road, St. Thomas, Exeter. The main meeting in June is in fact an away game — a multiway quiz game with Torbay, Plymouth and Exeter University clubs, at Torbay.

Now **Farnborough** seem to be a bit ahead, as they have sent us August's details! However, we also have the June stuff — June 8, for a talk on HF aerials, and June 22 for a VHF NFD preview.

Every Monday evening sees the **Fingal** club, gathering at the Scout Hut, Ballygall Road, East, Dublin 11, for various activities: they run theory and Morse classes for the examination, lectures and film shows, regular junk sales, and soon there will be a QRF construction project. Visitors are welcome, and refreshments are served during the evening.

At **Gloucester** the group are to be found on most Wednesdays at St. Barnabas Hall, Stroud Road, Gloucester.

We come next to the **G-QRP** Club, where the rate of growth has been quite phenomenal — over 2000 members on the books now. If you are interested in low power amateur radio, or home-brew gear, from a rig to an aerial or accessory, this is the one for you. Details from the Hon. Sec. at the address in the Panel.

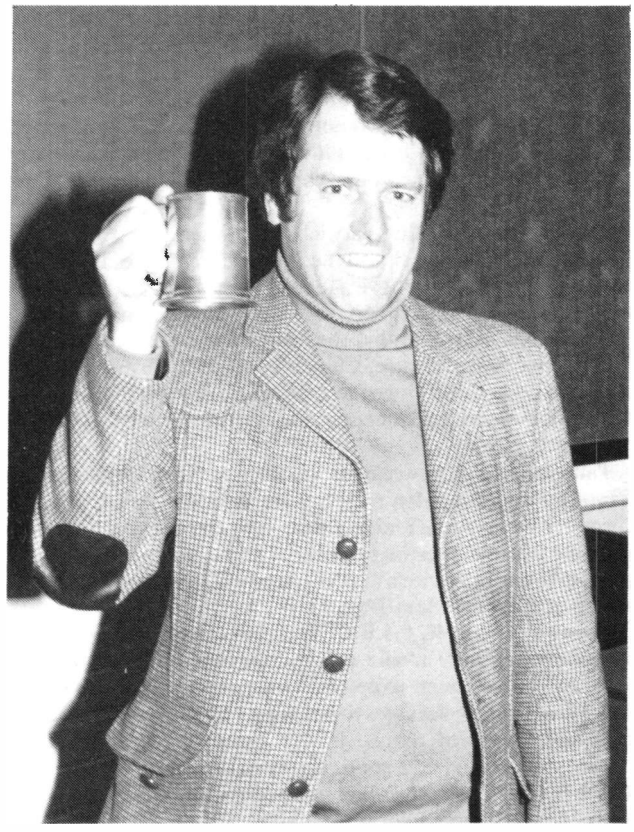
The **Greater Peterborough** crowd will be in session on June 23, at Southfields Junior School; details were still not entirely settled when they wrote but sound potentially very interesting.

The **Harrow** newsletter tells us that they are to be found on Friday evenings at Harrow Arts Centre, High Road, Harrow Weald, either in the Belmont or the Roxeth Room.

The **Hastings** group goes from strength to strength; they are to be found on any Friday evening at Ashdown Farm Community Centre; they have RAE and Morse there on Tuesdays, too. Bits of the club foregather there on most Monday evenings, but on the third Monday evening they all go to West Hill Community Centre for the main meeting of the month; June 18 is the Summer Social. Note the two different venues — it's awful easy to go to the wrong one!

At **Havering** they arrange to deliver their data in person, and the sheet says they have informals on June 1, 15, and 29, with a D/F Hunt on June 8, and a pre-VHF NFD briefing on June 22. All are at Fairkytes Arts Centre, Billet Lane, Hornchurch, Essex.

For **Hereford** it seems there is a 'finding them' problem at the moment; it seems the Fire Department looked over the place they have, and declared it unsafe as it only had one door! That must make almost every public room available for social activities in the U.K. unsafe . . . But, rather than put 'the man' under a cold water tap until he recovers his senses(!) the gang have accepted it in the interests of their long-term Hq, and so for the moment they are homeless. We suggest you contact the Hon. Sec. for the latest 'state of play' if you wish to join up with this go-ahead club.



Robin Powell, G3OGP, winner of the Thames Valley A.R.T.S. Meaden Trophy, which was awarded to him at their recent AGM.
photo by G3JNB

Ipswich are to be found on Wednesdays at the "Rose & Crown", on the junction of A45 Norwich Road and Bramford Road, every Wednesday evening.

Over the water again, this time to **I.R.T.S.** This is the place for all the details on what goes on in Eire, both in the local clubs and nationally. Details from the Hon. Sec. — *see* Panel for his address.

Part of the way back, and we come to the **Isle of Man** and this means every Monday evening at the Keppel Hotel, Creg-ny-Baa; they alternate between social evenings and more formal activity sessions, and they welcome visitors, especially visitors who can give them lectures! Details from the Hon. Sec. — *see* Panel.

The June 7 date for **Kidderminster** is down for G3PGQ to talk about aerials, while the meeting on June 21 was still not finalised at the time of their letter. In between they have a special-event station, on June 11; it is for someone's bicentenary — but the only word we can't read is the vital one! They are at Aggborough Community Centre, Hoo Road, Kidderminster on the dates given, and they have also a Morse class running on Wednesdays. More details from the Hon. Sec.—*see* Panel.

If you want to join the **Lincoln** club, head for the City Engineers' Club, Central Depot, Waterside South, Lincoln; On June 8, Lincolnshire Police give a talk on drugs, and on June 22 there is a night-on-the-air.

Over now to **Medway**, where they are based in the number one hall, St. Luke's Church, King William Road, Gillingham. June 3 is down for a film evening, and on 24th they have a junk sale. On the other Friday evenings they will be putting the club station on the air.

Turning to **Midland** they have their own place at 294A Broad Street, Birmingham. On Monday evenings there is a 'working party', which we believe is occupied in setting the place to rights, the third Tuesday in each month is the club main meeting, Wednesdays are Morse class and natter sessions, Thursdays HF nights-on-the-air, and Fridays the RAE class. Weekends are for more working parties or contesting. June 21 should bring 'em in — it is a junk sale.

Not far away is **Mid-Warwickshire,** where the Hq is at 61 Emscote Road, Warwick, on the first and third Tuesday of each month. On June 7 they have a talk on aerials and feeder systems, and on June 21 an Open Meeting — go along and have a chat.

During the even months, the **North Devon** crowd go to the Pilton Community Centre, Chaddiford Lane, Barnstaple; if the month is odd, then the venue is Bideford Community College, Abbotsham Road. In either case, it is on the fourth Wednesday in the month.

Thursday evenings weekly is the form at **North Wakefield,** at Carr Gate Working Men's Club; unfortunately our list of events doesn't extend far enough ahead, but we have it that they alternate formal meetings (lecture, films, or whatever) with informals. We do notice a visit in June, on 23rd, when they will be visiting the Holme Moss TV station.

Now we come to **R.A.I.B.C.** This club caters for those among our number who are invalid or blind; the object is to start them in SWL and in due course to get them fully licensed and active; or in the case of existing licensees to keep them on the air, as well as the more social side of things. If you know of someone in that category, you could do a good turn by putting them in touch with R.A.I.B.C. On the other side of the coin, of course, they need supporters, and representatives, through whom it all happens; and of course fund-raising activities are a help too. Details of it all from the Hon. Sec. — *see* Panel for her address.

The new *Datong Electronics Ltd.* Model PTS-1, shown above, adds selective calling to existing 2-way FM radio systems and is aimed primarily at CB users who want to monitor for a specific call but do not want to listen to the multitude of other signals that abound on the 40 channels available. With Model PTS-1 installed, the radio receiver remains silent until the desired call is received; this is particularly useful to people who use radio for business purposes, local emergency networks, family communications, farming, club nets, or any application where long-term monitoring of a channel is required without the need to listen to every other conversation and noise on the channel in the meantime. Installation is simple, and a comprehensive set of instructions is supplied with each unit. Model PTS-1 cost £45.99 inc. VAT, and full details are available from Datong Electronics Ltd., Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE. (Tel: 0532-552461).

Deadlines for "Clubs" for the next three months —

July issue — May 27th
August issue — June 24th
September issue — July 29th
October issue — August 26th

Please be sure to note these dates!

June 21 is going to be of interest to the **Reigate** group, as G3OLM is going to 'bonsai' aerials for them — HF aerials down to 3 GHz! This will be at the Upstairs Meeting Room, Constitutional and Conservative Centre, Warwick Road, Redhill, Surrey.

Royal Navy next, and here we must say what a pleasure it is to read their well-produced newsletter, with letters from members throughout the world. Details from the Hon. Sec. — *see* Panel.

St. Neots next, and here the venue is the Horseshoe Inn, Offord Darcy, near Huntingdon. They will be there on June 13 for a talk on Six Metres by G4BAO, and on June 30 they have a visit to the linear accelerator at Addenbrookes Hospital, Cambridge. Details from the Hon. Sec. — *see* Panel.

There seems to be a crowded June for the **Shefford** gang, based on the Church Hall, Ampthill Road, Shefford. Thursday, June 7, is down for a post-NFD. On June 14 they have a demonstration on radio for the blind at Sawbridgeworth, and on 16th a talk about a DX-pedition to Monserrat by G3VZT. June 23 is set aside for pre VHF NFD planning, plus a talk on tuning the FT-221 by G4DRS, and, provisionally, there will be "More Test Equipment" on June 30.

Southdown have a talk by G5CRD on North American licensing, on June 6, at The Chaseley Home for Disabled Ex-Servicemen, Southcliff, Eastbourne.

South Essex was only formed last autumn, but already they have over 100 members, and a very good newsletter. The venue is the Paddocks Community Centre, on Canvey Island, where they gather every Wednesday evening.

June 5 sees the **Spalding** Mobile Rally, at Sprigfields, with a talk-in on S22 and SU8. At the rally there are all the usual attractions plus some 25 acres of gardens to look at. June 10 is to be a natter night, at the "White Hart", Market Place, Spalding.

We turn now to a letter from G4EVY, who writes to tell us that he is the custodian, on behalf of the STC Sports & Social Club, of the callsign G4STC, issued to STC Business Systems, Maidstone Road, Sidcup. This year is the centenary of STC, and they hope to activate the call several times during the year.

Nowadays the **Stevenage** gang foregather at *T.S. Andromeda,* Fairlands Valley Park, Shephall View, Stevenage. On June 7 they have Sgt. Harris on the subject of Crime Prevention, and on June 21 G8WWI will talk about fastscan TV.

June 6 is an informal meeting for **Stourbridge**, and on June 20 they have a main meeting with the subject to be announced. Both will be at "The Garibaldi", Cross Street, Stourbridge.

Looking at the **Surrey** newsletter, we don't have any indication of June's doings at *T.S. Terra Nova,* 34 The Waldrons, where they are to be found on Mondays twice in each month. Thus for the exact details we must refer you to the Hon. Sec. — *see* Panel.

The **Surrey Police** club has now been in existence for three years and has some 34 members. They have now gone a little further with their own club call, G4SPF, and are sponsoring an award called the All-Surrey Award. Details from the Hon. Sec. — *see* Panel for his details.

We now turn to **Sutton & Cheam**, where they get together at Sutton College of Liberal Arts on June 10, and on June 24 they

Joan Heathershaw, G4CHH, on the occasion of her recent talk on RAYNET to York A.R.S. With her are, left, club chairman Chris Rouse, G4ESU, and Miles, BRS33736, who is controller of York & District RAYNET Group. *photo by G4EMA*

will be at Carshalton Sea Cadets Hq, Church Path, Beddington, which is near Cardew Manor School. As they were just coming up for the AGM when they wrote, no doubt the incoming committee will be fixing something up to cover these meetings.

A treat is in store for the **Thames Valley** members on June 7, when they will be listening to G3VA giving his talk "Clandestine Radio", at Thames Ditton Library meeting room, Watts Road, Giggs Hill, Thames Ditton, Surrey.

Off we go now to **Thanet** after our session in Surrey; here the venue is the Grosvenor Club, Grosvenor Place, Margate (although they didn't say so!), and on June 14 they have a junk sale. The Annual Picnic is on June 19, and on June 28 they have a video show and business meeting.

On August 28 there is the **Torbay** Rally, as usual at the STC Social Centre, Old Brixham Road, Paignton. As far as the club itself is concerned, they are based on Bath Lane, rear of 94 Belgrave Road, where they can be found on Friday evenings, plus the 'main' session on the last Saturday evening each month for business and a talk.

Now we turn to **UK FM Group (Southern)** who are in session on the first Wednesday in each month at Chineham House, Shakespeare Road, off Popley Way, Basingstoke. For the details of the programme, we must this time refer you to the Hon. Sec. — but we understand that in future we will be receiving regular programme details.

UK FM Group (Western) have their meetings on the first Thursday in the month at Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Warrington. This group looks after many repeaters in their area of interest, and put out an interesting newsletter, too.

The **Vale of White Horse** crowd are all over the IRAS tower and aerial which have been put up by the Appleton Laboratory on their pet VHF site, but at least they are philosophical about it and the value of what is being obtained from IRAS. The group are headquartered at the Club Room, The White Hart Inn, Harwell Village, where they can be found on any Tuesday.

The **Verulam** chaps now have all their meetings at the R.A.F.A., New Kent Road, St. Albans, where they seem to be using second and fourth Tuesdays of the month.

The **WACRAL** group is a world-wide group of radio amateurs and SWLs who are also committed Christians. Details from the Hon. Sec. — *see* Panel for his details.

At **West Kent** they have, on June 10, a talk on "Text Communication from Teleprinter to the Computer Age" by G8CAA, and on June 24 the second part of G4DRV's talk. Both these are at the Adult Education Centre, Monson Road, Tunbridge Wells.

The **Worcester** chaps intend us to make no mistake — there's a letter listing it all out in detail. Thanks! June 6 sees them at the Oddfellows Club in New Street, Worcester, for a talk on CW operating; and on June 20 they have the informal at the "Old Pheasant" in New Street, for a natter and a pint.

After a bit of a hunt, we found the **Worthing** programme hidden away on one of the back pages of the newsletter; from it we find they have G4BUE on QRP on June 7, June 14 sees G6AIW on technology in medicine, June 21 is one of their evening mobile rallies, and on June 28 they will round off the month with the "World at their Fingertips" tape lecture.

At **Yeovil** the locals have their headquarters at Milford Recreation Centre, Milford Park, Yeovil; it is here on June 2 that G3MYM will be talking about Great Circle propagation maps, and on 9th he will talk about the global distribution of ionisation. June 16 sees G3MYM working again, doing the briefing for the club's chordal hop tests on June 21. G3GC takes over the hot seat on June 23, when he will be talking about wind loading, and on June 30 the month is rounded off with a natter evening.

Finally, **York** where the group is to be found at the United Services Club, 61 Micklegate every Friday evening.

Finis

That's the lot for this time. The dates for the next few months are in the 'box', and are for the *arrival* of your news, which should be addressed to: "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ.

More Mobile Rallies

July 17, Sussex Mobile Rally at Brighton Racecourse, ample free parking, trade stands, bring-and-buy, full range of family attractions, doors open 10.30 a.m., admission £1 (children and disabled free), talk-in on S22 and 80m. Advance tickets for clubs can be obtained for 80p from Miss W. Firmager, Flat 2, 23 Chatham Place, Brighton, Sussex. **August 28,** Torbay Rally, at the ITT Social Centre, Old Brixham Road, Paignton, free parking, hot meals and bar, trade and used equipment stands, RSGB bookstall, Grand Draw, talk-in on S22 from 10 a.m.

HC1JB for WCY '83

As part of its contribution to the celebration of 'World Communications Year 1983', Ecuadorian radio station HCJB will be operating an amateur radio station on the 11th and 12th of June. The callsign for the station will be **HC1JB** and all transmissions will be on SSB on the 10-80m. bands, to the following schedule: 0000 UTC 11th June until 2359 UTC 12th June, 1983; 28545 kHz, 24 hours a day; 21445 kHz, 0000-1700 and 2300-0000 on both days; 14245 kHz, 0900-0000 daily; 7045 kHz, 24 hours a day. HC1JB is also hoping to work through *Oscar 8* on CW. A special QSL card will be issued for all contacts and for all correct reports from SWL's accompanied by one IRC. Reports should be sent to: HC1JB, Casilla 691, Quito, Ecuador.

Re-Launch of Historic Callsign

2MT, the callsign used to introduce Britain's first scheduled radio entertainment broadcast, will be heard once more later this year, on the amateur bands, after a 60-year break in transmission. Home Office approval has been granted to Marconi Radio Society to use the callsign G2MT, which will be first heard on the air at 1200 BST on 2nd July, 1983.

THE "WHITFIELD" SSB/CW/QSK TRANSCEIVER, PART IV

AN EASY-TO-BUILD, 5 WATTS OUTPUT, MODERN DESIGN COVERING 160 METRES, 80 METRES, AND 3 – 3.5 MHz

IAN KEYSER, G3ROO

THIS time we are going to cover the Tx mixer PCB and the PA PCB. This will allow an RF output to be obtained — and perhaps even a contact or two with the rig sprawling all over the place! I always like to do this as soon as possible as it gives me renewed 'go' to get on and finish the project; after working so long at it I find enthusiasm wanes a bit.

First to recap what we have got so far. The receiver should now be working on all three bands, plus an output from the VFO board for the transmitter mixer, which is adjustable; we also have a low level signal (SSB) from the receiver PCB. In the transmitter mixer PCB we have to mix these two signals together for SSB, filter out the required signal and amplify it to a suitable level to drive the PA PCB; for CW use the SSB signal is replaced by a keyed 455 kHz signal which is also generated on this PCB. The output from Q4005 is about 100mW. and therefore at quite a realistic level to try your first contact with a local friend.

Tx Mixer Circuit and Tuned Amplifier

The VFO signal and the low level 455 kHz SSB signal are fed into the transmitter mixer, IC4001, *via* DC blocking capacitors C4001 and C4002, *see* Fig. 14. As in previous circuits we use here 0.01 μF disc ceramic capacitors as they are small and have sufficiently low reactance at these frequencies. Pin 4 of IC4001 is the supply input and this is decoupled by C4005. The supply needed for the SL641 is only six volts and so a voltage regulator, Reg 4001, is used to reduce the + 12v. shaped supply (more of that later when we come to the Tx/Rx control PCB) to the required 6v.

The output from the Tx mixer is tuned by the circuit formed by T4001, VC4001*a* and C4008. C4008 performs the dual function of decoupling the supply line and completing the resonant circuit. Q4001 is used as a variable gain tuned amplifier covering the frequency span 1.7 to 4.0 MHz in one range. The signal from the input tuned circuit is coupled into gate 1 by C4006 (yes, you've guessed right at 0.01 μF!) and R4005 is the DC return for the gate. R4002 and R4003 set the bias for gate 2 and C4007 for decoupling. The drain is tuned by T4002, VC4001*b* and C4009, and the signal passed to the driver stage by the link winding.

There are two further components in this section which are very important, they are R4013 and RV4001. The balance of the SL641 can be considerably improved by the use of external balancing and

Table of Values
Fig. 14

R4001 = A.O.T., *see* text.
R4002 = 68K
R4003 = 82K
R4004 = 470R
R4005 = 680K
R4006, R4009, R4014 = 220R
R4007 = 10R
R4008 = 82R
R4010 = 6K8
R4011 = 100R
R4012 = 47R
R4013 = 22K
R4015 = 470K
R4016 = 1K
R4017 = 47K
R4018 = 150K
R4019 = 330R
VR4001 = 25K lin.
RV4001 = 47K min. preset
C4001 to C4015, C4017, C4019 = 0.01 μF d/c
C4016 = A.O.T., *see* text
C4018 = 220 pF, poly
C4020 = 0.1 μF, C280
VC4001 *a* & *b* = 2 × 360 pF, ex-BC Rx
Reg 4001 = 78L06
Q4001 = 40673 Mosfet
Q4002, Q4004, Q4005 = BC107
Q4003 = 2N3866
IC4001 = SL641
T4001, T4002 = KANK – 3333R, *Toko* coil

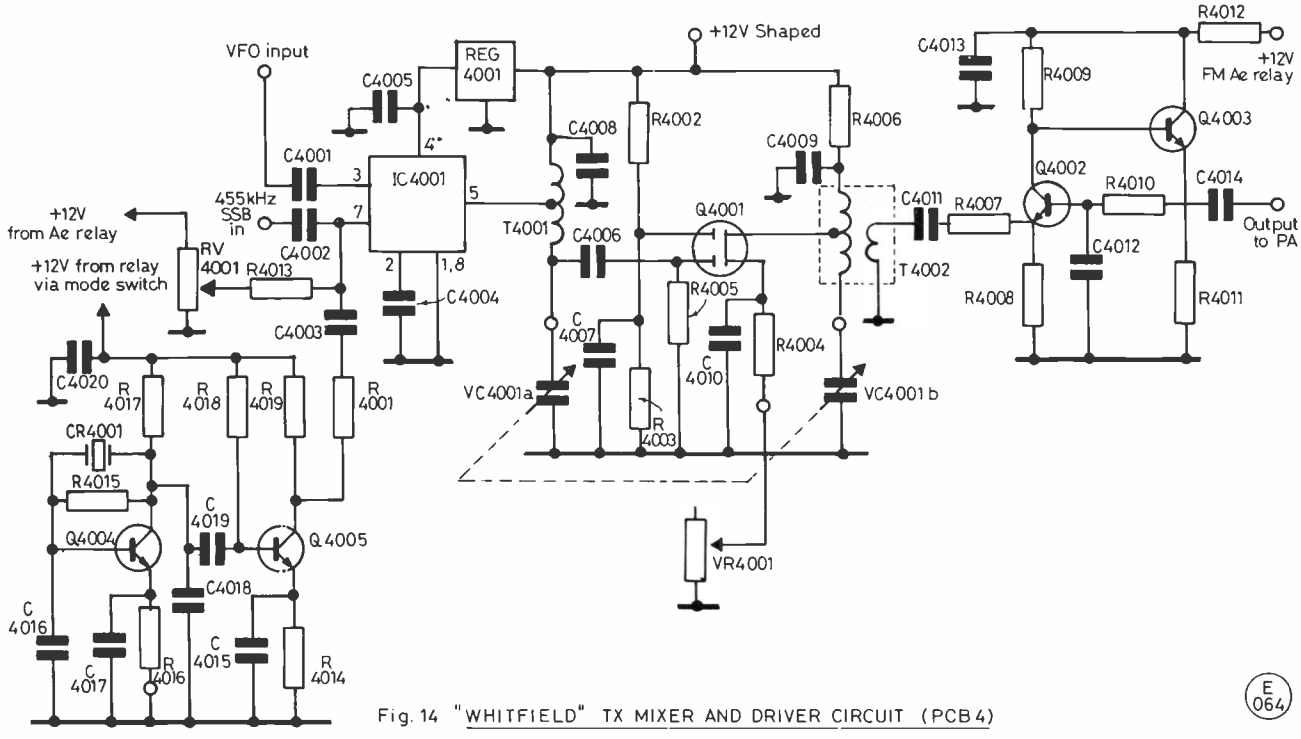


Fig. 14 "WHITFIELD" TX MIXER AND DRIVER CIRCUIT (PCB 4)

E 064

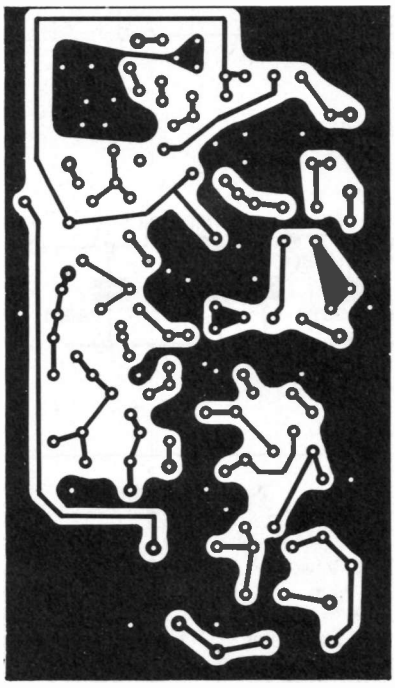


Fig.15 "WHITFIELD" TX MIXER DRIVER (PCB4) FOIL SIDE

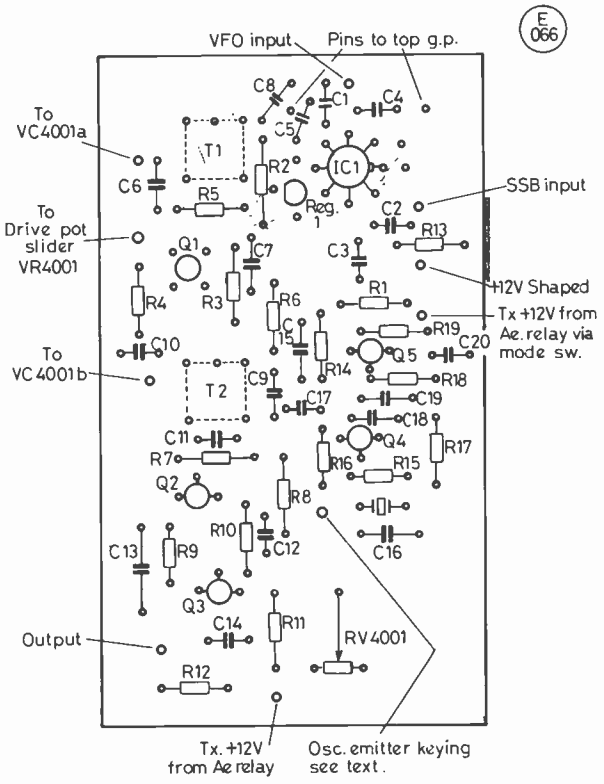


Fig.16 "WHITFIELD" MIXER DRIVER (PCB4) COMPONENT LAYOUT

these two components provide this. The problem is that the VFO signal lies in the passband of the tuned amplifier and it would be very easy to select this signal when tuning up. It is a simple matter to tune to the unwanted signal and adjust the preset until the signal disappears into the noise!

The Driver Stage

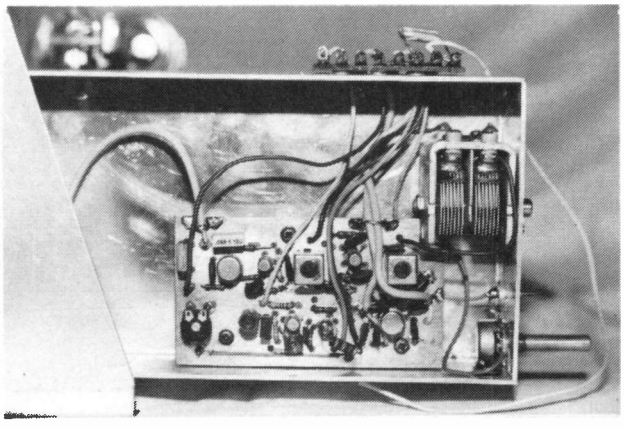
This design was first evolved a few years ago when I was rebuilding my FRG-7 *trans*ceiver. The requirement was for a wideband amplifier with about 20dB gain and a low output impedence. The two transistors Q4002 and Q4003 supply this without problem and, being DC coupled, the circuit is very tolerant of variable transistor parameters. Q4002 forms a grounded base amplifier, the base being decoupled by C4012, and Q4003 acts as an emitter follower; the DC voltage across R4011 is used as the input stage bias with R4010 as the current limiter. I have used this in many designs over the last few years with no trace of stability problems — providing that the supply filter of R4012 and C4013 is included. In fact I am convinced that the majority of stability problems that would-be constructors have can be traced to badly decoupled supplies.

Digressing a bit, but to prove a point, a year or so ago one of the G-QRP members sent me a SSB exciter he had built asking if I could spare a while to find out why it was giving out a very nice DSB signal. What he had done was to run the post-filter amplifier from the same rail as the double balanced modulator and decoupled it with a 10μF electrolytic . . . all that was needed was a 0.1μF across the 10μF and success was his! The reason for this was that the insertion loss of the filter being high, and the DBM leaking a lot of signal onto the supply line and this in turn being coupled into the base of the post-amplifier, the SSB signal from the filter was being swamped. The 10μF electrolytic, although fine for removing the audio signal impressed onto the supply by the microphone stages, had much too much internal inductive reactance to do anything worthwhile to the 1.6 MHz rubbish. The reactance of the 0.1μF was about 1 ohm and so provided an almost short circuit to the RF signal.

Keyed CW Oscillator

To get a good shaped CW signal it is necessary to firstly turn on all the signals required to produce the transmitted signal and then amplify them so that the signal builds in amplitude on 'key down', and dies in amplitude on 'key up'. In a break-in system this is a little more complex as it is necessary to ensure that all supplies are held, including that to the aerial relay, until the signal has reduced to zero otherwise a click will be generated. The problem with keying an oscillator, even a ceramic resonator controlled one, is the problem of chirp and click. This can be cured by turning the oscillator on at the earliest possible moment and off at the latest possible moment. The shaping of the signal is done by increasing and decreasing the gain of an intermediate stage (in this case the mixer and tuned amplifier), so avoiding the transmission of the clicks. This sounds rather a tall order for a simple set, but in practice it is not too difficult and is carried out by the Tx/Rx control PCB.

The oscillator is a very simple arrangement and its setting up is almost haphazard in method. Q4004 forms the oscillator around the frequency-dependent element, CR4001. To set this on frequency the value of either C4016 or C4018 is changed to get the correct beat note (but that will be covered later in the final setting



The Tx mixer and driver PCB.

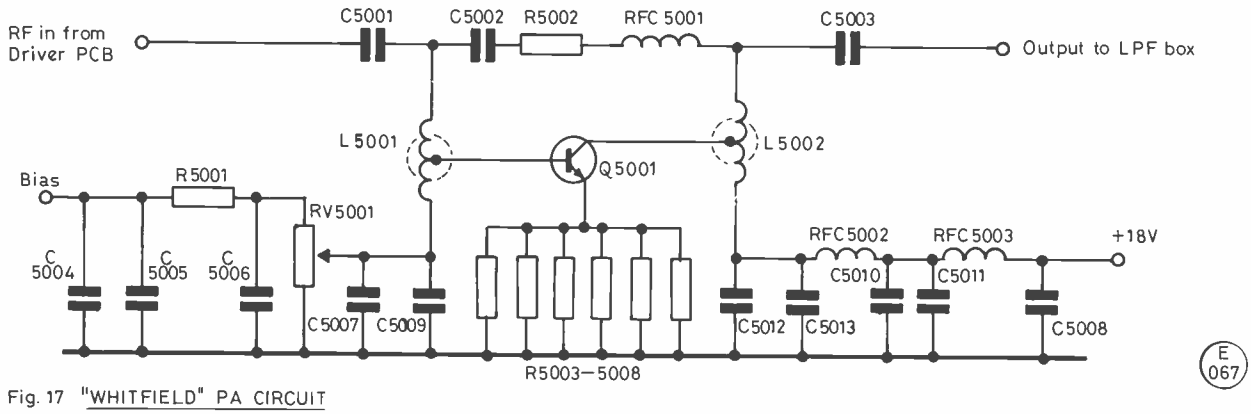


Fig. 17 "WHITFIELD" PA CIRCUIT

up procedure). Q4005 is used as an amplifier and buffer, and for keying of these stages the positive supply is taken from the + 12v. at the aerial relay *via* the mode switch on the front panel. You will no doubt notice that the emitter of Q4004 has been brought out to a pin: the reason for this is to allow flexibility in case, at a later date, we wish to do some modifications to the keying system. R4016 should be earthed at the top of the PCB for ease of access. The output from Q4005 is fed to pin 7 of IC4001, the signal input; C4003 acts as the DC block and R4001 as a simple attenuator to set the signal input on CW to the mixer. This will be also carried out in the final setting up procedure.

Setting-Up

This involves a little 'jury rigging' as the rest of the chassis wiring is not complete. The first step is to wire the VFO and SSB inputs into the mixer PCB and arrange a 12v. supply to the VFO, the SSB generator on PCB1, the + 12v. shaped supply, and the supply to the driver stages. Now loosely couple a general coverage receiver to the output on capacitor C4014.

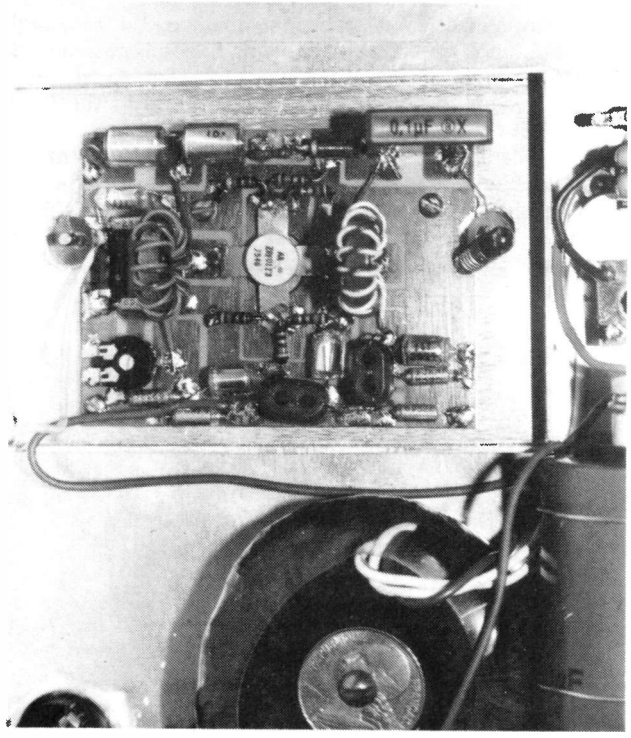
The first step in the tuning procedure is to tune the 'Whitfield' to 1.8 MHz and the general coverage receiver to the same frequency; by whistling into the microphone there should be no problem at all in hearing the signal. Leaving the 'Whitfield' on 1.8, now tune the GC receiver to 2.255 kHz and find the VFO signal, which should be strong, and adjust RV4001 for minimum amplitude. Return the receiver to 1.8 MHz and tune-in the 'Whitfield' signal — microphone noise should be very easily found and it will be necessary to reduce the RF gain of the GC receiver to stop feedback. Now fully mesh VC4001 and peak up T4001 and T4002 for maximum output; tune the 'Whitfield' and the general coverage receiver to 4.0 MHz and check that when VC4001 is peaked on this frequency (almost fully unmeshed) that there is not a double peak. If there is, it will be necessary to add a little capacity across the gang which is on the HF side of the two peaks; in the prototype this was not necessary as the difference was very slight indeed. Next remove the supply from the SSB generator and connect it to the supply pin for Q4004 and Q4005 to check out the CW oscillator. If all is well this will be audible on the general coverage receiver.

That is as far as the setting-up of the board can go; when we have the PA PCB completed we will be able to set up the levels of the signals.

Table of Values
Fig. 17

R5001 = 220R, ½w.
R5002 = 5K6, ¼w.
R5003 to R5008 = 4R7, ¼w.
RV5001 = 4K7 lin. preset
C5001, C5002, C5004, C5008, C5009, C5010, C5012 = 1 μF, 20v. tant
C5003 = 0.1 μF, 160v. poly
C5005, C5006, C5007, C5011, C5013 = 0.01 μF, 160v. poly
RFC5001 = 18 ins., 36 s.w.g., on ¼w., 10K resistor
RFC5002, RFC5003 = 4 turns, 26 s.w.g., on large ferrite bead
L5001, L5002 = 15 + 15 turns bifilar on T68 – 6 core
Q5001 = 2N5590

Note: *J. Birkett* stocks 2N5590's at about £4.75.

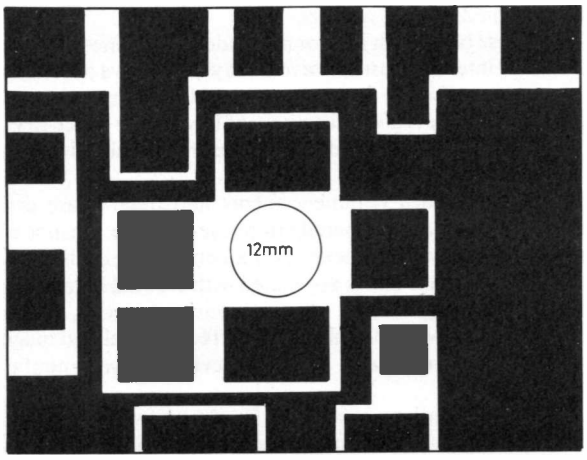


The PA PCB. Note the lamp for a crude dummy load; also the French coin holding the transformer!

The PA

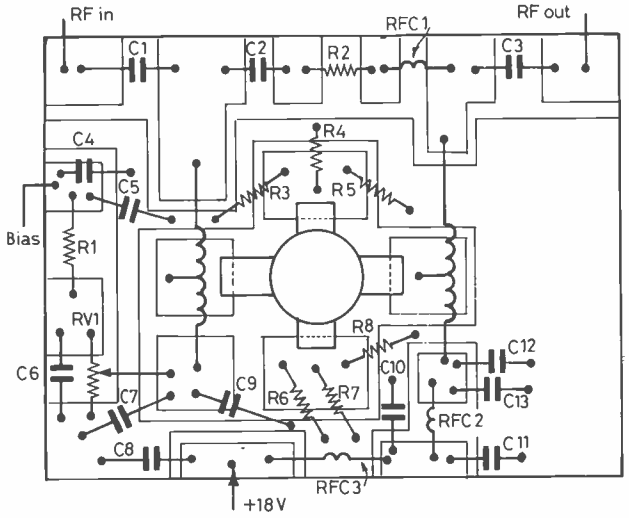
This stage (Fig. 17) is run in Class-A at 5W input, not the best mode for efficiency but the best for stability and simplicity in setting-up. There is the problem of the increased generation of heat, but this can be made acceptable by 'sandwiching' the PCB and heat sink on the backdrop of the case; by including the lid of a small box in this sandwich it is possible to make a very neat and efficient screened enclosure, and this can be seen in the photos of the PA and Tx module.

This board uses 'island' constructions — by that we mean that the board consists of islands of foil and the components are mounted on them with short legs. These islands can either be etched into copper laminate or may be fabricated using little pieces of PCB material 'superglued' onto a piece of laminate. In either case it is necessary to drill a large enough hole for the transistor to enable the collar to make good thermal contact with the heatsink assembly.



All components are surface mounted on this pcb

Fig.18 WHITFIELD PA PCB FOIL (E 068)



Components surface mounted on pcb.

Fig. 19 "WHITFIELD" PA COMPONENT LAYOUT (PCB 5) (E 069)

The original device used in the PA was a 2N5590, however you will notice that this is not the device in the photo. The reason being that, by mishap, I happened to allow + 12 volts to reach the base of the PA — so blowing it up! This was just a few days before John, G3YCV, was coming to take the photos and so I replaced it with another VHF device. This device works well, and I will no doubt leave it in to save the cost of a 2N5590!

The design of this stage as it stands is fairly flat in response up to 30 MHz. The reason for this is RFC5001 in the feedback circuit, which reduces the feedback at higher frequencies as its impedance increases. For this application it would be possible to replace this RFC by a link, but I have included it as no doubt someone will find the circuit useful in another application. The capacitor C5002 is in circuit for DC blocking, but where bias switching is not required this could be omitted, and the current that would flow through R5001 would become a component of the base bias.

L5001 and L5002 are 4-to-1 impedence transformers for transforming the input and output impedance of the device to give a reasonable match into 50 ohms. The emitter resistor is, in fact, a number of resistors in parallel to reduce the series inductance, the requirement being that the value should work out to be in the order of half an ohm.

Decoupling in this stage is very important. There are relatively high RF voltages inside this compartment which we do not want to have escaping into other parts of the circuit of the rig. For this reason the input supply is decoupled using two RF chokes; these consist of three or four turns on 'pig nose' ferrite transformer cores. However, if these are not available any ferrite ring will do as it is not critical.

Final Setting-Up of Tx Levels

We are now at the stage where we have RF out from the driver PCB and the PA built and mounted on the backdrop. The first level to set is the SSB, and for this we have to couple all the supplies as described earlier. In addition we need a supply for the PA. Take the bias supply from the 12v. rail and the collector supply from the 18v. of the smoothing capacitor of the PSU in use. If the supply is greater than this use a 12 volt supply instead, providing that it can supply the current. With a meter on the 1 amp. range in the collector supply and a dummy load on the output (a small 24v. lamp will do) adjust RV5001 for 500mA and leave it at that. It will be necessary to keep a watch on the temperature of the heatsink and if needs be remove the supply and allow it to cool. Now, with supply on, and the Tx drive control VR4001 set ¼-turn from minimum resistance, whistle into the microphone and the PA current should increase considerably. We are in fact overdriving the PA, and to set the level we now have to go to the SSB exciter and increase the values of R1019 and R1020 until the PA current increases to about 550mA with a good strong shout!

Now to set up the CW level. Disconnect the supply to the SSB generator and connect the + 12v, to the supply for Q4004 and Q4005; with the same settings of VR4001 and RV5001 adjust R4001 for 550 mA. This completes the setting up of the CW Tx.

As mentioned in the beginning of this part, it would now be an easy thing to construct simple switching to enable a QSO to take place. It was at this time that I did first tests with Dick, G2ACG. Modulation quality was good, and signal strengths S9 + 10 with the amplifier and S7 off the driver stage over a five-mile path. It must be remembered that the output has not yet been filtered and harmonics will be radiated, but with an ATU there would be considerable cleaning up of the signal — enough to allow a contact to be made without causing too serious a problem.

Next month we will cover filtering, and metalwork making the rig look like a rig!

to be continued

Correction: Referring to Figs. 4 and 5 (*Part II*, April issue, *pp.* 86-87), R1002 should read R1003; R1002 is missing on input to filter FL1001; C1030 should be connected to output of Reg 1005, not both sides earthed as shown; pins 1, 12 and 13 of IC1004 should be earthed; slider of S1b should be connected to C1020.

A 'JAMJAR' MAGNETOMETER

THIS ARTICLE REVIEWS THE PRINCIPAL DETAILS OF TYPICAL MAGNETIC STORMS, TOGETHER WITH RELATIONSHIPS BETWEEN MAGNETIC AND AURORAL ACTIVITIES. IT THEN DISCUSSES A SIMPLE METHOD OF ATTEMPTING TO OBSERVE MAGNETIC-FIELD DISTURBANCE AS A MEANS OF WARNING THE OBSERVER THAT THE AURORA MAY BE ACTIVE.

R. J. LIVESEY

This article appears here by kind permission of the JOURNAL OF THE BRITISH ASTRONOMICAL ASSOCIATION *and was originally published in their issue 1982,93,1*

The Magnetic Storm

THE Earth's magnetic field may be defined at any observatory by its horizontal-force component, *H*, the vertical-force component, *Z*, and its angle of direction, *D*, relative to that of true north. The strength and direction of the field may be altered temporarily by the generation of electrical currents in the upper atmosphere and in outer space surrounding the Earth due to solar activity. These currents produce their own magnetic fields which react with that of the Earth to form a net resulting field. Such disturbances cause changes in the values of *H*, *Z* and *D*. In broad terms they may be classified as follows:

(1) *Diurnal Variations*
Larger in summer, these daily changes are due to the tidal movement of ionized particles in the upper atmosphere backwards and forwards across the magnetic-field lines of force.

(2) *Crochets*
So called because of the shape of the disturbance traced on a magnetogram; they are found only on the daylight side of the planet. Crochets are brought about by increased ionization of the upper atmosphere due to the arrival of enhanced ultraviolet radiation from solar flares.

(3) *Sudden Commencements*
These comprise rapid increases in magnetic-field strength on both day and night sides of the planet; they are caused by compression of the magnetosphere surrounding the Earth by the arrival of a cloud of ionized particles shot out from an active region or flare on the Sun. These may or may not be followed by a main-phase magnetic storm.

(4) *Main-Phase Magnetic Storms*
These follow a sudden commencement and comprise a rapid diminution in field intensity, followed by a period of slow recovery to normal field conditions. They are due to increased ionization and resulting spatial electrical currents surrounding the Earth.

(5) *Magnetospheric Substorms*
Sometimes referred to as a bay due to its shape on a magnetogram, the substorm generally is a diminution of field intensity imposed during the recovery period of a main-phase storm. The sub-storm is associated with auroral activity and may repeat itself several times during the recovery period. It is brought about by auroral generating particles arriving from the tail of the magnetosphere.

(6) *Small Magnetic Storms*
These begin with little or no sudden commencement, are of low intensity, last for several days, and have a tendency to repeat at 27-day intervals associated with the rotation of the Sun. There is auroral activity of low profile which does not reach so far towards the equator as main-phase storm aurorae.

Crochets, sudden commencements and main-phase activity reach peak frequency generally in phase with the sunspot cycle. Small-storm activity reaches peak frequency in the declining years of the sunspot cycle and is associated with coronal holes. There is evidence to suggest that alternate sunspot cycles, being of magnetically opposite families, may affect auroral and magnetic disturbances on the Earth related to even and odd-numbereed cycles.

Magnetic disturbances associated with the visible aurora are greatest in effect at the Earth's surface immediately beneath the discrete auroral forms. The magnitude of the disturbance reduces equatorwards from the active auroral region. Certain auroral storms develop polewards from the auroral zone instead of equatorwards and in these circumstances magnetic disturbances related thereto may not be detectable by observatories at lower latitudes. It is also known for the field to become suddenly quiet and free from disturbance and for such periods to repeat themselves at 27-day intervals or thereby.

Measuring the Magnetic Field

Measurements of the magnetic-field components are conducted professionally with precision instruments in observatories where the effects of natural and man-made local 'noise' are minimized to a high degree in view of the small quantities that are to be detected. Notwithstanding the difficulties, the measurement of variations in the quantity *D* is a feasible proposition for an amateur investigator. Dr. Michael Gadsden in Aberdeen and Mr. David Pettitt both run recording flux-gate magnetometers that have contributed to the magnetic records of the Aurora Group. Mr. Karl Lewis in Cornwall operates a simple manually-read magnetometer which produced useful records of the great storms of October 20/21 and 22/23, when it was possible to correlate the timings of magnetic sub-storms with the appearance of auroral forms.

With the encouragement of Dr. Gadsden, the writer set out to investigate the possibility of simple magnetometry as a means of receiving early warning of possible auroral activity and to find out to what extent magnetometry might be an interesting study in itself for members unable properly to see aurorae due to geographic location, street lights or weather.

Will Ramsay, an engine-fitter of the old school, long-since deceased, once defined engineering to the writer as the art, not of

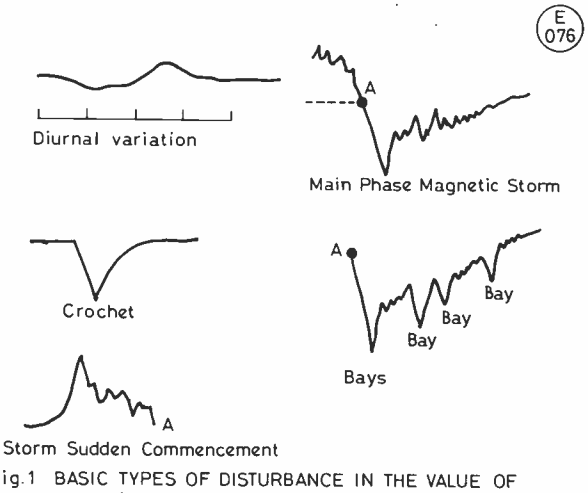


Fig.1 BASIC TYPES OF DISTURBANCE IN THE VALUE OF THE HORIZONTAL FIELD STRENGTH, 'H'.

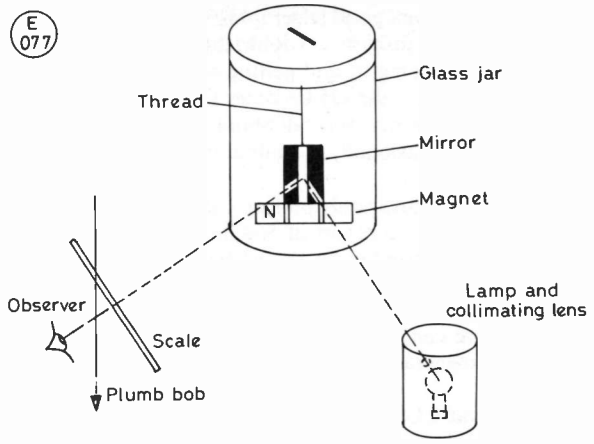


Fig. 2 THE "JAMJAR" MAGNETOMETER

making things, but of faking them out of nothing. The writer is also a firm believer in following first principles, especially along the historical path of their development. Put principles of science and a penchant for the chewing-gum-and-string approach together and 'jamjar' magnetometry was born. To be fair, the writer acknowledges the fact that Dr. David Gavine started to build his magnetometer before the one about to be described.

The 'Jamjar' Magnetometer

A small but powerful bar magnet 2cm. long was fitted into a copper wire carrier to which was glued a piece of glass mirror. The mirror surface was painted with matt black paint to leave only a thin vertical clear strip about 2mm. wide. The carrier was suspended by fine nylon monofilament thread inside an old glass jar, the thread being carried through a hole in the plastic screwtop, tied to a matchstick and glued to the top. Care was taken to ensure that the mirror was seen through the cylindrical barrel and not the curved bottom.

The whole assembly was rested on a wooden shelf glued to one side of the end wall in the garage. At a distance of 1.5m. and at the same level, an electric bulb was installed in an old paint tin. A collimating lens was fitted over a hole in the side of the tin to shine a beam of light on the mirror. At the other end of the garage at a distance of 5m, a horizontal metre-stick was supported on an old camera tripod. Care had to be taken when gluing the mirror into position on the magnet carrier that the direction of magnetic north was taken into account to enable the pencil of light from the lamp to be reflected correctly from the mirror towards the scale.

To read the instrument, the observer rests his head against the garage door. The head is moved from side to side and the eye centred to receive the pencil of light at its greatest brightness. This process is improved by wearing reading glasses so that the image forms the centre of a star of radial rays, which appear longest when the image is at its brightest. A plumb-bob is centred up with the light-image and is used to mark the point on the scale relative to the light-pencil. The apparatus can be read to 1cm. of accuracy. Because of the optical system the angular movement of the pencil of light is twice that of the magnet itself. Thus a movement of 17.5cm. in the location of the light-pencil represents a movement of 1° in the orientation of the magnet.

There is no zeroing of the scale required as the observer is noting relative movement only. The important factor is to record that a new series of readings has been started if some known source of interference has been identified, such as the movement of a car, lawnmower or other object. A lot of time is initially used up when commissioning the station in measuring the effects on the magnetometer of local 'noise'; indeed, one becomes suddenly very conscious of the location of every piece of ferrous metal within one's own premises and to tend to make marks so that they may be returned exactly into position if removed. The behaviour pattern of the neighbour's wife's car, especially when she garages it at night, takes on a sudden importance when it turns out to be the biggest single piece of extra-domiciliary noise in the neighbourhood. Notwithstanding the problems of interference, under the right conditions the system actually works.

On a typical quiet day when there were no sunspots visible at the telescope nor discernible neighbourhood activity of a magnetic nature, the following readings were noted:

1982 July 4

Time UT	0750	1250	1410	1445	1640	1805	2020	2230
Scale cm	48	49.5	48	48	48	46	46	48

The following readings were taken on an active day when at Aberdeen there was an all-sky aurora and the local magnetometer 'went wild'. The Sun exhibited a goodly rash of sunspots.

1982 July 13

Time UT	1540	1620	1745	1920	2000	2030	2105	2220	2300	2315
Scale cm	46	46	48	44.5	48	51	38	37	39.5	42.5

1982 July 14

Time UT	0640	1745	1840	1910
Scale cm	39.5	47	49.5	48

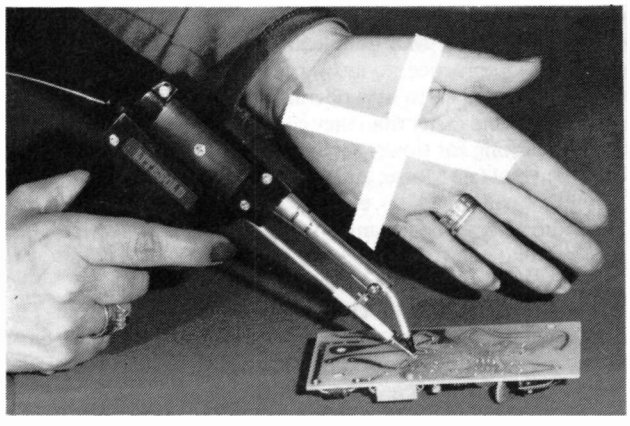
In the above observations rising scale figures indicate more westerly deflections. The magnet tends to swing westwards from the quiet position during a sudden commencement and eastwards during crochet, main-phase and substorm activities. Naturally enough, more frequent reading of the instrument would have produced more detail of the storm. Suffice it to say that, by becoming familiar with the dynamic magnetic pattern of the area, it is possible to pick out recordings which suggest that a magnetic storm is in progress and that a watch for auroral activity should be put in hand.

Conclusion

It is a feasible proposition for an amateur astronomer to attempt measurements of disturbances in the Earth's magnetic field due to solar activity, as a study in itself or as a warning that auroral activity might take place. Apparatus need not be complex, but the observer must get to know by experience the pattern of magnetic noise in his or her own locality in order to be able to deduce which disturbances are due to movements in the neighbourhood and which are solar generated. More advanced apparatus of the self-recording type adds to the observations.

The study of magnetic storms, it is proposed, would be, and in fact already is, a useful adjunct to the program of the Aurora Section.

(See 'VHF Bands', April S.W.M., page 74—Editor*)*



The Hakko MG self-feeding soldering gun from *Litesold* eliminates the need for a "third hand" for those tricky soldering jobs by feeding a controlled, and adjustable, length of solder at the squeeze of the trigger. Two models are available, one rated at 40 watts with a 4mm. dia. tip, the other at 60 watts with a 6mm. dia. tip; both are supplied with two solder feed nozzles for different solder diameters. Full details, and prices, from Light Soldering Developments Ltd., Spencer Place, 97-99 Gloucester Road, Croydon CR0 2DN. (Tel: 01-689 0574).

SOME THOUGHTS ON OPERATING

J. J. Maling, G5JL

I OPERATE exclusively on the HF bands and on CW, if that old-fashioned term is still permitted in these columns. I don't deny that there are many better operators using these facilities and some of them may feel that I'm interfering in an area which angels would proverbially avoid. Still, it is true that somewhere in a forgotten cupboard I have a First Class PMG certificate obtained long years ago. (There isn't even a PMG now.) It was given to me largely as a reward for a masterly description of the operation of that impressive but now outmoded collection of cogs, relays and bright emitter valves, the auto-alarm. Like everyone else I had learnt it off by heart before the exam. My ham licence dates from 1934 so I ought to have discovered a bit about operating by now. Yet I am aware that age and infirmity have crept up on me and neither my speed nor accuracy are what they once were. A ham doctor from the USA once suggested a prescription which he claimed was guaranteed to improve a patient's Morse. I didn't try it; perhaps I should have done.

Having disarmed those readers who were about to write in with comments on my personal operating style, I'd like to make a few suggestions.

We are all familiar with the rather common kind of car driver who proceeds at exactly the same pace in bright sunlight or thick fog; indeed his spectacular progress, so beneficial to employment in the medical profession, has often been recorded in the news bulletins.

We have his equivalent on the bands, though fortunately he causes few casualties apart from the occasional case of apoplexy. I like listening to a good telegraphist belting it out at 45 words a minute or more . . . when he has a decent signal in the clear. But a good operator as opposed to a person who is merely a good telegraphist, adjusts his speed to suit the circumstances. There are times when 45 words a minute is a waste of energy. Just as there are driving conditions when even 10 mph is dangerous, so there are band conditions when the good operator slows down to walking pace.

Most of us are prepared to send very slowly when we meet a new licensee who requests it or obviously needs it. But some newcomers mislead other operators. Nearly all 'learners' can send decent Morse faster than they can read it. It is common, and generally good practice, to answer a call at roughly the speed at which it was sent, so to new operators I'd suggest it isn't a very good idea to send faster than they can receive. Nor should they be shy about asking for slower sending. Good slow Morse is always better than bad fast Morse; and the worst Morse of all is Morse the other fellow can't read . . . even if it sounds perfect to the expert. There's nothing to be ashamed of in operating at a speed *both* operators find comfortable.

It is not generally appreciated that no matter how bad conditions are, an operator can always read his own callsign. The built-in filters in his ears are far more effective than the most cleverly designed electronic miracles. Even if the rest of the message is unintelligible, the rhythm of one's own call is unmistakeable. So might it not be a good idea, when answering a call to deliberately copy the way in which the caller sends his own call? Purists will tell us that Morse is Morse is Morse and that it ought to sound the same whoever sends it. In practice, at least for those who use a real key and can therefore call themselves telegraphists, Morse is as individual as handwriting. We all know of stations whose callsigns we write in the log book before they're sent; in fact we recognise the keying of most stations we contact regularly.

It is strange how even good telegraphists sometimes send their callsigns in a slovenly fashion, no doubt due to over familiarity. I have found myself doing it, and getting some very strange calls from replying stations: the G5 becomes OH or OE5 or GE5. I estimate that I've sent my own call about ten million times, so I should get it right occasionally. I doubt if it's always the receiving station at fault.

A G6 I often hear invariably puts an extra dot in the '6' in his call, though if he gives a report of 569, he gets the 6 right. Very strange! And a Y station I work about once a month is positively prodigal with his dots. I read him by discounting about 25% of them. It's quite easy when you get used to it.

However there can be advantages in modifying Morse. The technique of exaggerating the dashes is well known to all DX operators.

Most people call CQ too long. I do it myself when I'm reading a book, or making the tea, or writing up QSLs. We all do something else while calling CQ and only concentrate when we start listening. Rare DX stations only need to show their noses to attract more replies than they can handle but those of us from less exotic spots find three CQs, three calls, all repeated three times is about right. Often less is needed, very rarely more. Short CQs, followed by longer listening periods are normally better than long CQs, but as with everything in ham radio, we should vary our tactics to suit the conditions.

Nothing is more irritating (and therefore less, not more likely to bring a reply) than a CQ which goes on for several minutes without giving a callsign; and hardly less so is the CQ to which the operator adds at the very end a directional request which has not been indicated earlier. If DX, VK or something similar is required it should be made clear throughout the call.

Some operators ignore directional requests anyhow. No doubt their excuses would be that an awful lot of stations call CQ DX for hours when no DX is audible. That's their privilege; they're paying the electricity bills.

Other operators overlook the fact that not everyone has all day to spare. They'll natter on while breakfasts congeal and trains are missed, or possibly long after the other fellow has packed up and gone to work or bed. Unless it is known that time is no object, short overs are preferable. Indeed, they always are. Ideally we should all operate break-in. Many Russians and Japs are brilliant BK operators and could be taken as models in this respect.

It is many years since I took part seriously in a contest, but I usually put in an hour or two in major tests to give a few points to the night owls. Most of the stations heard on during tests are, I suspect, doing the same. The report is always 599 — rather surprising in view of the fact that the same stations on the same bands are apt to call it 449 at other times. Even at 599 they ask for repeats and they only have themselves to blame. At a genuine 599 no one would ever need a repeat. I wonder if some contestants wouldn't do just as well, or ever better, if they operated in a slightly more leisurely fashion. They wouldn't waste so much time on repeats, nor lose as many points for errors in their logs.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

THE deterioration of conditions continues; the sunspots, or rather lack of them, having their natural effect. Those who have been on the air at a sunspot minimum aren't worried too much — we know there's worse to come! However, now is the season when instead of frowsting in stuffy shacks, we all get out the gardening tools and the mower and get lots of good healthy exercise. . . .

Events

Just as we went to press last time the news broke of the sinking of the German DX-pedition to Spratly, which was at the time about one mile from Amboyna Cay. Diethelm Mueller, DJ4EI, was killed in the attack, and Gero Band DJ3NG, died in the dinghy on the ninth day adrift, just one day before the remaining survivors were picked up. The shelling was extensive, according to reports picked up in the *DX Bulletin*, and of Vietnamese origin. It was Amboyna Cay where the 1979 expedition was fired on without warning, but one has to say that to be as close as one mile to such a place is asking for trouble with the general acceptance of three miles or more for territorial limits. Be that as it may, there was no excuse for the Vietnamese action. At the time of writing, DU1CK should be on from another bit of Spratly, namely Danger Reef, 'with permission' as it is reported in both *TDXB* and *DXNS;* and there is word, as yet unconfirmed, of a German visit for geological activity, again 'with permission'. One thing we hope is that no-one is psyched into deletion ideas — to give best to a bunch of thugs is hardly calculated to improve international law and order, even though they probably thought the yacht was one of the pirates that infest the area.

People

From *DXNS* we see that our old friend G3XTJ was rushed off to hospital at the end of April for major surgery; all Ed's friends on the air will be wishing him well for a speedy and complete recovery.

Back in our March piece we were wondering about W1BB of Top Band fame. This produced a letter from N1ACH of *Ham Radio,* who says that W1BB is indeed QRT, as he is having a problem with his eyes which is preventing him getting on the air. We hope that many of the Top Band readers of this column will be moved to send a 'get well' card to W1BB — Stew Perry, W1BB, 36 Pleasant Street, Winthrop, MA 02152, USA, will reach him. We feel sure that Stew would like to know how we miss the sure guidance and news of which he was the source. And, tnx N1ACH for passing on the word.

DX-peditions

A Colombian group announced that they were proposing to activate Malpelo Is., hopefully in October, for five days. The announcement was made at Visalia by K3ZO (who used to be HS1ABD and is now living in HK) who said that all bands from 160 to two metres and Oscar will be activated by way of four stations, two of which are, it is hoped, to be airlifted to the top of the island.

In retrospect, the Heard Is. DX-peditions have left a nasty taste. All the mud slung at the VK9NS group by VK0HI/VK0CW, and published by *TDXB* in good faith, has been answered by Kirsti, VK9NL with a detailed rebuttal; and then independently we hear that the VK0HI/VK0CW group's logs contained as much as 30% duplicate QSOs (same station on same band and mode); they haven't, it appears at the time of writing, started on the QSL-ing. On the other hand, Jim Smith, VK9NS has answered all the QSLs which have reached him to date, which must be close to a record for quick work. Right from the early days it seemed to this writer that there was likely to be a personality clash, but the outcome seems to suggest that the mainland group should have stayed there; they have slung mud while VK9NS showed them how to do a DX-pedition — after all, Jim has done a few before, and managed to come up trumps. A sad and distasteful story.

The Bands — 160

Our usual report from G4AKY missed the bus again, due to work commitments at the time when he would normally be passing over the log copies. In addition, Dave is preparing for a move of QTH — we hope the new place is as good a QTH as the one in Harlow, from the radio point of view.

Top Band for G2HKU (Sheppey) was a matter of the usual sked with PA0PN on SSB, plus CW to SP1DDA, HB9KS, YU3EF, HB9AUY, HB9AGA, OE5JDL, 4X4NJ, and OK4AWQ/MM in the North Sea.

The other report on the band is from G3BDQ (Hastings) who took a brief bite at the band — twenty minutes from 2100 on April 29 — during which his CW made it over to UK3UAO and UB5NAR.

Eighty

GI4MXW (Portadown) comments that there has been, for him, a marked shortage of DX heard on the band; some Ws were heard around an hour after midnight but none of good enough strength to be worked; so David made do with EA2IA, CT4KQ, and ZB2EO.

That ON4ABT 'beacon' mentioned by G2NJ (Peterborough) last time round seems to have gone QRT at the end of March; the habit must be catching, as Nick also heard PA0GG around 3545 kHz sending "QRP QRP QRP Test PWR 1 W de PA0GG QSL" followed by a pause of around 20 seconds and repeat. Changing to the matter of real operations G2NJ mentions that G2CNN, who was operating /A from Thame at the start of April, towards the end of the month was near Royston. G2NJ, like many others, has noted the slow return of the SP stations, and had heard four up to the time of writing; and finally, he notes the fine signal coming out from G3MCK who was using a CO-PA transmitter at forty watts — like old times!

GW4OFQ (Carmarthen) stuck to SSB on Eighty, and it was enough to enable contacts to be completed with G3ZGC/MM, J6LCV, HZ1AB, PT7VOB, 4X4JU, 7X4AN, all around midnight; an hour earlier saw G3ZGC/J8, PY4VU, and FM7WS, while 0100z was the time for PYs and VP2MRA. For an *early* one (2200z) there was 4Z4DX.

Forty

This is to a great extent the band for the specialists, and most of them aren't going to give much away lest there be an invasion! Seriously, the key to working DX on Forty seems to be primarily the presence of an *attenuator* in the receive line plus a wide dynamic range in the receiver; and of course a philosophic outlook on lost QSOs due to the EU QRM and the Red Army Choir.

G2BON (Aldridge) has replaced his Icom 701 with the 740, but he wonders why it wasn't given an attenuator as he reckons it is needed badly on this band. Regardless, Tom managed to drive his new rig on SSB to PY2HDY and PY4UP around the 0700 mark, while an evening session found PR7AFJ around 2100z.

G2HKU offers just one QSO on the band, in the shape of a CW exchange with UL7IBZ, while GI4MXW made two; his were both CW, with IS0WON and UP2NK, before the high level of noise on the band caused him to beat a retreat.

Points

G8PTH of BATC writes to mention that we boobed in our statement last time — in connection with Bromsgrove's GB1BOY station — that this was the first GB1. Not so, and since your conductor saw at least two others himself, he has to hang his head in shame! For example, quite recently we had GB11ARU, and in the early post-war years RSGB had an Hq. station, given to the Society by EMI, which was given the call GB1RS, and appeared hourly on 3500.25 kHz until complaints from others sharing the building, and local TVI, caused it to be prematurely shut down.

Which brings us to GB1BOY; they don't intend to specify the frequencies, but will use all bands eighty to two metres, changing as and when conditions justify, through the 24 hours of June 21, 1983. All contacts will be QSL'ed through the Bureaux.

Those looking for 5Z4 contacts may care to note that G4HYD has now become 5Z4DJ and is active — QSLs *via* G4NJP. 5Z4DP is ex-G3TEU and will be arriving in July for permanent residence after being a visitor several times in July. His QSL manager will be G8RQH. Both stations will be active on RTTY and SSB, 80-10 metres; however, their licences do *not* include the new bands or one-sixty.

Contests

HF NFD is the main one as far as UK is concerned, one supposes. However, one shouldn't forget the All-Asian Phone contest over the weekend June 18-19; and over the weekend July 11-12, between 1500z and 1500z, you try to work as many South Americans as you can, with the multiplier being South American perfixes. June 25-26 is the weekend of the American ARRL Field Day.

Wanted

One hundred years ago, the Boys Brigade's first ever Company was formed in Glasgow by William Smith. To celebrate the centenary, on August 21, they have an activity called 'Anchor Chain' which involves passing on a message QSO from area to area of the Boys Brigade. To see if you can help on this occasion, please get in touch with the Glasgow Communications Committee; write to George Allan, GM4HYF, 22 Tynwald Avenue, High Burnside, Rutherglen, Glasgow G73 4RN, or telephone Rev. J. Campbell, GM4RUF, on 041-423 3912 for more information. We reckon this would be a worthwhile exercise, from the amateur's point of view, since the BB seems to have much more interest in the 'communications' angle — meaning that the effort will almost certainly be rewarding to amateur radio by virtue of new callsigns in due course.

Ten Metres

The mighty have fallen indeed! From the reports and our own observations we can suggest that there has been just one significant East-West opening during the month, with the odd N-S opening occurring around an hour either side of noon.

G3NOF (Yeovil) says he has listened around but found it generally dead. Around 1300 a few YBs were heard, and about 1600 some PY and ZS signals appeared, but nothing was heard from North America.

Turning to G4LDS (Chelmsford), he notes the occasional north-south opening, and managed to work phone to: 5B4ES, VP2EW, 8P6OM, 5H3DM, JY9CL, 7P8CM, ZD8FX, ZS6CX, ZS6BXD, ZS6CAX, LU9EAP, TZ6FIC for country number 216, and an opening to the USA during which he worked KW2P/4, W4TFB, N4ICE; OK2BHM was also a new one for the band.

GW4OFQ stuck to SSB for his contacts and managed to raise DL4SAP/5N1, CE7BIY, DJ5RT/TT8 and PZ1CC.

Turning to GI4MXW, David seems to have caught an opening to the States, as he mentions working NN6U, N6AW, K6SVL, NA5R, NU4Y, WB7FDQ, W5JW, K6LL/p/7, plus EA5CP and EA8AT nearer home.

Our final reporter on this band is G2BON, and Tom mentions just a couple of contacts, both SSB, with DL9ZAX/TT8 and Z21GO.

Fifteen

G2BON says the conditions have been very patchy, to put it mildly, with several solar disturbances. SSB on this band managed to swap reports with JR4BKX, KC0MS (Iowa), JA4CX, JT1AO, ZP5MJO, HZ1AB, VP2MGQ for Monserrat, VP2EC on Anguilla, PP2ZDD, LU2X, 5N8HEM, PT7VJS, VP2EW, TJ1GH, S79WHW, S79MC, S79ARB, JY9CL, KC7UU/5N6, PY1YZ, S83H in Transkei, PY7CAW, PY3CM, and VP8WA.

GI4MXW considers the band to have been rather like Ten, but a wee bit more consistent; operation was generally in late afternoon, and found XO7ZZ, VE5UF, VE6CAW, VE6OU, K6JR, NE6I, AJ6O, AI6V, W7TWL, KC7GX, K7RI, and W7FP in USA, while Central America was represented by C6ABA, TG9GI, VP2EC, VP2MGQ, HH2WW, KP4EQF, and VP2MRA. South America was also to be found, represented by PJ2FR, PP8ABV, and HM3AZC, while turning the Minibeam to the south resulted in contacts with EA9EU, CT2FH, and CT2CQ, these last being on CW.

Fifteen for G4LDS meant SSB contacts with VP2MRA, PZ1HJ, K8MWO/4, JY8KG (the Colvins; Lloyd and Iris are now back in USA), HK1ASZ, ZB2GR, EA8RCL, 7P8CM, PS8TK, PY2CUN, YV7AXM, LU8ECM, VP8ANT, PY7ARJ, OA4ML/8, SP6AYP, JAs, HL2AKP, EA6OS, and ZB2HO.

Both CW and SSB were used by GW4OFQ; the key stuff first, by way of G4ABI/ST2, FM7CT, LU7JI, UI8AM, and 9N1MM; SSB accounted for VK3VSL, UI8FAI, 9N1MM, CR9FE, JY9TS, S83H, 5Z4PR, FH8CB, HK4BVR, YC0BJH, YB1, YB2, 7P8CT, VQ9CI, TR8JD, JY8JP, HK3CZL, and 7P8CM.

"CDXN" deadlines for the next three months:

July issue — June 2nd
August issue — July 7th
September issue — August 4th

Please be sure to note these dates

The G3NOF analysis stresses the dearth of W signals, and the fact that when they are about it's not for long! VK/ZL by the long path have been absent, albeit a few have been heard on the short route. However, Don is making up for lost time, and his SSB went out to A71BJ, C53DF, C53EY, DL7AGD/6W8, DU1TV, FM7BX, FY0ESE, G4ABI/ST2, G4DUW/DU1, H44SA, HS1CZ, K2BS/C6A, K6CW, K6YRA, JAs, JY8JP, JY9CL, N6ERZ, P29NBF, PT7ACZ, PT7UP, PY1EFM/PY0T, TR8CR, TR8JD, TU2JL, UA0FCL in Zone 19, UI8OAA, UK9MYL, TJ1GH, TE1TDB, VK2PKB, VK4BFO, VK4NJS, VK8NE, VP2MDG, VP8ANT, VP8ARV, VP8ML, VQ9CI, XT2BM, YB5OD, YC1GJ, YC2CGW, YK1AO, Z21GN, ZB2HO, ZD9BV, ZL1ANJ, ZS5DX, 1Z9B, 4S7VG, 4S7ZN, 5H3DM, 5T5AP, 5V7WI, 6Y5AM, 7P8CL, 8P6JG, 8Q7AZ, 9L1DR, 9L1YL, 9N1MM, 9V1VM and 9V1VP.

July issue due to appear on Friday, June 24th

Now for G3BDQ, whose letter incidentally contains some more reminiscences of our mutual friend from Albania, Arabackle Oblifork; however, to the matter in hand, and on 21 MHz it was SSB to YV5PF, 3B8FK, YC1WS, YB8VL/0, YB2BJM, VK8IC, HR3JJR, 7Q7LW and 9X5WP.

The only contact on the band mentioned by G2HKU was QRP both ways, on CW with I5QHW who was running just the one watt as against Ted's four watts of CW.

New Bands

Once again a dearth of reports. G2HKU had a CW QSO with VK2BKH, and *DXNS* indicates that VP8ALD is now QRV on the band, with EA6ET on 10111 at 1800z, weekends. No mentions whatever of 18 and 24 MHz.

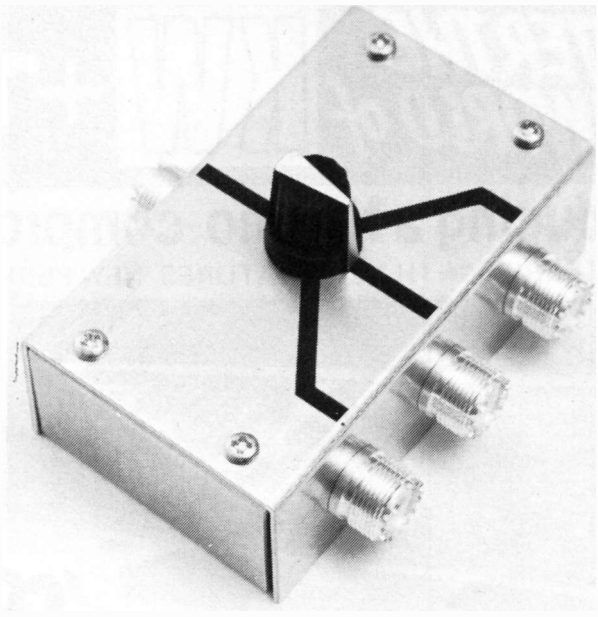
Here & There

FCC approved the expansion of the U.S. Phone band on 14 MHz. Extra class licences have 14150-14175, Extra and Advanced classes get 14175-14225 and General/Advanced/Extra get 14225-14350 kHz, as from May 22.

G2BON sent in a list of QSL addresses, all culled from his listening/operating. It includes ZP5LOY, to POB 512 Asuncion; 9K2DZ, to POB 1262, Kuwait; KC7UU/5N6 to K6EDV; DL9ZAX/TT8 to DJ5RT; A92P, to Box 14, Manama, Bahrein; J37AH, to Box 383, Roseau; VP2MRA to VE5RA; A71BJ to G4HNP/G5VS; TU2JL, to Box 139, Abidjan; 1Z9A and 1Z9B to JA8IXM; ZP5MJO, to Box 512 Asuncion; C53LF to G3LQP; CN8EU to KA4S; P29MF to G4CHP; VP2EW to KC5EA; 9X5SL to DL8DF; TJ1GH to DJ5RT; 5N8ALH, to POB 7355, Kanu; S7ARB *via* WA2PPN; S79WHW, to POB 491, Seychelles; S79MC *via* AK3F; JY9CL to G3MUL; 5N9GM to I8XIU; PA3CRZ/SU to PA3CRZ; and VP8WA, to Box 38, Stanley. Turning to DX Nets, Tom mentions WA2PPN on 21371 at 1700z Saturdays and Sundays covering the Indian Ocean; the African Safari Net on Saturdays, 1700z on 14176 kHz, and the VK/ZL/Pacific Net, controlled on Tuesdays at 0600z by ZL1PN and on Fridays by VK3AH, the frequency being 14265 kHz.

Twenty

The analysis of the band by G3NOF indicates that he himself hasn't been too active on it, although he has listened; long-path VKs have peaked around 0730z and gone on until 0900 with a few KH6 and KL7 heard about the same time. In the evenings the East Coast Ws and South America have been good. Don only worked EL2AD, T70A who was sporting the new prefix replacing M1, and VK7GK.



Davtrend Ltd. **recently introduced their new** *DRAE* **VHF Antenna Switch, shown above. The low-loss single-pole 3-way switch is designed for use up to 500 MHz and is rated at 250 watts r.m.s. at 50 ohms impedance; fittings are SO-239 connectors. Priced at £15.40 inc. VAT, the switch is available from** *Davtrend Ltd.*, **The Sanderson Centre, Lees Lane, Gosport, Hants. PO12 3UL (tel: Gosport 20141), or from** *DRAE* **stockists throughout the country.**

G2BON spent quite a while on Twenty SSB, and notes his QSOs with VK5AWC, 1Z9A, 3V8AA, VK2DXH, VK3NQ, TR8CR in Gabon, VO1CV, VP2MGQ, VE6OU, VP2MRA, KP4BZ, 9Y4VU, VE1DXA, VK1WB, A92P, WB4WXE/KL7, VK3ZY, KC7UU/5N6, 3B8DA, 9L2FD, VK2HD, PA3CRZ/SU, KH6ML, W6LAS/SVA/P who was using low power to a mobile whip from Mount Athos, VK3AH, and KH6OB.

The reappearance of the SPs gave a new country to GI4MXW by way of SP3KEY and SP7FQI on Twenty; in addition VP2EL, CR9OF, TO2VX, IS0FRH, VO1CV, ZY5EG, OH0BA, SV1JG, IT9DQZ, UP2ND, CQ1BQW, and lots of Europeans were raised.

The list from G4LDS includes 7X2KGT, K9PPV, 5N8YPM, VK4AHR, VK3AUC, KC4AAA over the N. Pole (QSL *via* W9AUB), 9Y4VU, VP8ANT, T77J, K2JFR, K1YZW, and finally ZB2HO.

Twenty for GW4OFQ was all SSB, and he offers VE8RCS, ZL1AXB, 8P6IB, DU9RG, JA3EGZ, VS6CT, VK3DUP in mid-afternoon, CR9WW, KL7IHP/VS6, JA9YBA, YB3AC, VU2NUT, A4XJU, HI3CTA, 5T5RY, VP8ANT, 5T5AP, LU4MDR/Z (Antarctica), VP2EC and JY9RC.

Finally G3BDQ, who notes JY9CL, a QSO from Hastings to Hastings by way of ZL2AN in Hastings NZ, and an all-time new one in 5W1DQ in W. Samoa.

Finals

We understand that in Turkey they now have an IARU affiliated society, Turkiya Radyo Amatorleri Cemiyeti, and that new laws have been formulated which will make amateur radio from Turkey legal, for the first time since the 1920s.

A new prefix of a little more than normal importance is noted in *DXNS*, by way of Desecheo, which is now KP5; and we have already mentioned that M1 is changed into T70.

Finally, by the time this comes to print, the next session from 1A0KM will probably have come and gone — hard luck if you were looking for them and missed!

Finis

For another month. The deadline for the next piece is in the 'box' and we can always use more reports for the feature — after all, it is for the writer only to record your doings and the news and views he may gather through your letters. As usual, the deadline is for arrival, addressed to your scribe, "CDXN", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ.

READERS ADVERTISEMENTS

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Copy must be received by June 9th for inclusion in the July issue.

READERS

For Sale: IC-260E, £230; **Sony ICF-2001,** £80; rare **Drake TC-2** 144 MHz transverter, 180w., £150; **Arcos K2RIW 432 MHz 1.5kW amp.** kit, silver-plated anode circuits, all brand new components including Eimac 8930's and bases (cost £500), sell £350. Kungsimport 2-way **144 MHz power divider, £18. — Ring McHenry, G3NSM, 0865-56321.**

Selling: FT-101Z(FM) with fan and mic., Microwave Modules 2m. transverter with power supply, Welz CT-150 dummy load, SWR-25 Mk.II SWR/Power meter, Jaybeam 8-element Yagi, all as new and one year old or less, £550. — Ring Stainton, 01-561 5892.

Sale: FT-221 transceiver with service manual, £300. FR-50B receiver, £70. — Ring Crabb, G8LPO, Southend 558767.

For Sale: Marconi CR-100, 6 bands, working order, AC mains, with handbook, ideal for keen SWL. Offers? — GW8FII, 20 Erw Goch, Waun Fawr, Aberystwyth. (Tel: Aberystwyth 3591).

For Sale: Heathkit SB-100 transceiver, SB-600 speaker, HM-15 SWR bridge, Diamond KB-105 10-80m. trapped vertical, D104 mic., £225 or near offer for quick sale. — Ring Griffin, 0733-203169.

Sale: Racal RA-17 Rx, with MA-197B preselector unit, RA-98 sideband adaptor and relevant manuals, good condition, £250. — Ring G4SVU, 0623-29289 after 6 p.m.

Selling: Yaesu FR-400SDX amateur bands Rx, 2-160m. plus CB, with spare valves and manual, etc., in FB condition. Also SR-9 2m. Rx with magmount antenna. — Ring Garlick, Pontefract 795821.

Wanted: Second-hand Datong D70 Morse tutor. — Ring Cimatti, Llandudno (0492) 77514 most afternoons and evenings.

Wanted: Eddystone 770R VHF receiver in good working order. Will pay up to £150. — Ring Bassnett, 041-632 9250.

Sale: Mobile rig: Heath HW-17-2, Heath FM adaptor, solid -state power supply, dash bracket, 3 handbooks. Offers? — Davis, 20 Erw Goch, Waun Fawr, Aberystwyth. (Tel: Aberystwyth 3591).

Sale: Yaesu FRG-7700, immaculate condition, with Type-C FRV-7700 (still boxed) and new copper long wire (still coiled), £250. — Ring Upminster 25501.

Selling: Trio TR-2300 2-metre transceiver, very good condition, with nicads and charger, £100. — Ring Gardner, G6MCZ, 061-969 6516 (Manchester).

For Sale: KW-202 amateur bands Rx, 160-10m., SSB/AM/CW, with Q-multiplier, notch filter, matching speaker and handbook, excellent condition, £135. — Taylor, G4KKG, QTHR. (Tel: 0935-25327, Yeovil).

Wanted: By SWL, modern communications receiver covering 0.5 to 30 MHz. — Ring Smith, 01-556 5131 after 5 p.m.

For Sale: Complete HF station: FT-200, FP-200, K.W. E-Zee match, K.W. antenna switch, KW-103 SWR meter, hand mic., all mint, boxed, with manuals, £375. — Ring Guest, Bath 313974.

Selling: Racal RA-117A, mint condition, in cabinet, £275 or near offer. Grundig Satellit 3000, £200 or near offer. *Wanted:* Sony CRF-320 or 330K. — Ring Jouhal, 0602-613404 after 9.30 p.m.

Sale: Yaesu FRG-7700 receiver, with FRT-7700 antenna tuner, as new, boxed, with handbook, £260 or near offer. — Ring 051-922 9632.

For Sale: Standard C.146A 5-channel handheld transceiver, with charger, helical aerial and leather case, £65. Piptone (roger bleep) oscillator boards for Icom or other transceivers with electronic p-t-t switching, £5.25 inc. postage. — Croft, G8CJM, QTHR. (Tel: Medway 47280).

For Sale: FT-290R with nicads, charger, mobile mount, carrying case, and Ambit 20w. linear, £220. — Ring Smith, Ripley 874768.

Selling: Receivers: Racal RA-17, £160; RA-317 solid-state, 0-30 MHz, £300. Eddystone EC-958/7 professional Rx, 10 kHz to 30 MHz, digital readout to 1Hz, £600; 770R Mk. II Rx, VHF, £120. Drake R7-A, all 5 filters fitted, with MS-7 speaker, mint, £825; Drake R4-C, all 5 filters fitted, with MS-4 speaker, mint, £400. MM400KB RTTY transceiver with keyboard, £180. Daiwa CN-1001A auto ATU, £80. Trio AT-130 ATU, £60. Trio TS-120V transceiver, mint, £250; VFO-120, mint, £60. Racal LF-137 LF adaptor, £50; RA-63 SSB adaptor, £50; RA-218 SSB adaptor, £50. Avo digital multimeter, £65. All the above in very good condition, or mint, with handbooks; carriage extra. — Poole, GW3JAZ, QTHR. (Tel: Gresford 2584).

Selling: Yaesu FT-480R 2m. transceiver, 6 months old, used only as a base station, £290. Two-metre 8-ele. antenna, 13V 5A PSU, Himound HK708 key, Yaesu headphones, SWR bridge, £60. The lot, £330 or near offer. — Ring Moffatt, G4DTI, Wokingham 792102 evenings/weekends.

Wanted: R.1155 super slow-motion tuning assembly, new condition. Details and price, please. — Sykes, 30B Bridge Street, Louth, Lincs. LN11 0DP.

For Sale: Datong FL2 multimode filter, £48. Amtech 300 ATU, boxed, new, £20. Scopex 4D-10 oscilloscope, £125. Two base mics., £15 each. — Ring Barnes, Uxbridge 54116.

July issue: due to appear June 24th. Single copies at 85p post paid will be sent by first-class mail for orders received by Wednesday, June 22nd, as available. — Circulation Dept., Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ.

Sale: Micronta portable 3-in. oscilloscope, 10 MHz, little used, £35. — Williams, Highfield, 97 Cwm Road, Dyserth, Rhyl. (Tel: 0745-570209).

Sell or Exchange: Datong FL3 audio filter, unwanted gift. Offers? Or exchange, W-H-Y? Interested particularly in mobile HF. — Ring Whitticombe, GW4ODN, 06462-3991.

Selling: Sommerkamp TS-280FM, high-power, 80-channel, ⅝-wave magmount, and Datong Morse tutor, £235. — Ring Rabin, 061-980 4884 evenings.

For Sale: FDK Multi 700EX 2m. FM transceiver, mint, boxed, £140. Jaybeam LW8/2M Yagi, £12. — Ring Scollan, 0376-517385 (Essex).

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