

The SHORT WAVE Magazine

VOL. XLI

JANUARY 1984

NUMBER 11

RADIO SHACK'S LATEST GOODIES

Direct-Access Keyboard Tuning of
22,884 Frequencies

£ 229.95

Available 15th January, 1984
Covers 68-88 MHz VHF-Lo, 144-148 MHz Ham,
106-136 MHz AM Aircraft, 138-144 MHz,
148-174 MHz VHF Hi, 380-450 MHz Ham,
450-470 MHz UHF-Lo, 470-512 MHz UHF-Hi



Realistic PRO-30. A full-feature, micro-processor-controlled scanner with extended frequency coverage — in a compact size you can carry wherever you go! Scan up to 16 of your favourite channels continuously, or search a selected frequency range for new or unpublished channels. Scan and Search in two speeds. Two-second Scan Delay, selectable for each channel prevents missed replies. Lockout feature temporarily bypasses unwanted channels. Big LCD display shows channels and frequencies being monitored or programmed as well as the status of the channels. Priority function monitors your favourite frequency while you listen to others. Frequency-tracking front end assures top sensitivity on all bands. Squelch control eliminates noise between messages. Has jacks for external antenna and earphones. With flexible antenna. 7½ x 2 ¼ x 1 ¼". Requires six "AA" batteries or mains or DC adaptor. Memory backup requires four silver-oxide batteries. £229.95

Mains Adaptor..... £6.99
DC Adaptor..... £4.49

OUR BEST EVER!

60-Channel Programmable Receiver
for Home or Car



50 Public Service and Aircraft
Channels Plus 10 FM
Broadcast Channels

£ 259.95

Listen to Aircraft, Hams, VHF Marine and More — Even Your Favourite
Standard FM Stations

Realistic PRO-2003. No crystals to buy — direct keyboard entry of 20,584 frequencies. Use the search circuit to find new channels. When you find one that sounds interesting, store it in memory. Zeromatic® circuit assures accurate signal tuning every time. Has a 2-speed scan and search; Scan Delay, individual channel-lockout, priority function and variable squelch control. Large easy-to-read display shows channel number, frequency, function and mode. Bands: VHF-Lo 68-87 MHz; FM Broadcast 88-107 MHz; VHF-Air AM 106-136 MHz; Ham 138-148 MHz; VHF-Hi 148-174 MHz; 410-450 MHz; UHF-Lo 450-470 MHz; UHF-Hi 470-512 MHz. Built-in speaker, telescopic antenna, plus jacks for headphone and external speaker. 3½ x 11 ¼ x 9". With operating manual, mains operation of 12VDC negative ground. Memory backup requires 9v battery. £259.95

BEARCAT SCANNERS

BC-100FB £345.00

Hand held 16 channel
programmable

BC-20/20FB
(with air band)



40 Channels
AM/FM
£258.75



COLLINS KWM-380 Transceiver



DRAKE R7A



General Coverage Receiver

TRIO — YAESU — ICOM — FDK — KDK
DATONG — HUSTLER — SHURE
ASTATIC — Hy-GAIN — TELEX
MICROWAVE MODULES — HAL
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EVERYTHING ELSE IN AMATEUR RADIO

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BARCLAYCARD

VISA

TR9130 TWO METRE ALL MODE TRANSCEIVER

This rig is proof, if one needed it, that TRIO do not bring out new models just for the sake of it. The TR9000 is remembered as a classic rig and today people are still asking for second hand ones, even they are a rarity on our S/H shelf. The TR9130 incorporates the improvements that all amateurs asked for, green display, reverse repeater, tune whilst transmitting, higher power, more memories and of course memory scan. TRIO's answer, the TR9130.

TR9130 £433.32 inc vat.



TS780 DUAL BAND BASE STATION TRANSCEIVER

The TS780 is the perfect base station VHF/UHF transceiver for the enthusiastic operator. The rig has all the necessary control functions essential for operating on both today's busy two metre band and the wide spaces of seventy centimetres. Full repeater facilities plus reverse repeater are included and the transceiver has the usual memory channels (10), two VFO's, up/down frequency shift microphone, IF shift, two priority channels, memory and band scan, etc. A superb rig, I have one myself, ring for a full enthuse!

TS780 £795.00 inc vat.



TR7930 TWO METRE FM MOBILE TRANSCEIVER

Those who have used or owned a Trio TR7800 will know what I mean when I say that Trio, with the introduction of the TR7930 have improved on the unimprovable. The Trio TR7930 improves on the TR7800 by giving a green floodlight liquid crystal display, extra memory channels, both timed and carrier scan hold, selectable priority frequency and correct mode selection (simplex or repeater). The most significant change is the liquid crystal display, but closely following this must be the ability to omit specific memory channels when scanning and the programmable scan between user designated frequencies.

TR7930 £305.21 inc vat.



R2000 GENERAL COVERAGE RECEIVER

The amateur bands are only a very small part of the radio spectrum, many other transmissions are available for the short wave listener. Broadcast stations provide an alternative source of current information both political and regarding the life style of the country. Fitted with the internal VHF converter the R2000 covers continuously frequencies from 118 to 174 MHz giving access to amateur two metre transmissions (am, fm, ssb and cw) plus a lot more. Having 10 memories, memory scan and programmable scan the R2000 provides in one rig the perfect receiver.

R2000 £398.82 inc vat.



TS930S HF TRANSCEIVER WITH GENERAL COVERAGE RECEIVE FACILITIES

Much has been said about the TS930S transceiver and it now has a place high in the affection of those amateurs fortunate enough to own one, indeed it has become the "flagship" of the TRIO range. Providing full amateur bands plus a general coverage receiver (150kHz to 30MHz), the TS930S has every conceivable operating feature for today's crowded frequencies.

TS930S £1216.70 inc vat.



TR2500/TR3500 HANDHELD TRANSCEIVERS

Two first class hand held transceivers, one for two metres and the other for seventy centimetres. Ten memory channels, band and memory scan, repeater shift, reverse repeater and a low power position make the rigs extremely useful for the radio amateur who wishes to keep in touch with his local scene. A comprehensive range of accessories, base station charger, speaker microphone, mobile mount, etc. can be added to enhance operation, accessories used with one rig being compatible with the other.

TR2500 £232.53 inc vat.

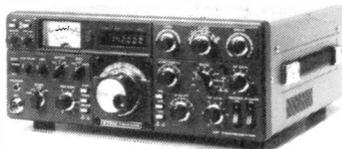
TR3500 £250.70 inc vat.



TS530S HF AMATEUR BAND TRANSCEIVER

A logical progression from the reliable TS520 series the TS530S was the most popular HF rig in the range. I use the term "was" because TRIO decided to cease production and supplies were no more, however the demand from radio amateurs worldwide for the transceiver have continued and TRIO have reintroduced the rig. A standard HF valve transceiver without the frills but providing today's amateur with all necessary facilities for reliable world wide communication, the TRIO TS530S.

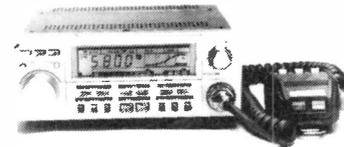
TS530S £595.00 inc vat.



TW4000A DUAL BAND FM TRANSCEIVER

I have been waiting for this rig for the last three years, now it is here and I am using one, words fail me. Send for details.

TW4000A £469.00 inc vat.



just a part of the range

Securicor carriage on the above items £6.00

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KEYT901	Curtis Keyer	£26.85
DCT1	OC Power Cable	£9.60
RAMT1	Non volatile memory board	£13.05
FMUT1	FM unit	£39.85
XF8.9KCN	300 Hz CW filter	£17.25
XF8.9KC	600 Hz CW filter	£17.25
XF8.9KA	6 KHz AM filter	£17.25
XF10.7KC	800 Hz CW filter	£11.90
FT980	Transceiver General Coverage Rx	
	Amateur Tx	£1150.00
SP980	External speaker	£54.80
SP980P	External speaker phone patch	£69.75
FT102	Transceiver 9 band multimode	£685.00
SP102	Speaker with audio filter	£49.05
SP102P	Speaker and phone patch	£69.00
FV102DM	Synthesized scanning VFO	£230.00
FC102	Antenna coupler 1.2KW PEP	£200.00
AMFMUT102	AM/FM unit option	£48.00
FAS14R	4 Way antenna selector	£39.10
XF8.2GA	6 KHz AM filter	£18.80
XF8.2HSN	1.8 KHz Narrow SSB filter	£18.80
XF8.2HC	600 Hz CW filter	£18.80
XF8.2HCN	300 Hz CW filter narrow	£18.80
XF45.5C	500 Hz CW filter	£44.85
XF45.5CN	270 Hz CW filter narrow	£44.85



FT-980

FT77	Transceiver 8 band mobile	
	multimode 100 watts	£459.00
FT77S	Transceiver 8 band mobile 10	
	watts	£399.00
MRKT77	Calibration marker unit option	£9.60
FMUT77	FM Board option	£25.30
FP700	External power supply/speaker	£110.00
FC700	Antenna tuner	£85.00
FV700DM	Digital VFO	£170.00
XF8.9KC	600 Hz CW filter	£17.25
FT757GX	Amateur bands TX General RX	£625.00
FP757GX	Switch mode PSU	£135.00
FC757AT	Automatic Antenna Tuner	£210.00
FP757HD	H/D Power unit	£145.00
FT902DM	Transceiver 9 band, multimode	£765.00
FT902DE	902DM less inverter, memory & FM	£749.00
FT902D	902DM less inverter, memory & Keyer	£749.00
FMU901	FM Mobile	£28.00
KEYT901	Curtis Keyer	£26.85
MEMT901	Memory Unit	£87.90
DCT901	Inverter (from 12VDC)	£48.75
XF8.9GF	12 KHz crystal filter FM	£26.05
FV901DM	Digital VFO	£139.00
50TV	6m transverter module	£97.75
70TV	4m transverter module	£84.70
144TV	2m transverter module	£109.65
430TV	70cms transverter module	£214.65
XF8.9HC	CW Filter 600Hz	£28.05
XF8.9HCN	CW Filter 300Hz	£26.05
XF8.9GA	AM Filter 6KHz	£26.05
FL210Z	Linear Amplifier 1200W + P/P	£475.00

FT707	Transceiver 100W 10.80M (8 bands)	£425.00
FP707	Mains power supply/speaker	£110.00
FV707DM	Digital VFO	£170.00
FC707	Antenna Tuner	£85.00
FTV707R	Transverter frame	£79.00
FRB707	Relay switching box	£15.35



FT-726R

FT726R(2)	Multimode multiband c/w 2M	£675.00
FT726R	Main fram only	£550.00
50/726	6m module	£170.00
212428	HF module for 15m, 12m	£180.00
144/726	2m module	£135.00
430/726	70cm module	£230.00
SAT726	Full duplex module	£90.00
XF45.5MC	600Hz CW filter	£39.85
FT230R	Transceiver 2m FM 25W	£238.00
FT730R	Transceiver 70cm FM 10W	£259.00
FT690R	Transceiver 6m 2.5W multimode	£238.00
FT290R	Transceiver 2m 2.5W multimode	£249.00
FT790R	Transceiver 70cm 1W multimode	£299.00
SMC2.2C	Nicad cell, 2.2 Ah/2 C size	£2.70
SMC8C	Slow charger (220mA)	£8.80
MMB11	Mobile mount	£24.90
CSC1A	Soft carrying case	£3.85
YHA15	Flexible helical antenna	£5.00
FL6010	Linear amplifier 6m 10W	£49.00
FL2010	Linear amplifier 2m 10W	£59.00
FL7010	Linear amplifier 70cm	£91.00
FT680R	Multimode transceiver 6m	£349.00
FT480R	Multimode transceiver 2m	£399.00
FP80A	Power supply unit	£55.00
SC1	Station console	£138.00
FL2050	Linear amplifier 50W	£115.00



FT-290R

FT720RV	Transceivers 2m 10W FM	£199.00
FT720RVH	Transceivers 2m 25W FM	£299.00
FT720RU	Transceivers 70cms 10W FM	£229.00
FT720R	Control head	£100.00
720RV	Deck only 2m 10W	£110.00
720RVH	Deck only 2m 25W	£110.00
720RU	Deck only 70cms 10W	£130.00
S72	Switching box	£39.00
E72S	Cable, 2m long	£10.00
E72L	Cable, 4m long	£15.00

Prices include VAT & Carriage

FT208R	Transceiver Handheld 2.5 2m	£199.00
FT708R	Transceiver Handheld 1W 70cms	£209.00
FNB2	Nicad Battery Pack	£19.95
FBA2	Battery pack sleeve (fits FNB2)	£3.05
FBA3	Charging sleeve (for FT207 acct)	£5.35
NC9C	Slow charger	£8.00
NC7C	Base Master	£30.85
NC8C	Quick charge and PSU	£50.60
MMB10	Mobile bracket	£6.90
FRG7700	Receiver 0.15-3.0 MHz AM/	
	CW/SSB/FM	£335.00
FRG7700M	Receiver c/w 12 channel memory	£389.00
DCRG7700	DC modification kit	£1.15
MEMG7700	Memory option	£89.80
FR77700	Antenna tuner/switch	£42.55
FR77700A	Active antenna	£38.70
FF5	Low pass filter 500 KHz	£9.95
FVR7700A	Converter 118-130, 130-140,	
	140-150 MHz	£78.95
FRV7700B	Converter 118-130, 140-150,	
	50-59 MHz	£84.70
FRV7700C	Converter 140-150, 150-160,	
	160-170 MHz	£74.75
FRV7700D	Converter 118-130, 140-150,	
	70-80 MHz	£80.90
FRV7700E	Converter 140-150, 150-160,	
	118-130 MHz	£83.95
FRV7700F	Converter 150-160, 160-170,	
	118-130 MHz	£83.95



FRG7700

YM21	Hand 600, 4 pin noise cancel	£15.70
YM24A	Hand 2K, 6 pin min. speaker/mic	£18.40
YM35	Hand 600, 8 pin scan	£15.35
YM36	Hand 600, 8 pin, noise cancel	£14.95
YM37	Hand 600, 8 pin	£7.30
YM38	Stand 600/50K, 8 pin scan	£27.20
YM47	Hand 600, 7 pin, scan control	£10.75
YM49	Hand 600, 7 pin, speaker/mic	£16.85
YE7A	Hand 600, 4 pin	£7.65
YD148A	Stand 600/50K, 4 pin	£22.80
YD844A	Stand 600/50K, 4 pin	£26.85
MH-188	Hand 600, 8 pin scan	£13.80
MD-188	Desk 600, 8 pin scan	£49.85
FSP1	Mobile speaker 8 ohms	£11.15
FSP2	Mobile speaker 4 ohms	£11.15
YH55	Headphones padded low z	£9.95
YH77	Headphones lightweight low z	£9.95
YH1	Lightweight mobile headset/ boom mic	£13.80
S81	PTT switch box for FT208/FT708	£14.95
S82	PTT switch box for FT290/FT790	£12.85
S83	PTT switch box for FT202	£13.80
FP4	12V power supply 4 amps	£44.45
QTR240	World time clock quartz	£31.45
FF501DX	Low pass filter	£25.70
YP150Z	Terminated Wattmeter 5-30-150W FSD	
FP4	12V 4 amp PSU	£92.00
FYP80	12V PSU	£44.45
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FS602M	50-150MHz 20/200W Pep £51.35 FOC
FS603M	430-440MHz 5/20W Pep £51.35 FOC
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FS301MH	2-30MHz 200/2000W £35.85 FOC
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VB1	FS711V Coupler £23.75 FOC
UB1	FS711U Coupler £23.75 FOC
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SWR3S	3.5-150MHz F/S Meter ant. £26.45 FOC
SWR50B	3.5-150MHz Twin Meter £37.95 FOC
FS200	3-150MHz 5/20W £115.00 FOC
FS800	1.8-150MHz 6/30/150W £115.00 FOC
JD	
JO110	1.5-150MHz 10/100W £13.80 FOC
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HK703	Straight Key £25.70 £1.20
HK704	Straight Key £17.85 £1.20
HK706	Straight Key £14.80 £1.00
HK707	Straight Key £13.75 £1.00
HK710	Straight Key £38.40 £1.75
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BK100	Mechanical Bug £22.25 £1.75
MK701	Single Lever Paddle £25.25 £1.60
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MK705	Squeeze Key £22.80 £1.75
MK706	Squeeze Key £19.50 £1.75
IKP60	Lambic £9.95 FOC
HK802	Deluxe brass key £76.00 £2.00
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KP200	Memory 4096 Multi Ch Mem Back Up 230/13.8V £155.25 £2.50
DATONG	
D70	Morse Tutor £56.35 FOC

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LW10/2M	Yagi 10 element 10.5dB £24.15 £2.50
LW16/2M	Yagi 16 element 13.4dB £35.07 £3.20
14Y/2M	Yagi 14 element 12.8dB £38.23 £3.20
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D8/2M	Yagi 8 over 8 slot 11.1dB £34.50 £2.50
5XY/2M	Yagi 5 ele crossed 7.8dB £28.17 £2.50
8XY/2M	Yagi 8 ele crossed 9.5dB £35.85 £2.50
10XY/2M	Yagi 10 ele crossed £48.00 £2.50
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PMH2/M	Harness 2-way 144MHz £12.85 £1.50
PMH4/2M	Harness 4-way 144MHz £28.75 £1.50
CB/70	Co-linear Omni Vertical 61.4dB £82.10 £2.50
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PBM18/70	18 ele Parabeam 13.5dB £32.20 £2.50
PM24/70	24 ele Parabeam 15.1dB £42.55 £2.50
LW24/70	Yagi 24 element 14.8dB £27.02 £2.50
M8M28/70	28 ele Multibeam 11.5dB £21.27 £2.50
M8M48/70	48 ele Multibeam 14.0dB £35.85 £2.50
M8M88/70	88 ele Multibeam 16.3dB £48.87 £2.50
8XY/70	Yagi 8 ele crossed 10dB £42.55 £2.50
12XY/70	Yagi 12 ele crossed 12dB £52.90 £2.50
PMH2/70	Harness 2-way £10.35 £1.50
PMH4/70	Harness 4-way £22.42 £1.80
CR2/23CM	Corner reflector 13.5dB £40.25 £2.50
PMH2/23CM	Harness 2-way £31.05 £1.50



SMC-HS	
SMCG0X1	Discone 80-480MHz 3dB x 3.3' £40.25 £2.50
SMCG0X2	Discone 50-480MHz 3dB x 6.2' £49.45 £2.50
GDXA	Discone 100-440MHz 3dB x £33.75 £2.50
SMCVHRL	Discone 65-520MHz Rx only 5.0' £15.70 £2.50
SMCGP23	Co-linear 2M 3 x 1/2 wave 7.8dB x 14.8' £39.95 £2.50
SMCGP144W	Co-linear 2M Multi x 1/2 wave 6.5dB x 10.2' £27.80 £2.50
SMCGP2M	1/2 wave chg ground plane 3.4dB x 4.6' £18.00 £2.50
SMCS0144	2M Swiss Quad for vertical mounting £57.80 £2.50
SMCSP432X	Co-linear 70cm 3 x 1/2 wave 6.6dB x 5.6' £29.90 £2.50
SMC70ZV	Co-linear 2.8dB x 2M 5.7dB x 70cm 3.6' £29.90 £2.50
SMC2H66	6M HB9CV 2 Driven elements £19.95 £2.50
SMCHS770	144/432 Duplexer 50W 30dB isolation £15.35 £1.50
HY GAIN	
12AVQ	Vertical 10, 15, 20, 14.0'H £50.80 £2.75
14AVQWB	Vertical 10, 15, 20, 40 18.0'H £84.40 £2.75
18AVTWB	Vertical 10, 15, 20, 40, 80M 25.0'H £113.85 £2.75
14RMQ	Roof mounting Kit for above £38.52 £2.75
18V	Vertical 10, 15, 20, 40, 80M 19.0'H £36.22 £2.75
1038A	3 Ele Yagi 10 metres 17.0'LE 8.0'B £67.85 £3.50
1058A	5 Ele Yagi 10 metres 18.5'LE 24.0'B £155.25 £3.50
1538A	3 Ele Yagi 15 metres 23.0'LE 12.0'B £90.85 £3.50
1558A	5 Ele Yagi 15 metres 24.5'LE 20.0'B £236.90 £5.90
2038A	3 Ele Yagi 20 metres 35.0'LE 16.0'B £178.25 £4.90
2048A	4 Ele Yagi 20 metres 36.5'LE 26.0'B £286.35 £7.30
2058A	5 Ele Yagi 20 metres 36.5'LE 34.0'B £398.75 £9.40
4028A	2 Ele Yagi 40 metres 43.0'LE 16.0'B £247.25 £6.50
0810/15A	3 Ele Yagi 10-15M 23.0'LE 13.0'B £198.95 £4.80
TH3JNR	3 Ele Yagi 10-15-20M 24.2'LE 12.0'B £202.40 £3.50
TH2MK3	2 Ele Yagi 10-15-20M 27.3'LE 6.0'B £189.05 £3.50
TH3MK3	3 Ele Yagi 10-15-20M 27.0'LE 14.0'B £274.85 £5.30
TH5DXX	"Thunderbird" 5 Ele 31.0'LE 18.0'B £419.75 £6.70
TH6DXX	"Thunderbird" 6 Ele 31.1'LE 24.0'B £398.75 £8.50
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KP250	Bel 6 Core Lighter Duty £54.91
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MML70/50S	4M 10W in 50W out £92.00 FOC
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MML144/50S	2M 10W in 50W out £92.00 FOC
MML144/100S	2M 10W in 100W out £149.95 FOC
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MMT70/144	2M down to 4M £129.95 FOC
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MMT432/28S	10M Up to 70cm £159.95 FOC
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MMT432/144S	2M Up to 70cm £184.00 FOC
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MMA144Z	2M Down to 10M £29.90 FOC
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MWC432/144S	70cm Down to 2M £37.80 FOC
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We don't sell our sets until we know them inside

The new IC-02E Push-button Perfection



ICOM introduces the new top-of-the-line IC-02E to compliment its existing line of popular handheld transceivers and accessories. The new direct entry microprocessor controlled IC-02E is a 2 meter handheld jam packed with excellent features.

Some of these features include: scanning, 10 memories, duplex offset storage in memory & odd offsets also stored in memory. Internal Lithium battery backup and repeater tone are of course included.

Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority. The IC-02E has an easy to read custom LCD readout indicating frequency, memory channel, signal strength, transmitter output and scanning functions.

A battery lock, frequency lock and lamp on/off switch are also featured, as is an aluminium case-back, providing superior heat sinking.

A variety of batteries will be available for the IC-02E, including new long-life 8.4 volt and 13.2 volt packs. Charging may be done from a top panel connector for 13.8 volts which will also power transceiver operation. The IC-02E continues to be available, and its complete range of accessories work with the new IC-02E.

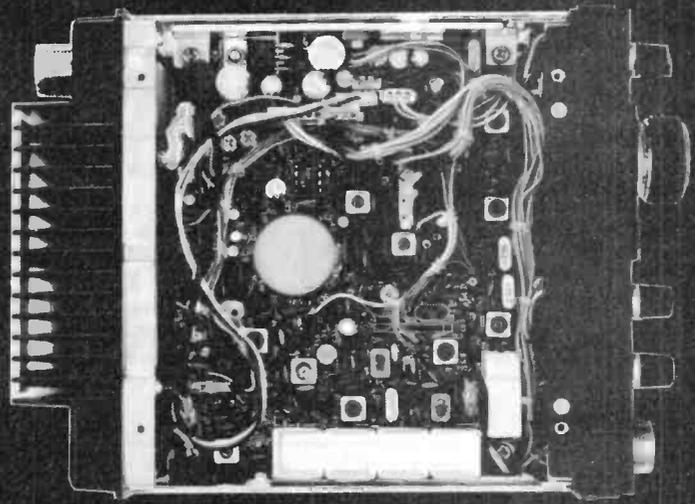
The IC-02E comes with the BP3 Nicad battery pack, BC25E wall charger, flexible antenna, wrist strap and belt clip as standard equipment. A truly excellent product destined to a great future.

We do not sell any sets until we know them inside out. A bold claim, but true. Our engineers have been trained by ICOM in Japan, and can guarantee the best after-sales maintenance service available.

As well as the 02E, 751, 745, 271, 471, R70, 290D, 490E, 25H, 45E, 2KL, AT100, AT500, 120, 2E, 4E in the ICOM range we also stock such famous names as Tono, Telereader, Cue Dee, Versatower, Yaesu, Jaybeam, Datong, Welz, G-Whip, Western TAL, Bearcat and RSGB Publications. Thanet Electronics can offer you the most comprehensive and thorough service.

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**IC-751, £969.
HF Transceiver**

The IC.751 supercedes the already popular IC.740. Improvements such as the addition of 36 memory channels, do away with mechanical bandswitching and add full HF receive capability (0.1-30 MHz), which is even an improvement on the famous R70, and you get a pretty good idea of what the IC-751 is like. It is fully compatible with Icom Auto units such as the AT-500 and IC-2KL and a further option for computer control can be added. There is also a digital speech synthesizer option which will be ideal for blind operators. For power supplies you have the option of the IC-PS740 (which fits inside) or the PS-15/PS20 range for external use.

As you would expect there is a built in speech processor, a switchable choice of a J-FET pre-amp, straight through or a 20dB pin diode attenuator and two VFOs allowing split frequency operation.

Other standard features include:- 36 memory channels with scan facility and start/stop timers, a marker, 4 variable tuning rates, Pass Band Tuning, notch, variable noise blanker, monitor switch, DFM (direct feed mixer) in the front end, full break-in on CW and AMTOR compatibility. The first IF is 70.045 MHz. Any XIT and RIT adjustment is shown on the display. The transmitter features high reliability 2SC2904 transistors in a low IMD (-32dB@ 100W) full 100% duty cycle. Power is restricted to 40W on AM and adjustable from 10W on all modes. FM and the IC-FL44A crystal SSB filter are both fitted as standard.

As you can see from this brief description the IC-751 is certainly a transceiver worth considering – Why not call us for further details?

Agent Please telephone first,
anytime between
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INPUT POWER	OUTPUT POWER (R.M.S.)	MODES OF OPERATION	PRODUCT	PREAMPLIFIER		POWER REQUIREMENTS	RF VOX	CONNECTORS
				GAIN	N.F.			
1 or 3W	30W	SSB	MML 144/30-LS	12dB	<1.5dB	13.8V @ 4A	✓	SO239
10W	50W	FM	MML 144/50-S			13.8V @ 6A	✓	SO239
10W	100W	AM	MML 144/100-S			13.8V @ 12A	✓	SO239
1 or 3W	100W	CW	MML 144/100-LS			13.8V @ 14A	✓	SO239

PRICES (inc. VAT)

- MML 144/30-LS : £69.95 (p + p £3.00)
- MML 144/50-S : £92.00 (p + p £3.00)
- MML 144/100-S : £149.95 (p + p £3.50)
- MML 144/100-HS : £149.95 (p + p £3.50)
- MML 144/100-LS : £169.95 (p + p £3.50)
- MML 432/30-L : £129.95 (p + p £3.50)
- MML 432/50 : £129.95 (p + p £3.50)
- MML 432/100 : £245.00 (p + p £4.50)

This advertisement represents a cross section of our extensive range of linear power amplifiers, currently available for the 144 and 432 MHz bands.

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Although cheaper amplifiers have appeared on the market, we seriously advise the potential buyer to consider the following points:

- 1 Has the Company manufacturing the product been in business since 1969?
 - 2 Is the product manufactured solely in the U.K.? If not what happens when you need service facilities?
 - 3 Does the amplifier you are considering have a "realistic" power output specification? Be sure to check if the power rating is RMS or PEP!
 - 4 Is the product fully guaranteed for 12 months, INCLUDING PA DEVICES?
- If the answer to any of these questions is No, then you should telephone us immediately for help!

INPUT POWER	OUTPUT POWER (R.M.S.)	MODES OF OPERATION	PRODUCT	PREAMPLIFIER		POWER REQUIREMENTS	RF VOX	CONNECTORS
				GAIN	N.F.			
1 or 3W	30W	SSB FM	MML 432/30-L	12dB	<2dB	13.8V @ 6A	✓	INPUT — BNC OUTPUT — BNC
10W	50W	SSTV	MML 432/50	12dB	<2dB	13.8V @ 8A	✓	INPUT — BNC OUTPUT — 'N'
10W	100W	AM CW	MML 432/100	—	—	13.8V @ 20A	✓	INPUT — BNC OUTPUT — 'N'



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PASS FASTER



MODEL D70 MORSE TUTOR

Once you've decided to tackle the dreaded Morse Test you won't want to mess about. You'll want a learning method that is effective, painless, and that gets you on the HF bands FAST without any expensive retakes.

That's exactly what the Datong Morse Tutor can do for you, as thousands of satisfied users will confirm.

The Morse Tutor generates a random stream of Morse characters to give receiving practice, but two very important features set the D70 apart from other systems.

First: each character comes at you at its normal speed but with an extra delay between each one. As you improve you reduce the delay until full speed is reached. This way you always learn the correct rhythmic sound for each character and avoid the worst of the notorious "plateau" effect.

Second: you can take it anywhere and use it whenever you like without the bother of a mains lead. Battery drain is so low that you should be able to pass the exam on the battery which we install before shipping!

Supplied complete with internal speaker plus personal earpiece, and with a key jack for sending practice, Model D70 is your passport to a more rewarding hobby.

Price: **£49.00 + VAT (£56.35 total)**

FL2/FL3 MULTI-MODE AUDIO FILTERS

These high performance audio filters will improve the performance of any existing communications receiver... in most cases, dramatically.

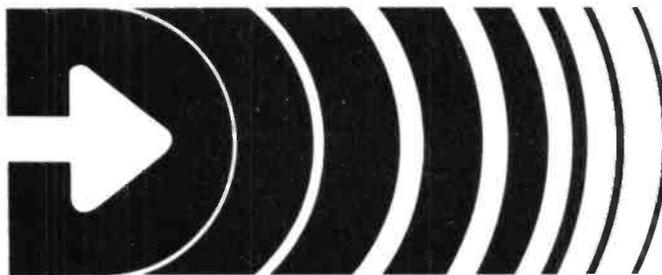
By selecting "SSB" mode you can: remove high pitched monkey-chatter from off-tune SSB stations; remove low pitched noises from other stations on the low side of your signal; remove tune-up whistles with a manually controlled notch filter; at the same time remove tune-up whistles with a second notch filter which tunes itself automatically (this function applies to FL3 only).

What marks out the Datong filters from the rest is the high performance of each of the above functions plus the fact that *all four functions are available simultaneously*.

By selecting "CW" mode all available filters (except the automatic notch) are automatically harnessed together to give an almost unbelievable ability to pull out a single CW signal from a crowded band.

Whether you are an amateur or a professional and no matter which rig you use, the overcrowding on today's HF bands can spoil your reception. Simply adding a Datong audio filter in series with the speaker may be the biggest single improvement you will ever make. Note that by retrofitting the FL2/A auto-notch conversion kit you can convert an FL2 to an FL3 at any time. The only difference is the auto-notch filter.

Prices: FL2, **£78.00 + VAT (£89.70 total)**; FL3, **£112.49 + VAT (£129.37 total)**; FL2/A conversion kit, **£34.49 + VAT (£39.67 total)**



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TRIO TS830S
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We are proud to introduce the VHF/UHF communications receiver we have all been waiting for. A glance at the brief specification will tell you why the new AR2001 receiver is going to take the listener by storm.

- ★ Continuous coverage 25-550MHz (no gaps).
- ★ Receive modes of AM (for VHF/UHF airband), FM narrow (for amateur radio, CB, business radio) and FM wide (for broadcast and TV FM).
- ★ Digital display of frequency, mode and memory channel.
- ★ Memory channels which store frequency and mode.
- ★ Full range of scan facilities.

The performance of the AR2001 sets new standards. Gone are the complaints of "deaf" receivers. The AR2001 has typical sensitivity of 0.2 microvolts for 12dB SINAD on FM (N) across the entire 25-550MHz range.

Finally, the AR2001 is small, light weight, and powered from any 12V dc source, so it can be used at home, in the car, boat or aircraft, and whilst out portable. £325.00



J.R.C. NRD515D

General coverage receiver 100 KHz to 30 MHz fully synthesised. Digital readout PLL synthesiser with rotary type encoder pass band tuning — modular construction. £985.00

NSD515 TRANSMITTER & AC PSU £1,371.00
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THE R532
AIRCRAFT BAND RECEIVER
£ 159.40 inc. VAT

SPECIFICATION.
Frequency range: 110 to 136MHz, i.e. all NAV/COM channels.
Number of channels: 1040 (25KHz steps).
Sensitivity: Better than 0.75 microvolts 10dB /SN.
Memory channels: 100 (10 banks of 10). Memories can be scanned automatically or selected manually.
Power required: 12V dc negative earth 300mA typical. (Display can be switched off to reduce consumption when operating portable). Size: 160 x 45 x 130mm.
Weight: approx. 1kg. (including memory backup batteries).

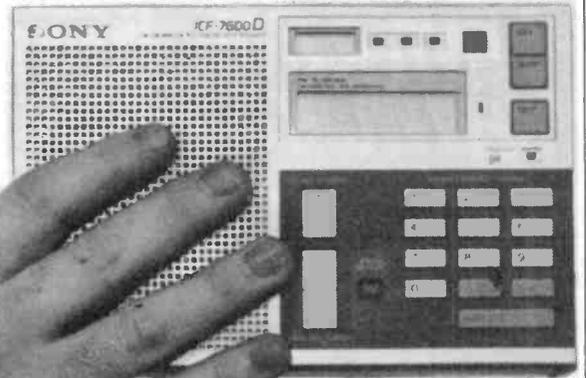
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SONY ICF7600D

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£199

£329

**FDK M750XX
FM - SSB - CW**



The M750XX is the latest from FDK with a powerful output of 20 watts on all modes SSB-CW-FM. Features include bright digital display, LED bar S-meter, RF gain control, RIT control, dual vfo memory, 144-148MHz coverage, band scanning, up/down control from microphone, tone burst, repeater shift, etc., etc. Supplied complete with microphone, mobile mounting bracket, DC lead and all hardware. Ideal as mobile or base station, here's your chance to work the DX on a budget.

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£4.99 post free.
While stocks last.



TRIO R600 £257

0.5-30MHz
230v/12v DC



R2000 £398

0.5-30MHz
230v/12v DC
Scanning memories, etc.



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(GB3SWM)

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Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of A4 sheets. Photographs should be lightly identified in pencil on the back with details on a separate sheet. All drawings and diagrams should also be shown separately, and tables of values prepared in accordance with our normal setting convention — see any issue. Payment is made at a competitive rate for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The
SHORT WAVE
Magazine

EDITORIAL

“Magazine” Articles

Any magazine needs different kinds of material, within its field, if it is to satisfy its readership. However, we know from over forty years' experience that as far as *Short Wave Magazine* is concerned, constructional articles are one of the most important parts of the contents. Now this is where you, the reader, comes in. We can always use good material, so why not write-up your latest brainchild for publication? If writing isn't your favourite occupation, you could always co-operate with another amateur who would do the writing-up from your notes, and with yet another who has the photography knack.

The articles can be short or long — one page or twenty-plus. We do feel, though, that many readers would like to read about a transceiver which operates at the normal power level used on the bands (around 100 watts output CW or p.e.p. SSB) with stability and readout accurate enough to compete with commercial equipment — and which can be home-built through a blow-by-blow series. This, of course, is a 'top line' suggestion; we still want to see plenty of shorter, and simpler (which can be just as original!), contributions. And of course we pay well for all material published.

So put your ideas and experience together and get cracking!

Bill Skiff
G3KFE.

WORLD-WIDE COMMUNICATION

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

THE month under review seems to have been pretty abysmal — at least for those of us who are restricted in the hours available for operating by the demands of work, eating, drinking, sleeping and other *minutiae*. At the times when your scribe has been able to get on, the band has varied — from awful to unspeakable; which is not to say that some lucky reporter or reader hasn't found some DX, so let's get on and look.

The Bands

The problem seems to have been, in part, declining sunspots, and in part also to geomagnetic field behaviour varying from sub-storm levels to just unsettled. And in the short term as we write this, the outlook does not look much better.

Top Band

It is often said that when things are poor on the higher bands, they pick up on lower frequencies. This hasn't really been true this time, although to be fair there has been DX about — in this case we suspect that the events of early October on Top Band have made normality an anti-climax.

G3BDQ (Hastings) has his card in to confirm the ZL2BT contact, and since then managed a QSO with HZ1AB. But of even more interest was the relaying by UA3PFN of an SWL report that the 'BDQ signals had been heard by the operator at Mirny Base, Antarctica — 449 at 2005 on October 5. Needless to say the lads at 4K1B will be rectifying their inability to transmit on Top Band from there, in short order; the relay for this SWL report was UK6LAZ. A second, later, letter makes the point that while November might have seemed to be an anti-climax, there was still DX about — several East coast Ws, VE1ZZ and VE1BVL; their sunset time was of interest and yielded contacts at 2051 and 2148, with VE1ZZ and VE1BVL respectively. UA9COT and ZS5AB provided more interest and enabled John to hear the buzz that 7P8CL was on the band — though later words indicated this might have been some piracy. 5N8ARY and JY7ZZ were nice contacts, and then the whole Top Band gang were out after the JAs, between November 21, when JA6IEF was heard at 529 around 1910 kHz, to 23rd when he was a good signal, peaking at S7, and fading away while G3BDQ waited his turn — he was finally relieved to get the last QSO before full daylight at the JA end took him down into the noise again. The CQ WW Contest was not very good to G3BDQ for DX —

although an impressive list of countries heard from Europe appeared in *DX News Sheet*; but just before closing date on December 6, John managed a QSO with AA1K and W3CV, in time to hear GW3YDX working K6SE, followed by G6CJ, who had a bit of a scratch before K6SE faded out. On the morning of December 7, John found TU2TF and W3CV; the latter said he understood that K6SE had heard him and so G3BDQ was able to make his first California QSO on Top Band; and straight afterwards he was called by W5AQ. Thus, the tailpiece is that G3BDQ has now worked all the W call areas on Top Band save for KL7.

Turning to G4AKY (Harlow), Dave is getting ready for a move of house which should come up in mid-January — but he *has* promised to put up an aerial and power the rig before he unloads the furniture. In a small way this move is a bit of a nuisance, as Dave would have liked to make his 100 countries confirmed from the present place — only eight left to go for that target. November's list shows 7X2AL, EZ6GAW, W9SMY, K5UR, UL7MAN, HZ1AB, UA1ZCN (Murmansk), SV3SJ, RV0WCY, Y39XO, Y22TO, T77C (who is in the Call Book under his old M1C call), CT4BD, 3V8AS (QSL to DJ6QT), VP2KAC and lots of smaller fry; all these were on CW, but SSB made it over to 2V8AS, DL1YD, and GM4NBZ. Gotaways on CW included SV1JG, 4Z4DX, VK6HD, VE3GAS, KV4FZ, and YV2IF.

G3OUC (Newbury) has been operating between 2100 and 2300z on Top Band with his home-brew 25 watt p.e.p. signal and a loaded vertical — 45 feet made to look like 3/8 wave and tuned against earth, a set-up which yielded QSOs with YU3BTG, DA1WD, 4X6DK, EA3VY, EA2BGR, OH5NQ, LX1BR and PA0KS during the month, along with some of the more local stuff.

G2HKU (Minster) used his SSB to reach out to SV8CS and PA0PN, while the CW sorted out EA8AAU, GD4VGN, DL1YD, HB9AMO, OZ1W, CT1AOZ, 4X4NJ, DL1RK, and RV9WCY; YVIOB was a gotaway — he was only working Ws, after Ted got up specially to hook him. There must be a moral there!

Eighty

Not a band on which people normally chase DX — but the few who do seem to like it that way, so they can have it all to themselves!

G2HKU ran the rule over the CW end of the band; it measured out at DL1RK/CT3 with the Big Rig, while QRP and four watts dealt with DF9ER.

Your scribe, having been driven downwards by the state of the higher bands, bent an attentive ear to the doings on Eighty CW; but it seems to be the case that the real DX which shows in the earlier part of the evening always disappears under the weight of EUs, a situation that rectifies itself, we are told, about ten minutes after I've given up and gone to bed! Nonetheless, Ws and JAs have been logged at workable strength.

G2NJ (Peterborough) reports that the band started well for his favourite inter-G afternoon operating, but fell away as the month went on, picking up nearer the deadline, when SMs were noted after DX as early as 1430z. PA3BSA/MM was heard operating near the Isle of Wight on November 7, working PA0LCE. Sadly before G2NJ could call him, he had cut off the contact prematurely and QRT. That QRP station, PA0GG, who was operating in 'beacon mode' back in May, reappeared in October, sending "QRP QRP QRP PWR 1 W TEST DE PA0GG PSE QSL" around 3555 kHz many times during November.

G4SXE (Burton-on-Trent) says that his success in October with his QRP rig made him dead keen to get at the November band openings. For the first fortnight not much at all happened, but then it occurred to him to change his ¼-wave end-fed to a half-wave also end-fed, and to alter the ATU from a pi-network to a parallel-tuned set-up. This did the trick, and in the three days before he wrote Brian worked Y54PL, F6HPZ, PA3BTH, F5QF and ON5IG, all with the tiny rig.

Forty

This is a sadly neglected band as far as reports are concerned, but that's not by any means to say the DX isn't there! There was one evening when even 7 MHz was dead, but relatively local signals are there for the QSO-ing most of the time, and DX of course to be found, usually within pretty narrow limits, although it is worth while to sweep the band right through once in a while, as this just might result in a pleasant surprise.

Just one was enough for G2HKU — DL1RK/CT3 — and from what we could hear from here, we aren't surprised!

Odds & Ends

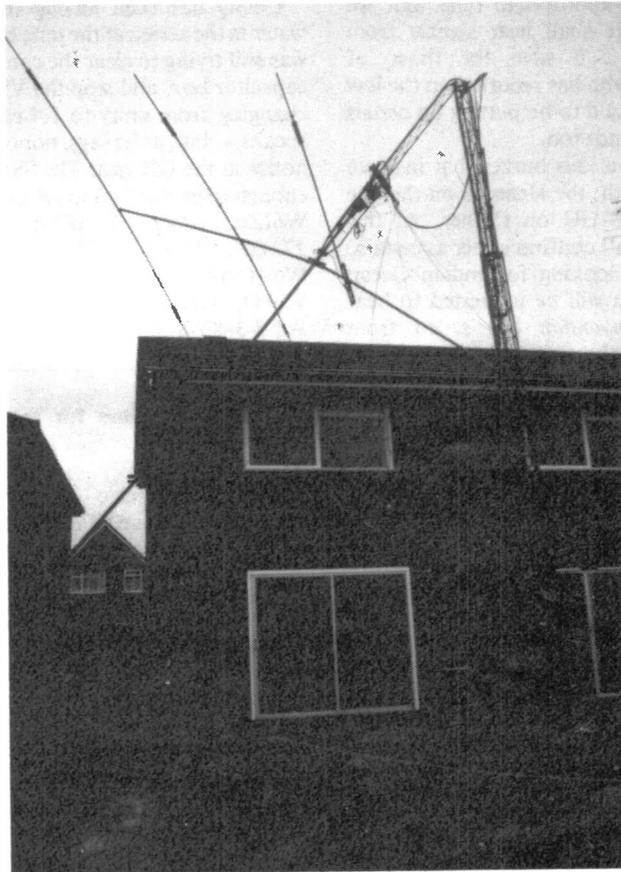
G4BUE (Upper Beeding) has various things upon his mind at the moment, not the least of which was — almost literally — his tower and beam. Chris decided to have a bite at the 21 MHz only section on the CQ WW CW contest, using his little STX rig, which he reckons can be built for under £4 plus the cost of the crystals. As the STX rig is VXO controlled around 21060, it was decided to catch up on the chores around the house in between clearing up whatever stations might camp on the crystal frequency. This went quite well on Saturday, and the day ended with some QSOs of interest, and some cupboard's built and installed. However, the next morning, G4BUE looked out of the shack, and saw the *end of an aerial element* . . . not possible if it's in the proper place! A fast look outside, and all was revealed; the top section of the tower had bent through ninety degrees, and both it and the aerial on top were a write-off. Luckily Chris is covered under the RSGB insurance scheme, and so it only remains to decide what to replace it with! The point of this is that, while the G4BUE aerial was falling over, and a nearby building comprising four stables was ripped out of the ground and rolled over completely, (a) Chris wasn't particularly aware of the wind strength and (b) the Shoreham coastguard said the highest gust they had recorded was 72 mph — clearly it was *much* higher in the small area in which G4BUE's aerial is located. The moral, one supposes, is that if one is in doubt the aerial should be cranked down. Anyway, we are pleased to say G4BUE is back on the air with a G5RV suspended from the TV mast at about 30 feet, and has already made his QRP get over the pond on this aerial.

BARTG's Ted Double, G8CDW, who has for so long been the mainstay of their RTTY contest organisation, has sent in a letter indicating that he has had to give up as from the end of 1983. His place will be taken by Mr. P. Adams, G6LZB, who lives at 464 Whippendale Road, Watford, Herts., to whom all enquiries, doubtless, should be directed. All we can say is that G8CDW set a standard which will be hard to keep up, and he will be sorely missed.

Forthcoming Events

For the interest of this section of the piece we are indebted to *DX News Sheet*, *The DX Bulletin*, W1WY, and a set of Mark One ears.

January 21-22 sees two QRP contests; the AGCW-DL affair and the Michigan QRP Club one. The former has five classes: 'A' is 'under 3.5 watts', 'B' under ten watts (both single-op), 'C' is multi-op under ten watts, 'D' high-power stations over ten watts, and 'E' the SWLs. Contest runs 24 hours, starting at 1500z; single operator and SWL entries to take 9-hour break, multi-op stations may go right



As mentioned in the text, the horrifying sight which met G4BUE's eyes on the Sunday morning of the CQ WW CW Contest!

through. Exchange RST, QSO number, and power input, plus 'X' if crystal controlled (e.g. 579001/X), and QRO stations send 'QRO' at end of the RST-plus-serial-number. Score 1 point for QSO with your own country, two for a country outside your own but same continent, and five for a country outside your own continent. Crystal controlled stations score double points, but must have no more than three crystals per band. The multiplier is one point for each DX contact defined as outside one's own continent, and one for each country. Call areas in JA, PY, VE, VK, W/K and ZS are each counted as multipliers. Final score total QSO points on each band times multiplier for that band, adding each band score 10-160 metres. Separate log for each band, and logs to be received no later than six weeks after the contest end. Send them to Siegfried Harl, DK9FN, Spessartstrasse 80, Seligenstadt D-6453, Federal Republic of Germany, and enclose one IRC for the results.

That Jarvis Is. DX-pedition by AD1S/KH5 was a bit of a frost as far as Europe was concerned, as the propagation was so poor only 200 EU contacts were made.

If you are still in need of South Orkney, then you may be interested in looking for AZ5ZA, which will be the call used by LU6EIB(SSB) and LU9EIE(CW) for a period of forty days from December 20. The QSLs go to LU2D, Box 100, Buenos Aires 1428.

Now for the latest news on the Clipperton front; the transportation is organised and the dates are given as March 5-23.

Shortly after this reaches you, HI3RST/KP5 is claimed to be looking to a Desecheo operation over January 6-8, and maybe a little longer.

The people who want Andaman Is. and also those who need Laccadives will both be interested to hear that VU2TS has announced to the world on Twenty that he has permission for Laccadives, and will be taking an all-Indian group there; the same source indicates that the Andaman situation is opening up.

The news that, due to action on the part of NZART, VK9NS will not be licensed for Kermadec has caused 24 members of the Chiltern DX club to write to NZART urging reconsideration and support for Jim Smith's proposed expedition; all we can say is that we will bend an ear to the

bands at the appropriate time, but we doubt that we shall hear signals from Kermadec . . . save for those of ZL3AFH/K who has reported on the low bands and is said to be putting up aerials for the HF bands too.

There are various buzzes that indicate 5U7 this month; the Hensons on the one hand and KC7UU on t'other. At this writing we can't confirm either as certain.

If you are looking for Indian Ocean countries, you will be interested to hear that the *Banyandah* has sailed from Cairns, Australia, with Jack and Judith Binder; this is the boat that was involved in the 1978 Mellish job, Spratly in 1979, Kingman Reef, Tokelau and Palmyra in '81, and Mellish again in '82. This time the intent is to base at Mayotte, and run from there to Glorioso and Juan de Nova, in July 1984, having reached the area by a roundabout route from Cairns that will take in the Solomons, the Philippines, Singapore and the Seychelles group. More details from Jack Binder at PO Box 542, Cairns, Queensland, Australia 4870.

Twenty

Not a lot of news this time, probably because some letters have got caught up in the slowing Christmas mails, first class taking two days or more.

G2HKU continues to have his regular skeds on SSB with ZL; ZL1AX, ZL3FV and ZL3RS this month. CW was used for contacts with RR2WCY, UK0QAA, DK7PE/6W8, and W6KG/HK0 for San Andres.

Turning to G6QQ (Hoverton) we find David has now managed 136 countries, all-bands, in the short time since he came back on the air; on SSB we see 5N3RTF, KT9S, AK7Y, W1BFA, VP2KT, K7SPL, and EL8E, with CW used for KA7V and W2FC. EL8E, incidentally, comes from Liverpool, and will be home Christmas; G6QQ hopes to make a personal QSO when the EL station is in the Norfolk area at the end of December.

Fifteen

Here we start with G4BUE; we have already noted Chris' mishap with aerial and tower, and left him putting up a G5RV on the top of the TV aerial mast. With his home-brew STX rig (which is QRP in size, too — about 2 inches cube!) Chris made 28 contacts, including QSOs with UF6, UA9, UH8, P47E (better known as PJ7), KP4A, and thirteen East Coast Ws on his 800 milliwatts. After the aerial came down, Chris fed the G5RV through a home-brew QRP ATU, at the same level, either from his OXO transmitter or the Argonaut 515 he brought back from the U.S.A. in the autumn; at this level, K1XA was worked among other stations — which shows that the G5RV was keeping him going.

The G2HKU haul was all CW, in the shape of TA1UA, UK9FDA and JA5YAV.

G6QQ has been having trouble with water in the aerial; at the time of writing he was still trying to clear the contents of the capacitor box, and stop the VSWR from changing from unity to 1.4 each time he speaks — but, as he says, nobody seems to notice at the DX end! The SSB was good enough to enable him to get out to KT7V, W6IZB, 7P8CS, ZS6BMF, YB8ARM, J73DF, JY7ZZ, JY7IM, VP2KM, W6KG/HK0, HR3JJR, ZS2RJ, TL8ER, V2AO, HR3JJR again, PP5YC, and W1-2-3-4-7-8-9.

"CDXN" deadlines for the next three months:

February issue—January 5th

March issue—February 2nd

April issue—March 8th

Please be sure to note these dates

Stamps

There are many amateurs who would like to QSL direct, with an *s.a.e.* as the experts suggest, but who are deterred because they can't get hold of either IRCs or the stamps of the country concerned. Now G3TXF has realised this, and to help DX-ers and SWLs out of the problem Nigel is stocking stamps of the required denominations from some 19 countries in which QSL managers are likely to reside. Nigel has an order form showing the amount in the currency of the particular country, the cost in UK currency and, of course, the country in question (two more, VK and ZL are just being added) and it is obvious that overall it is a lot cheaper to buy mint stamps from G3TXF and stick them on an *s.a.e.*, than it is to include a couple of IRCs — as well as being a lot easier for the QSL manager. Contact G3TXF for the details: N. S. Cawthorne, G3TXF, DX-Stamps Service, Holt Cottage, Kingston Hill, Kingston-upon-Thames, Surrey KT2 7JH, or telephone 01-942 7853.

New Bands

G3SFZ(Ealing) notes an error in our reference to his activities on the new bands — for 100 read 1000 — and the tally now is nearer 1100 QSOs completed on the bands in 41 countries, and using only the QRP rig. Mostly this activity has been on 10 MHz, but just recently G3SFZ has turned to 18 MHz, using an indoor dipole and TS-930S during the period November 18 to December 3. This short period of operation, around 18069-18070 kHz, was rewarded by contacts with LA9XG, GJ3YHU, PA3AWN, G3JLB, DL1SQ, CU1LN, VK3AGW, and OZ1EUO. However, the only contact on 24 MHz was the local G3RHM.

Ten Metres

There does seem to be a little life in the old dog yet. In the CQ WW Contest propagation on the band went well down into Africa and to parts of the Caribbean. G4HZW (Knutsford) operated some 70% SSB and 30% CW; he reckons the conditions between November 3 and 8 were super, but poor for the rest of the time. The CW Activity periods organised by RSGB gave Tony a lot of fun, with contacts down to Surrey and up into GM on what sounded like a dead band. In terms of contacts, it added up to an all-time new one by way of 5R8AL, then 3D6AL, 4Z0DX, 9J2FC, A4XYY, EA5BAA/EA8, OH2MM/EA8, HH2CQ, HH2VP, JY7YJ, JY7ZZ, N4TO/KP4, NP4Z, PY8FZ, SV1OL/SV5, TR8JD, UW1ZD in Murmansk, UA1-2-3-4-5-6-9, UI8DAM, UA0AAB, UA0ACK, all W call areas, VE5ACP, VK5AWC, VK5ATN, VS6CT, ZL3ACT, ZS1CT, ZS3TSB/P; and the gear of course was the usual TS-820 two-element Quad aerial.

November 6 was the big day for G2ADZ (Chessington) who put out a CQ call at 0819 and was rewarded by a call from ZL2UW, followed by ZM2RY and VK4LV, and it was noted that other VK and ZL stations were on too; and the next three days were just the same, with beacons in all continents audible. The CW was used to work VS6HI, K1DG/PJ7 (QSL to K1AR), ZL2UW, ZM2RY, VK4LV, VK6OH, JY7KV, while the following were heard but not worked: VP9LB, VK6UA, TJ1QS (QSL to F6DZU), VK8HA, 3B8CF, 3B9FK, S83H and various South Americans.

G3OUC noted quite a bit of activity from the ex-CB rigs, putting their RF into the ten-metre repeaters over the other side of the Atlantic and so working around various parts of the U.S.A. Although the 'channel' system is a retrograde step on any band where occupancy is heavy, reducing as it does the possible spectrum usable and so adding to the QRM, there isn't much activity or many openings on Ten at sunspot minima, so here it can be justified at least until another four years or so have gone; but G3OUC is still building up a VFO-controlled machine for his personal campaigning.

Finis

Sad to say more letters arrived after the deadline and so too late to be taken in — among them contributions from G3NOF, GW3YDX and G4LDS. For the next time the deadline is **January 5**, to arrive, addressed as always to your conductor, "CDXN," SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Oh, and *thanks for all the good wishes!* They're much appreciated and heartily returned.

MAIDENHEAD SQUARES

A WORLDWIDE LOCATOR SYSTEM

N. A. S. FITCH, G3FPK

CONTESTS have always been a feature of amateur radio activity and few weekends are free of them on the HF and VHF bands. On the HF bands, the scoring is usually based upon countries, prefixes, or zones of various kinds worked. Conversely, most all VHF/UHF/SHF events use distance as the basis for calculating the points. Furthermore, distance records are compiled for contacts on the many bands above 30 MHz via various propagation modes such as Moonbounce, Sporadic E, tropospheric, etc. To calculate distances over the Earth's surface, and the Great Circle bearing of one station from another, if required, information must be exchanged to, in effect, define latitude and longitude.

Latitude and Longitude

Everyone is familiar with the concept of latitude and longitude whereby a sphere, such as the Earth or Moon, is divided into *Meridians of Longitude* running north to south through the poles, and *Parallels of Latitude* parallel to the Equator. Any spot on the sphere's surface can be uniquely defined by the degrees, minutes and seconds method to an accuracy of about $\pm 15\frac{1}{2}$ metres at the Earth's Equator. Knowing the latitude and longitude of any two locations, the actual surface distance between them can be calculated by solving the triangle OAB in Fig. 1. OA and OB represent the radius of the Earth, while AB can be found when the angle AOB has been found. The latter is calculated from the formula:—

$$\angle AOB = \arcsin[(\sin a \times \sin b) + (\cos a \times \cos b \times \cos C)] \dots (1)$$

where:— a = the latitude of location A
 b = the latitude of location B
 C = the longitude difference between A and B.

Notes:— 1. arcsin is the same as \cos^{-1} and means, "the angle whose cosine is . . ."

2. Latitudes south of the equator must be entered with a minus sign. e.g. 39°S would be entered as "− 30" with due allowance made for the sign of the appropriate function. (If using a pocket calculator, this is done automatically).

Other Reference Systems

In Great Britain, the *Ordnance Survey* uses a basic grid system of 100 km. by 100 km. squares identified by two letters, such as "TQ" which includes the Greater London region, and "NS" in which Glasgow is situated. Places are located by their *National Grid Reference (NGR)* consisting of two letters and six figures, e.g. TQ 694683. The first three figures are known as *eastings* as they are measured from the western edge of the main 100 km. squares in an easterly direction, while the last three are called *northings* since they are measured from the southern edge of these squares in a northerly direction. Thus, the first and fourth figures represent tens of kilometres, the second and fifth kilometres, and the third and sixth hundreds of metres.

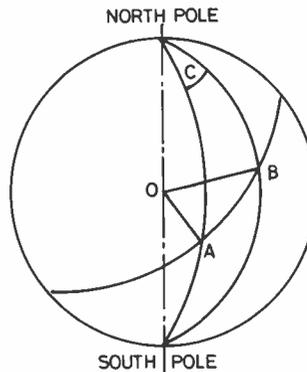


Fig. 1

Fig. 1. Point O is the centre of the Earth. Points A and B lie on three great circles, two of which pass through the poles; i.e. they are meridians of longitude. Angle C represents the difference in longitude between A and B. To calculate the circumferential distance from A to B, the angle AOB has to be calculated. See text.

For amateur radio purposes, the NGR system is too parochial. It is quite satisfactory for calculating the distance from Land's End to John o'Groats, but no use for working out the short distance from Dover to Calais since the NGR system does not extend into France. It will be seen that the NGR system is incompatible with latitude and longitude.

A concept familiar to all serious VHF operators in Europe is the *QTH Locator Squares* system and which, unlike the NGR one, is derived directly from latitude and longitude. The *primary squares* are two degrees from east to west and one degree from north to

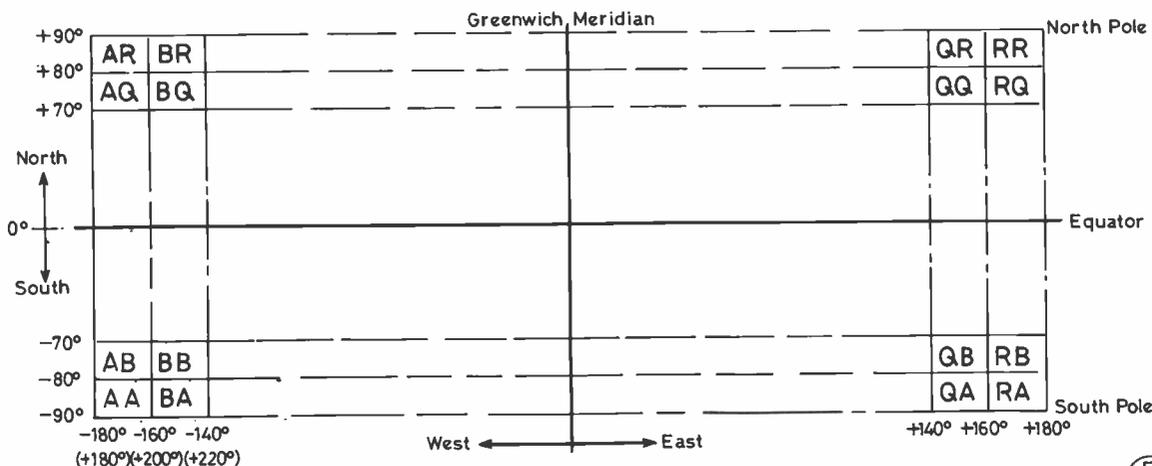


Fig. 2 THE 324 FIELDS

Fig. 2. The 324 Fields. Note the west to east, and south to north lettering sequences. See text for explanation of the +180°, +200° figures.

E 174

E 175

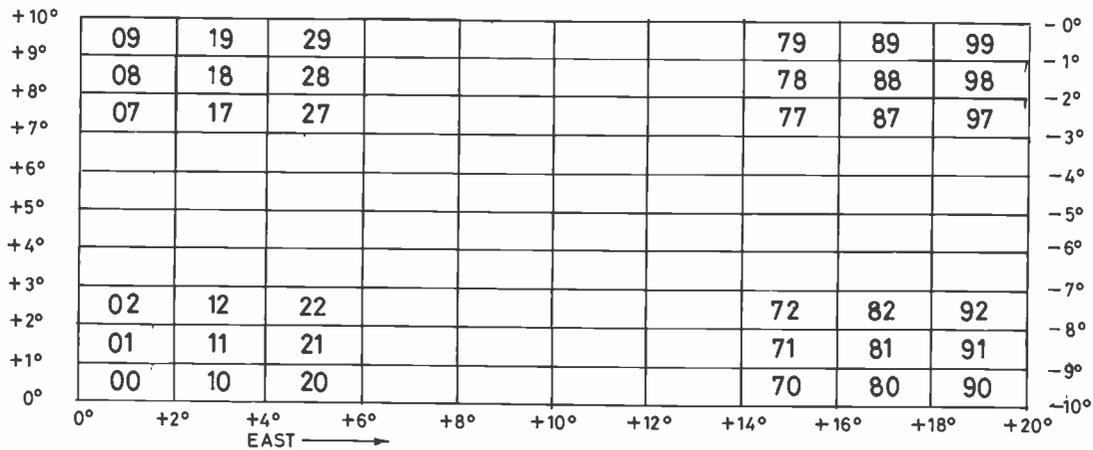


Fig. 3 THE 100 SQUARES

E 176

Fig. 3. The 100 Squares. Note the west to east, and south to north numbering sequence. For the northern hemisphere use the left-hand, plus, scale and for the southern hemisphere use the right-hand, minus, scale. See text.

south, being identified by two letters such as "AK" or "CG". These are sub-divided into eighty secondary squares, twelve minutes east to west and 7½ minutes north to south, numbered 01 to 80. Each of these is finally sub-divided into nine tertiary squares lettered "a" and "j" omitting "i." Thus a typical locator would be ZN54c.

Actually the so-called squares are not square since the "sides" converge towards the North Pole. At latitude 51°N, the tertiary squares are 4.662 kms. East-West and 4.631 kms. North-South giving a diagonal accuracy of ±3.286 kms. within a square. The origin of the European QTH Locator System, square "AA," is the Greenwich Meridian at latitude 40°N. Unfortunately, this ingenious system is not unique. For example, the Mediterranean island of Malta is in "HV" square, but there is another "HV" in Sweden and others in Asia.

Maidenhead Squares

Some VHF enthusiasts saw the need for a world locator system that would define any location with reasonable accuracy in as few symbols as possible. During the 1970s, over twenty schemes were proposed and these were studied at a meeting of European VHF Managers in Maidenhead, Berkshire on April 26-27, 1980. Out of these deliberations there emerged the preferred system from a proposal by John Morris, G4ANB. This Maidenhead Squares idea now seems to have been adopted by Moonbounce operators

throughout the world.

This system is based upon latitude and longitude, the globe being divided into 324 areas, each twenty degrees from east to west and ten degrees from north to south, known as Fields, and identified by two letters from "AA" through to "RR". The fields are each divided into one hundred Squares two degrees E-W and one degree N-S and numbered from "00" to "99." Thus these squares are compatible with the primary squares of the QTH Locator system, currently in use in IARU Region 1. The squares are finally sub-divided into Sub-squares, each five minutes E-W and two-and-one-half minutes N-S. These 576 sub-squares are lettered from "AA" through to "XX". So a complete locator would be of the form JN45WH, for example, and that would be unique and not repetitive. The accuracy is similar to that of the current five symbol QTHL system. In each, the "height" of the smallest squares is the same, but in the Maidenhead system they are 25% "wider." At latitude 51°N, the sub-squares are 5.828 kms. E-W, giving a diagonal accuracy of ±3.722 kms.

The origin of the Maidenhead system is longitude 180° West at the South Pole. All lettering/numbering runs from west to east and from south to north, and the basic idea can be seen by studying Figs. 2, 3 and 4. Referring to the JN45WH example, it will be seen that the 1st, 3rd, and 5th characters, "J," "4" and "W" represent the longitude information, and the 2nd, 4th and 6th characters, "N," "5" and "H" the latitude data.

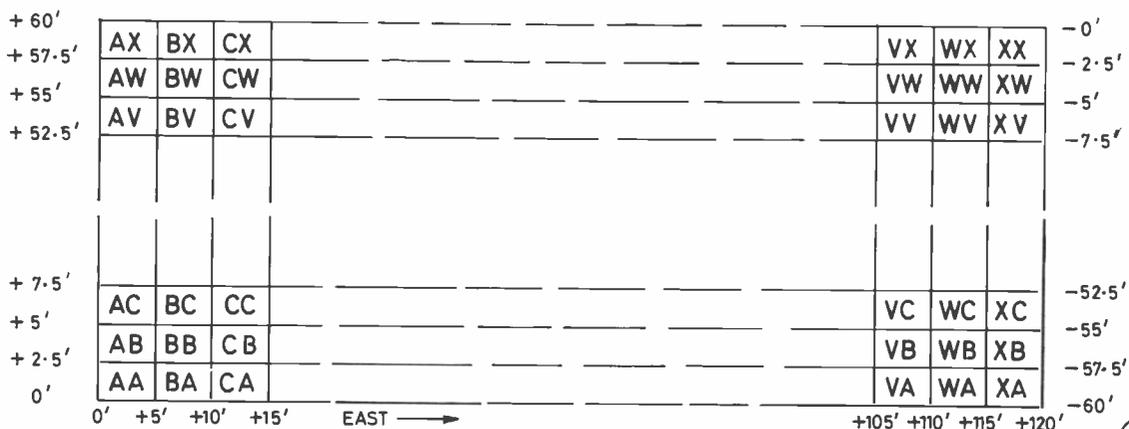


Fig. 4 THE 576 SUB-SQUARES

E 177

Fig. 4. The 576 Sub-squares. Note the west to east, and south to north lettering sequences. For the northern hemisphere use the left-hand, plus, scale and for the southern hemisphere use the right-hand, minus, scale. See text.

Working out a World Locator

The best way to appreciate the Maidenhead *World Locator System* is to mark the Fields on a large world map, preferably one drawn in *Mercator's* projection. If you do not wish to do this, you can draw them on a sheet of tracing paper hinged to the top of the map with adhesive tape. To work out any locator, the latitude and longitude must be known. Tables 1 and 2 have been compiled to enable anyone to work out a World Locator from such data. A couple of examples should suffice to illustrate the use of these tables.

Example 1. Derive the locator for Scafell mountain in the English Lake District.

From the *Ordnance Survey*, the latitude is derived as North 54°.26'. 50" and the longitude West 3°.13'. 23". To avoid ambiguity, longitudes *west* of Greenwich round to the International Date Line are changed to *east* of Greenwich, using the formula:— Long. E° = 360° — Long W°. Thus Scafell's longitude is 360—3°.13'. 23" = 356°.46'. 37" East. This kind of presentation will be familiar to satellite users, although in *amateur* satellite work for some strange reason, degrees *west* of the Greenwich Meridian are used!

Back to Scafell, though. Using Table 1a, we note that 356° lies in the "340-360" line corresponding to letter "I", to give the first character. Coming to Table 1b, measuring from the western edge of the Field, *i.e.* 340°, we have 16°.46'. 23" left over, which figure lies within the "16-18" line corresponding to figure "8" to provide the third character. Finally to Table 1c, again measuring

Minutes East of western side of square	Sub-square Letter
0- 5	A
5- 10	B
10- 15	C
15- 20	D
20- 25	E
25- 30	F
30- 35	G
35- 40	H
40- 45	I
45- 50	J
50- 55	K
55- 60	L
60- 65	M
65- 70	N
70- 75	O
75- 80	P
80- 85	Q
85- 90	R
90- 95	S
95-100	T
100-105	U
105-110	V
110-115	W
115-120	X

Table 1c. This determines the fifth character.

Degrees East of Greenwich	Field Letter
0- 20	J
20- 40	K
40- 60	L
60- 80	M
80-100	N
100-120	O
120-140	P
140-160	Q
160-180	R
180-200	A
200-220	B
220-240	C
240-260	D
260-280	E
280-300	F
300-320	G
320-340	H
340-360	I

Table 1a. This determines the first character. *Note: Longitudes west of Greenwich have to be converted to degrees east. See text.*

Degrees East of western side of field	Square Figure
0- 2	0
2- 4	1
4- 6	2
6- 8	3
8-10	4
10-12	5
12-14	6
14-16	7
16-18	8
18-20	9

Table 1b. This determines the third character.

Table 1. Longitude Data

from the western edge of the square, we have 46'. 23" left over, which amount lies within the "45-50" line, equating to the letter "J". So we now have I?8?J? for the longitude part.

To derive the latitude characters, we use Table 2. In Table 2a, 54°N is in the "+ 50-60" row, to give the second character, the letter "O." Measuring from the southern edge of the Field, we have 4°.26' 50" left over, which lies in the "+ 4-5" row in Table 2b, to give figure "4". Lastly, the remaining 26'. 50" is found in the "+ 25-27.5" row in Table 2c, corresponding to the letter "K". Therefore, the complete locator for Scafell becomes IO 84 JK.

Example 2. To find the locator for a place in the southern hemisphere to the east of the Greenwich Meridian, *e.g.* 32°.21'. 18" South and 28°.44'. 39" East in Cape Province, South Africa. Following the same procedure as in Example 1, from Table 1a we derive the first character "K" from the "20-40" line. There is 8°.44'. 39" left over which yields figure "4" from line "8-10" in Table 1b, for the third character. From Table 1c, with 44'. 39" left over, from line "40-45" we get the fifth character, the letter "I".

Next the latitude data from Table 2. Since we are dealing with a southern hemisphere location, the "minus" parts of these tables will be used. From 2a, the 32°S part is in line "— 30 — 40" corresponding to letter "F" for the second character. There is 2°21'. 18" over and from 2b, this lies in line "— 2 — 3", using the right-hand column and gives figure "7". Turning to 2c, we still have 21'. 18" over and, again using the right-hand column, this lies in line "— 20 — 22.5" corresponding to letter "P" for the sixth character. This gives the complete locator as KF 47 IP.

Naturally Tables 1 and 2 can be used in reverse to calculate the latitude and longitude, given the locator code. To take an example, let us derive the latitude and longitude corresponding to OJ 11 VH.

The longitude data is given by the 1st, 3rd and 5th characters, "O", "I" and "V". From Table 1a, the letter "O" corresponds to 100°E; remember, always work from the *western* edge. From 1b, figure "1" corresponds to 2° and from 1c, the letter "V" is in

the "105-110" minutes line. Let us take the mid-point of that sub-square as 107.5' or 1°.47.5'. So the longitude is the sum of these three figures:—

$$\begin{aligned} O &= 100^\circ \\ I &= 2^\circ \\ V &= \underline{1^\circ.47.5'} \end{aligned}$$

$$\text{Longitude} = 103^\circ.47.5'$$

The latitude information is contained in the 2nd, 4th and 6th characters, "J", "1" and "H". From Table 2a, "J" is in row "+0 - 10" so we start with 0°. From 2b, the figure "1" is in row "+1 - 2" since we have established from the "J" letter that the location is a plus one, i.e. in the northern hemisphere. This gives 1°. Lastly, from 2c, the "H" is in the "+17.5 - 20" row, so the mean figure is 18.75'. Thus the latitude is:—

$$\begin{aligned} J &= 0^\circ \\ 1 &= 1^\circ \\ H &= \underline{0^\circ.18.75'} \end{aligned}$$

$$\text{Latitude} = 1^\circ.18.75'$$

This location is in the region of Singapore, in south-east Asia.

Distance Calculations

The distance between two locations on the surface of a sphere can be derived from Equation (1) which gives the angle between the two locations as viewed from the centre of the globe. The Earth is not a perfect sphere, its polar diameter being about

Latitude Degrees	Field Letter
+80-90	R
+70-80	Q
+60-70	P
+50-60	O
+40-50	N
+30-40	M
+20-30	L
+10-20	K
+ 0-10	J
- 0-10	I
-10-20	H
-20-30	G
-30-40	F
-40-50	E
-50-60	D
-60-70	C
-70-80	B
-80-90	A

Table 2a. This determines the second character. The plus sign denotes northerly latitudes, the minus sign southerly ones.

Degrees North	Square Number	Degrees South
+9-10	9	-0- 1
+8- 9	8	-1- 2
+7- 8	7	-2- 3
+6- 7	6	-3- 4
+5- 6	5	-4- 5
+4- 5	4	-5- 6
+3- 4	3	-6- 7
+2- 3	2	-7- 8
+1- 2	1	-8- 9
+0- 1	0	-9-10

Table 2b. This determines the fourth character. Use the left-hand column for latitudes north of the Equator, and the right-hand column for those south. See text.

Minutes North	Sub-square Letter	Minutes South
+57.5 - 60	X	- 0 - 2.5
+55 - 57.5	W	- 2.5 - 5
+52.5 - 55	V	- 5 - 7.5
+50 - 52.5	U	- 7.5 - 10
+47.5 - 50	T	-10 - 12.5
+45 - 47.5	S	-12.5 - 15
+42.5 - 45	R	-15 - 17.5
+40 - 42.5	Q	-17.5 - 20
+37.5 - 40	P	-20 - 22.5
+35 - 37.5	O	-22.5 - 25
+32.5 - 35	N	-25 - 27.5
+30 - 32.5	M	-27.5 - 30
+27.5 - 30	L	-30 - 32.5
+25 - 27.5	K	-32.5 - 35
+22.5 - 25	J	-35 - 37.5
+20 - 22.5	I	-37.5 - 40
+17.5 - 20	H	-40 - 42.5
+15 - 17.5	G	-42.5 - 45
+12.5 - 15	F	-45 - 47.5
+10 - 12.5	E	-47.5 - 50
+ 7.5 - 10	D	-50 - 52.5
+ 5 - 7.5	C	-52.5 - 55
+ 2.5 - 5	B	-55 - 57.5
+ 0 - 2.5	A	-57.5 - 60

Table 2c. This determines the sixth character. Use the left-hand column for latitudes north of the Equator, and the right-hand column for those south. See text.

Table 2. Latitude Data

0.34% less than its equatorial diameter. The author uses figures of 6,356.912 and 6,378.388 kms. for the respective radii. Therefore, the average circumference of the Earth is:—

$$(6,356.912 + 6,378.388) \times \pi \text{ kilometres}$$

which works out to 40,009.125. Thus, for every one degree of angle subtended at the centre (point "O" in Fig. 1) the surface distance is 40,009.125 ÷ 360 = 111.13646 kms. So to work out the distance between "A" and "B" just multiply the solution to Equation (1) by this constant.

Accuracy

Making the perfect sphere assumption, all Fields, Squares and Sub-squares are the same distance from north to south so, for any two locations on the same longitude — say West London and Accra in Ghana — the accuracy is ± 4.631 kms., the "height" of a sub-square. However, in the E-W direction the size of the sub-squares is a maximum at the Equator and zero at the Poles. Using the average circumference of 40,009.125 kms., the 5' width equates to 9.261 kms. so the maximum error between two points on the Equator would be ± 9.261 kms. The maximum error would occur between two sub-squares straddling the Equator, e.g. KJ 80 AA and KI 89 BX, being ± 10.355 kms. However, in such cases, local maps would be used for working out short distances.

A New Award?

For certificate hunters, one can envisage a new award based upon a "Worked All Fields" concept. The attraction of this is that it would eliminate any argument about what constitutes a country. The only requirement would be the obvious one that whoever was operating from wherever had a valid licence to do so, in accordance with I.T.U. regulations. This would avoid tragedies like the ill-fated Spratly Islands affair since there would be no need to visit such sensitive areas. The *Short Wave Magazine's* QTH Squares Century Club, and the QTH Squares Table in the

VHF Bands feature leave little doubt of the popularity of an impartial "squares" idea, so why not extend it to a global scale? Any such award could become 'big business,' as has the ARRL's DXCC, so it would need to be sponsored and managed by a large organisation. Since the idea for the described world locator system was born in England, it would be appropriate if the RSGB operated such an awards programme.

Conclusion

The QTH Locator system which has been in use in part of I.A.R.U. Region 1 for many years, while being basically

satisfactory, does have the drawback of not being unique. It is not suitable for inter-continental use. Whether or not it is eventually phased out in favour of the Maidenhead Squares system for VHF contest use is up to the VHF fraternity to decide. However, with more long distance contacts being made in the VHF/UHF/SHF bands, *via* Moonbounce, Transequatorial propagation, satellites, etc., there is no harm in including your World Locator code on your QSL card.

• • • SWL • • •

SHORT WAVE LISTENER FEATURE

By Justin Cooper

THOSE of you who have been on for a year or more will have noted how conditions have declined with the falling sunspot count — after a 'plateau' lasting for quite a while, the falling trend has accelerated and so brought things nearer to where they would have been expected to be at this stage. However, we have a long way to go yet; the SSN for November should be around the seventies, and at the very bottom we will be looking at an SSN of well below ten! What will this mean to us in the context of the bands? Essentially, Twenty will only ever be open in daylight, 21 MHz will flicker into life once in a while, and Ten will have nothing on it at all in the line of DX. As far as Ten goes, in previous cycles, VHF-type propagation has been available, with its 'lifts' and tropo openings, Spor-E, and so on, but there has always been a sad lack of activity. With any luck, this time round there will be beacons, FM stations and local nets to keep things humming when the DX isn't about — and of course a 'DX' station may be in Europe anyway if his call is rare enough!

And that, of course leads to the old question, "What is DX, exactly?" About the best answer we can give is the one so often given by Cass, WA6AUD, in the late-lamented *WCDXB* — "DX IS!" If you've never heard, say, an Italian signal before, the first one is DX — even if a few weeks later I prefixes become ten a-penny. The use of the term DX when calling CQ, though, is slightly different; here the implication is that a G calling CQ DX on, say, Twenty when the band is open is looking for a station in a different continent at least, although he may well settle for another G if he doesn't get a decent nibble. On Top Band in daylight, a call from GM in answer to a CQ DX would be quite acceptable, but not so a call from a local only interested in a ragchew across town — although here again a local caller should at least have the decency to wait and see if the CQ nets a more distant reply. And, of course, the real top-liner often won't even fire up the transmitter unless there is a 'new one' under that pile-up! In practice, a CQ DX call from a G station is a bit of a waste of time anyway — the proper procedure is to listen for a station of interest and then call him, as most CQ DX calls won't scare up anything of real interest if they emanate from a country with a sizeable radio amateur population.

Competition

What an uncompetitive lot you are! Admittedly we didn't go mad over drumming up support, and in the event we only got a few entries. Be that as it may, *Tina Parry (Blackpool)* emerged a good winner! Tina wanted a pre-amp, so she scrounged around

for the bits: the case, in true amateur fashion, had the odd surplus hole in it, left over from some earlier effort of the OM, and all the bits barring the BFY90 and the miniature power switch came from the junk-box. Tina made the PCB layout herself (having previously done some layouts for the OM), then wired it up and made it go, finishing off with a re-paint of the case, and some appropriate lettering. The only real problem was the eternal one of the 'junk-box builder' of components that the solder won't 'take' to — but patience and persistence earned its just reward. A pity the photographs she sent weren't sharp enough for reproduction — but they showed the writer a simple circuit very well done, and far better than *his* first apprentice constructions. So Tina Parry scoops the pool, and by the time you read this will be receiving her prize of a copy of the 1984 *DX Listings*.

The Letters

The top of the pile this time is the one from *E. B. Ward (Nottingham)*. Barry has his fingers crossed for the RAE, and since he is being licked into shape by Alan Lake, G4DVW, we can guess that he is being indoctrinated into the QRP game, as well as taught theory! On the CW side, Barry can take the W1AW Morse at 25 wpm without writing it down, but as for the sending, the bugs have reduced his speed on a pump-handle to 15 wpm; but that ought to be enough for a pass in Morse — and an RAE failure will merit instant excommunication! Meantime, the fall-away in sunspots has induced Barry into some thoughts on a mysterious Wonder-Wire for the low bands.

Turning to the letter from *H. M. Graham (Chesham)*, Maurice found the autumn lift in conditions quite fair, between October 8 and November 10, after which Ten dropped back into the doldrums. However, he is still outstanding several QSLs for over a year now and has all but given up hope of them; some being rare-ish countries, too.

A very brief note comes in from *J. Heath (St. Ives, Huntingdon)* who adds a few to his score and says he will be more active soon.

E. M. Gauci (Sliema, Malta) writes in with a first entry to the HPX Ladder — Eddie used the Rules and the Geoff Watts *Prefix List* as his guides and by the looks of it they've kept him well on the straight-and-narrow.

Sad Story

Letters that go astray! The unfortunate this time was *I. F. Thorpe (Bracknell)* who has sent several lists in, but none seem to

last time, we didn't take his entry into the Table — one of those mistakes that occur, due to a mis-aimed paper-clip. Sorry, Charles!

An entry in all three tables seems likely to come before long from *R. Fox (Northampton)* — provided he completes sorting out the gear for *Oscar 10*. Roy has pretty wide coverage of the band, as his list this time shows claims on all bands between 3.5 MHz and 430 MHz.

Aerials Again

Last time round we talked of a simple home-brew aerial for one's first tries at VHF; this resulted in an interesting letter from *G4UMI (Woking)* — if his drawings and writing had been clearer we'd have turned it into a complete article. Anyway, what Peter is saying is that while he was listening for the various slow Morse transmissions on the band, he felt the need for a simple aerial to enable copy on his hand-held two-metre rig. He started with a perfectly normal HB9CV design, but then there came a heat-wave (remember, gang, those days when it was warm enough to go out without an over-coat?) and hence the need for the garden shack door to stay open while operating. So, G4UMI mounted his beam on a length of dowel of square section and then — this is the delicious bit — made a suitable square-shaped cup for the base of the pole to sit in, and *screwed it to the shack door*. Now, if you mount the square dowel in the cup, you have four possible directions immediately, just by a quick lift, flip of the wrist, and replace. But, if you open the door, then the 90 degree movement of the door fills in the remaining angles, and lo! the shack door is your rotator. OK, so there aren't heat-waves all year . . . but the idea is there for an all-the-year-round arrangement with no more than a few minutes of careful thought. It certainly wouldn't need any serious modification to become handy for a holiday, using the car's wind-up windows as the clamp mounting.

Another licensed chap, *J. M. Coates, G4GYU*, of Mansfield, comes in at this point and says he has an answer to the problem of Mr. H. Linton mentioned last time. It seems G4GYU was in *Lowe's* at Matlock the day before he wrote, and upon enquiry, established that they had sets of valves and stabilisers, including pilot lamps, for the Trio 9R59DE and DS models, and a reasonable stock situation on spares generally for the older receivers of Trio make.

Congratulations are due to *R. Everitt (Bluntisham)* who has obtained G1CRH. However, the intention is to continue with SWL activity as a hobby while studying at Leicester Poly; of course, any calls heard from there would be able to count towards the main total.

Oh, dear! We've done it again, and given *D. B. Shapiro* a wrong initial. We will have to go to *Prestwich* and make our peace some time! Seriously, we had to laugh at the first note this time — just a postcard with "1000+" written as large as possible on one side, and the address on the other! In fact, the second letter bumped the total up to nearly 1100. The second point was about our reader, *A. Chadwick* — D.B.S. says you must live very near to him, and what about getting in touch? D.B.S. can be found at 1 Butterstile Lane, Prestwich, Manchester M25 8PW.

A first entry for the 1983 HPX Ladder is sent in by *C. Burrells (Stevenage)* — pretty obviously the local club lads have been laying it on a bit thick about the J.C. red pencil to judge by Charlie's letter. We wonder which old friend has been winding-up the works?

An interesting question arises in the letter from *A. P. Lincoln (Aldershot)*. Peter has a rotatable dipole and a vertical and he finds that, in general the horizontal aerial will outperform the vertical. However, it has been noted that when a signal is good on the vertical, the horizontal doesn't show much directive effect,



The SWL station of Gordon Allis, RS84821. Gordon, who lives in Epsom, came back to amateur radio through CB, having lost his early avid interest in listening some years ago; he is now studying hard for the R.A.E. The station consists of a Geloso G209R double-conversion receiver and an Eddystone EC-10; antennas are a trap dipole, 132-ft. long wire and a TA-33Jr beam. All bands are monitored, with a preference for 80m. and 15m. Gordon is also a member of the Royal Signals Radio Society.

but if the signal is weaker on the vertical than the horizontal shows directivity to a marked degree. This, we suspect, is largely a question of the angle of the incoming wave to the ground. The vertical will tend to favour the lower angles, at least in theory, while the horizontal, which at these frequencies is relatively low, will tend to prefer the higher angle signals. Hence it is found that the vertical is good for the locals, poor for the short-skip and nearer Europeans, and better again at the DX beyond about 2500 miles. In practice, we think that what happens is that the horizontal is only picking up enough signal for the directive effects to be apparent when the signals are coming down from a high angle. However, the truth of the business is that in a practical situation, about all the real profit there is lies in using whichever aerial comes out with the best signal!

Finally, we must mention a letter from *Alcides Pires Lavinas, Avenida Alves Rotapas No. 18, 5000 Vila Real, Portugal*. Our friend has noticed in hot weather the presence of distant — usually Spanish — FM stations, and as he is interested in DX reception anyway, he would like to know more about aerial gain and aerial pre-amps, active aerials and so forth. Doubtless some readers will have ideas and practical knowledge on this subject, and would like to write and pass on their knowhow. Thanks!

Finis

That's it for another time; the deadline for next time is **January 19, 1984**, to arrive, addressed to your conductor, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ, and include your closing score for 1983 if you are on the Annual Ladder, and we will take the first score for the 1984 HPX table as well. Thanks to all for your Season's Greetings, which we, belatedly of need, sincerely reciprocate.

AN ALL-BAND AERIAL WITHOUT TRAPS

AN INTERESTING AND ORIGINAL APPROACH

E. W. HOLT, G3MHQ

As a result of experiments carried out by two Ealing Club members (G3SGT and G3UPW) it was discovered that if a quarter-wave top band 160-metre aerial was earthed at the distant end, it loaded up nicely on 80 metres. By earthing the end, the aerial appeared to lose a quarter wavelength, at twice its frequency. As most amateur bands are harmonically related I wondered if this would hold good for the other HF bands. In other words, would a full-wave aerial load up as a three-quarter wave, and a two wavelength aerial as a one-and-three-quarter wave, etc. This should give a low impedance feed for all bands, 80 down to 10 metres. (The new bands were not included.)

Two 22-ft. wooden poles were set up approximately 90-ft. apart and 132-ft. of aerial cable was stretched between them. Two 5-ft. 1½-in. diameter copper pipes were driven into the earth at points 'A' and 'B', and a 75-ohm feed co-ax cable connected between the aerial and earth at point 'B'.

The first tests were somewhat disappointing. While it was possible to load up the aerial on all bands, the loading was accompanied with a large standing wave ratio, often as high as 3:1. Comparing field strength readings with those of a half-wave dipole, the readings were considerably lower. The earth connections at 'A' and 'B' were the first suspects. As a DC ohmmeter cannot be used to test earth resistance due to earth polarisation, and a megger type AC earth tester was not available an improvised earth tester was constructed as shown in Fig. 2.

By connecting the 12 volt winding of a transformer, and an AC ammeter in series with points 'A' and 'B' it was found that approximately 0.1 amp was flowing. Ohm's Law gave the total resistance (A + B, plus the connecting wire) as $\frac{12}{0.1} = 120$ ohms. As the wire was only about 1 ohm it could be ignored. Thus the resistance of the earth rods was approximately 60 ohms each. While this method will give an approximate resistance, it will not give the earth impedance as the rods must have some capacity to earth. However it seemed quite possible that a considerable portion of the RF was being used for heating up the garden. In order to improve the earth a bare copper earth wire was buried to a depth of the spade, thus connecting the earth rods 'A' and 'B', making them a continuous earth connection.

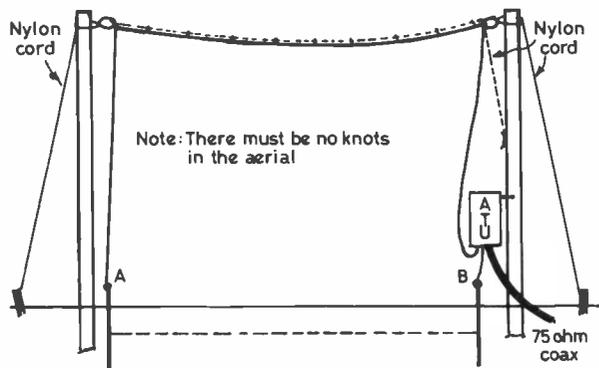


Fig. 1 "ALL-BAND" AERIAL

This improved the radiated power but the standing wave ratio did not improve. It was obvious that if the aerial was to be matched successfully with a good standing wave ratio on all bands, then some method must be devised to match the aerial to the co-ax at point 'B'.

The aerial could possibly be matched by terminating it directly on the Tx loading unit, providing the connection to earth was reasonably short at the shack; a long earth wire could cause excessive RF. However the siting of the poles, and my shack, necessitated a co-ax feed. As the impedance changes from band to band, a switched aerial tuning unit (ATU) was indicated for point 'B'. See Fig. 1.

In order to keep the earth connection as short as possible it was decided to mount the ATU at the bottom of pole 'B' where the actual earth wire is only 12 inches long, to the earth rod at 'B'. The snag here, of course, is that mounting the ATU out of doors causes problems of weather proofing, and tuning the unit.

The components of the ATU are mounted in a waterproof die-cast box 17 x 12 x 11 cm., the die-cast box in turn mounted in a wooden construction similar to a bird box. (I hope that sparrows don't take a fancy to it!) All switch spindles, etc., coming out of the die-cast box were given a liberal coating of petroleum jelly to prevent moisture creeping in. The aerial, earth wire, and co-ax cable are all brought into the ATU at the bottom to prevent water running down them and on to the die-cast box. As the ATU is so close to the ground it is convenient to bury the co-ax cable in a suitable duct, e.g. hose pipe.

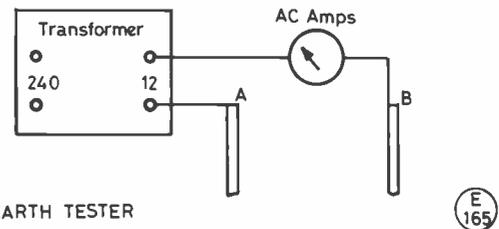
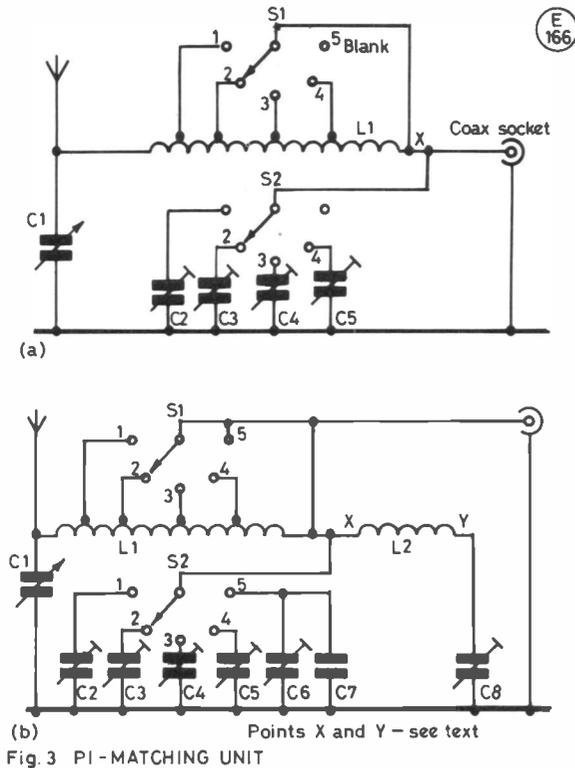


Fig. 2 EARTH TESTER

The aerial wire consists of 132-ft. of co-ax cable (of unknown impedance) with both inner connection and outer braiding connected together to make a single wire. The connecting earth wire between 'A' and 'B' is another length of the same co-ax with the outer plastic cover stripped away allowing the braiding to contact the earth; co-ax cable was used only because it was available and I am sure that any substantial standard wire would be equally effective. Co-ax cable when used as an aerial does have a tendency to stretch, and long runs should be supported by a nylon cord, between poles. As a high voltage node will appear on some bands close to the top of the poles (with this configuration), good quality insulators should be used in these positions.

At first, it was thought that this type of aerial would only load up successfully on 80, 40, 20, 15 and 10 metres, and by disconnecting the distant end from earth on 160 metres. As the junk box sported a five-position, 2-pole, ceramic switch and a 35-turn 16 s.w.g. (silvered) copper coil on a 2" diameter, 4" length, ceramic ribbed former, the π matching unit shown in Fig. 3 was constructed. The first five turns on the coil at C1 end were eased along the former to give double spacing for these turns. (The normal spacing is one thickness of the 16 s.w.g. wire). When the correct coil taps were established it was found by chance that 80 metres and 10 metres both matched nicely on position 1 of the switch. (This may not be so for a different configuration.) It seemed pointless connecting two positions of the switch to one tap on the coil so this left a blank switch position. I would suggest, however, that if six bands are anticipated a 2-pole, 6-position, switch be used in case 80 and 10m. are not together; another trimmer would also be required. Fig. 3a shows the original 5-band arrangement.

I wondered if it would be possible to load the aerial for top Band with the far end earthed — it would be like loading a quarter-wave

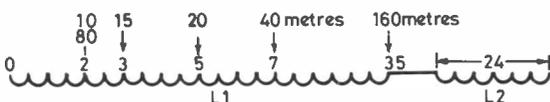


aerial at the 'hot' end. As the original 35 turns were not sufficient to obtain the correct match a further 24 turns of 24 s.w.g. enamelled wire, close-wound, were added to L1 and connected in series.

The switch connections were moved from point 'X' to 'Y'. It was found that the aerial loaded up nicely now on Top Band but the added resistance of the thin wire of L2 flattened the Q of L1 on the other bands, and it was impossible to obtain a good match on any of them. The switch connection was rapidly moved back to point 'X' and it was thought that Top Band would have to be abandoned. However it was found that Top Band *could* still be matched in this position, and that C8 had considerable effect on the loading (I suppose this could be considered as matching by mutual inductance); L2 has no effect on the other bands. Fig. 3b shows L2 added for 6-band operation.

Care must be observed when soldering the taps onto the coil to ensure a good contact and that the solder does not short-circuit the turns, Fig. 4 shows the taps counting from C1 end of the coil, i.e. the tap marked '7', is 7 turns from 0. Receiver type components were used as the only band to develop a high voltage is Top Band, and the low power restriction takes care of this. The trimmers are compression type with mica insulation between plates, and the tuning condenser C1 is 160pF air spaced.

The initial matching of each band was a laborious task of trial and error and the coil tappings shown may only hold good for an aerial of similar impedance, and similar impedance co-ax cable. Fig. 5 shows a simple field strength meter useful for the initial stages of the matching — as in my case, where the ATU is remote from the standing wave indicator.



Tapping to match 75 ohm coax
 C1 : 160p air spaced
 C2,C3,C4,C5,C6 and C8 : 250p mica
 C7 : 1300p

Fig. 4 COMPONENTS OF ATU

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Setting-Up the ATU

The co-ax lead should be removed from the ATU and terminated on a dummy load equal to the impedance of the co-ax, i.e. 75-ohm co-ax should be terminated with a 75-ohm dummy load. The Tx should be tuned to the centre of the first band and then be loaded for maximum power into the dummy load. If the co-ax and dummy load are correctly matched the standing wave indicator (SWI) should show a 1:1 ratio; should it show anything else, either the co-ax or the dummy load is not 75-ohms. (A little either way would not be serious; co-ax cable sometimes is not exactly as it is marked). Having set the Tx the tuning controls should not be touched, but the power reduced to just give full scale deflection on the 'set' position on the SWI, with adjuster turned to maximum; this is to reduce interference while loading the aerial. Turn off the Tx, remove the dummy load and re-connect the co-ax to ATU and aerial.

Switch the ATU to first band, and set C1 to mid-position. Switch on the Tx and adjust the appropriate trimmer in the ATU for maximum deflection on the field strength meter held, or placed, at a position to give about half-scale-deflection. On some bands the trimmer(s) will have greater effect on the field strength than others; on Top Band the trimmer C6 has a fairly large capacitor (C7) in parallel and C6 may appear to make little difference. However, on this band C8 should have considerable influence.

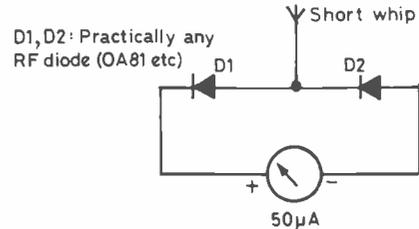


Fig. 5 SIMPLE FIELD STRENGTH METER

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The final adjustments to the trimmer(s) should be made a little at a time and observing if the SWI ratio is improving. When the best ratio has been achieved on the trimmer(s), C1 should be moved one way or the other until as close a ratio as possible is achieved. The calibrated dial reading of C1 should be carefully noted, so that this point can be returned to. In theory a 1:1 ratio should be achievable on all bands. In practice, however, the best that could be adjusted on *one* band was 1.2:1. This is because the least that can be adjusted on the coil taps, is one turn, as it is not possible to get at all sides of the coil. (The perfectionist should obtain a roller coaster!) If a good SWR cannot be achieved it may mean altering the coil tap up or down one or so turns. The above procedure must be repeated for each band. No attempt was made to load up the new bands as my transmitter does not cover these.

When all bands are adjusted and C1 dial readings noted, it is a simple matter when changing bands to switch to the desired band and set the dial to the correct reading and tune the Tx for maximum power on this band. The only problem is changing bands when it is pouring with rain, but I am sure someone will find a suitable remote control!

In conclusion, the aerial described I believe to be original and unusual. I am a firm believer in the higher the aerial the better and I would have liked to have tried a configuration using 33-ft. poles spaced 66-ft. apart as this should be very directive on 40, 20, 15 and 10 metres. Another possible arrangement is an inverted-V; this would be a possibility for those with limited space, e.g. a central pole on the chimney stack and point 'A' in the front garden and point 'B' in the back — though it may be a bit difficult to arrange a continuous earth from 'A' to 'B' if it is a terrace house. The shape of the aerial will determine the radiation pattern and impedance; co-ax other than 75 ohms could be used but this could mean changes to the coil taps, etc., and much trial and error.

I would like to thank Bill Teale, G3SGT, and Peter Smith, G3UPW, for starting the idea for 80 metres.

DIGITAL DISPLAY FOR THE KW-2000B TRANSCEIVER

AN UPDATE FOR A FINE OLD RIG

PETER J. COOK, G4NCA

IN the face of ever-increasing transceiver prices, the prospect of upgrading older equipment becomes increasingly attractive. A popular example of such a piece of equipment is the KW-2000B, offering 5-band coverage, SSB/CW, with an input power of 180 watts p.e.p., usually available at a fraction of the price of its present day counterparts. A comparatively simple transceiver such as the '2000B lends itself to modification (for example, see "Modifying the KW-2000A Transceiver for the 10 MHz", *Short Wave Magazine*, May 1982).

One feature the author has found very annoying with the rig is the inaccuracy of the analogue dial, it being very difficult to net precisely on any specific frequency. The addition of a digital readout would enable an accurate check on frequency (and also show just how much the VFO drifts during operation . . .), allowing very accurate netting.

A study of the various mixing processes carried out in the KW reveals that the VFO tunes from 2.5-2.7 MHz, producing a 200 kHz allocation for each master oscillator crystal. The output from the VFO is mixed with 455 kHz SSB to produce a variable IF of 2.955-3.155 MHz. This signal is subtractively mixed with a crystal master oscillator to produce RF in the appropriate amateur band. A consequence of this mixing process is that as the transceiver is tuning to a higher frequency, the VFO frequency is in fact decreasing. Hence any digital readout must read '200 kHz' when the VFO is at 2.5 MHz, falling to '0 kHz' when a frequency of 2.7 MHz is attained.

Operation

The basic operation of the display is probably best described with the aid of Fig. 1, a simplified block diagram. All clock pulses are derived from a 2.7 MHz crystal oscillator, applied to input A, the sinewave output from the VFO being squared off and applied to input B. These two signals pass to the clock and data inputs, respectively, of a D-type bistable, forming a digital subtractive mixer. When the VFO is tuned to 2.5 MHz, a frequency of 200 kHz is produced at the Q output, falling to 0 kHz as the VFO frequency rises to 2.7 MHz, in accordance with the requirement illustrated in the previous paragraph. Additionally, the 2.7 MHz signal undergoes a division of 27,000 to generate 100 Hz clock for timing purposes. A further division by 2 is implemented to generate 50 Hz pulses, connected to the display enable input (DEI) of the counter/display module. Whenever this input goes high, the data stored in the counters is applied to the 4-digit, 7-segment, display; hence in this application the display will be on for 10mS, followed by a 10mS off, or blanking period. It is during this period that counting must occur (otherwise the display will be a meaningless jumble of figures), and this is achieved by allowing the clock inhibit pin of the counter/display module to go low during an appropriate period of blanking. The interval between counting periods is determined by the action of the ripple counter, in conjunction with the count interval controller (another D-type bistable).

Assume that the ripple counter has just been reset to zero. It will count up in binary upon receiving 50 Hz clock pulses from the divider chain. For the time interval that the output Q4 is low, the data input of the count interval controller will be held low, as will

Table of Values
Fig. 2

R1, R2	TC1 = 3-30 pF
R4, R15 = 10K	Q1, Q2 = BC109
R3 = 4M7	D1, D2, D3 = 1N4148
R5 to R13,	IC1 = 4069
R17 = 100K	IC2 to IC6 = 4017
R14 = 47K	IC7, IC8 = 4013
R16 = 1K	IC9 = 4040
C1 = 100 pF	IC10 to IC13 = 4026
C2 = 1 nF	Xtal = 2.7 MHz
C3 = 100 nF	LED Display = four 7-segment
C4 = 100 μ F	common cathode.

Note: For IC1, 7, 8, +8V to pin 14, 0V to pin 7; all other IC's, +8V to pin 16, 0V to pin 8.

the Q output irrespective of 100 Hz clock pulses being applied to the clock input. However, once 2³ clock pulses have been received, Q4 goes high. When the next clock pulse is applied to the controller, Q goes high, causing the clock inhibit input to go low, allowing 10mS-worth of pulses from the subtractive mixer to reach the counters. At the same time, the ripple counter is reset to zero, causing Q4 to go low. On receiving its next clock pulse, the Q of the controller goes low, and so the process continues. . . . It will also be noted that as Q4 goes high it opens the way for a 0.1mS reset pulse immediately preceding a count period, resetting the count to zero.

This control logic at first may seem unnecessary as it would appear much easier to count during all blanking periods. This

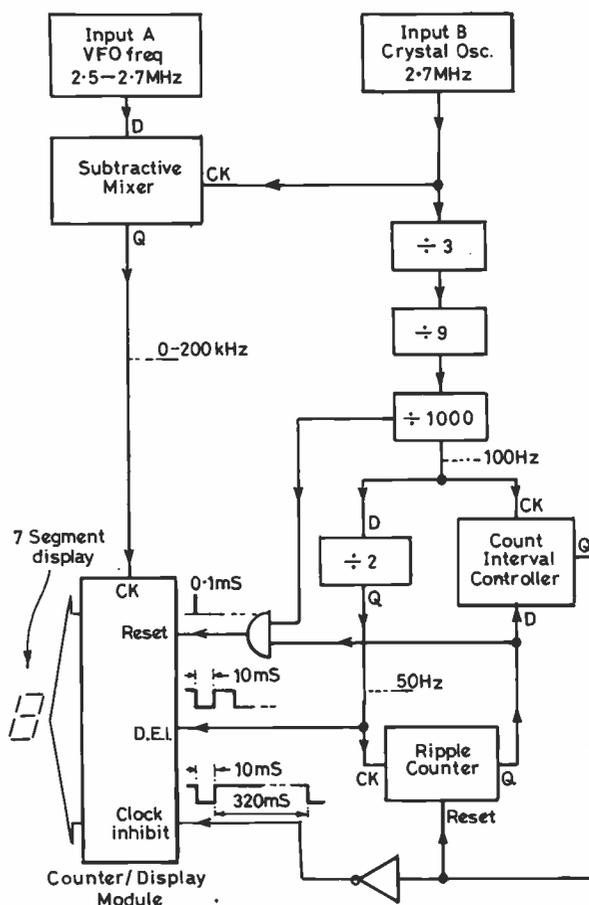


Fig.1 SIMPLIFIED BLOCK DIAGRAM OF THE KW-2000B DIGITAL DISPLAY

View of the modified front panel.



method was originally adopted by the author, but an intolerable amount of jitter occurred due to the 100 Hz (least significant) digit changing alternately between two digits, this change taking place

at any frequency from 0 to 50 Hz. With the circuit as shown (Fig. 2), the count rate is one count every 320mS, which is the best compromise between annoying jitter and sluggish tracking of the

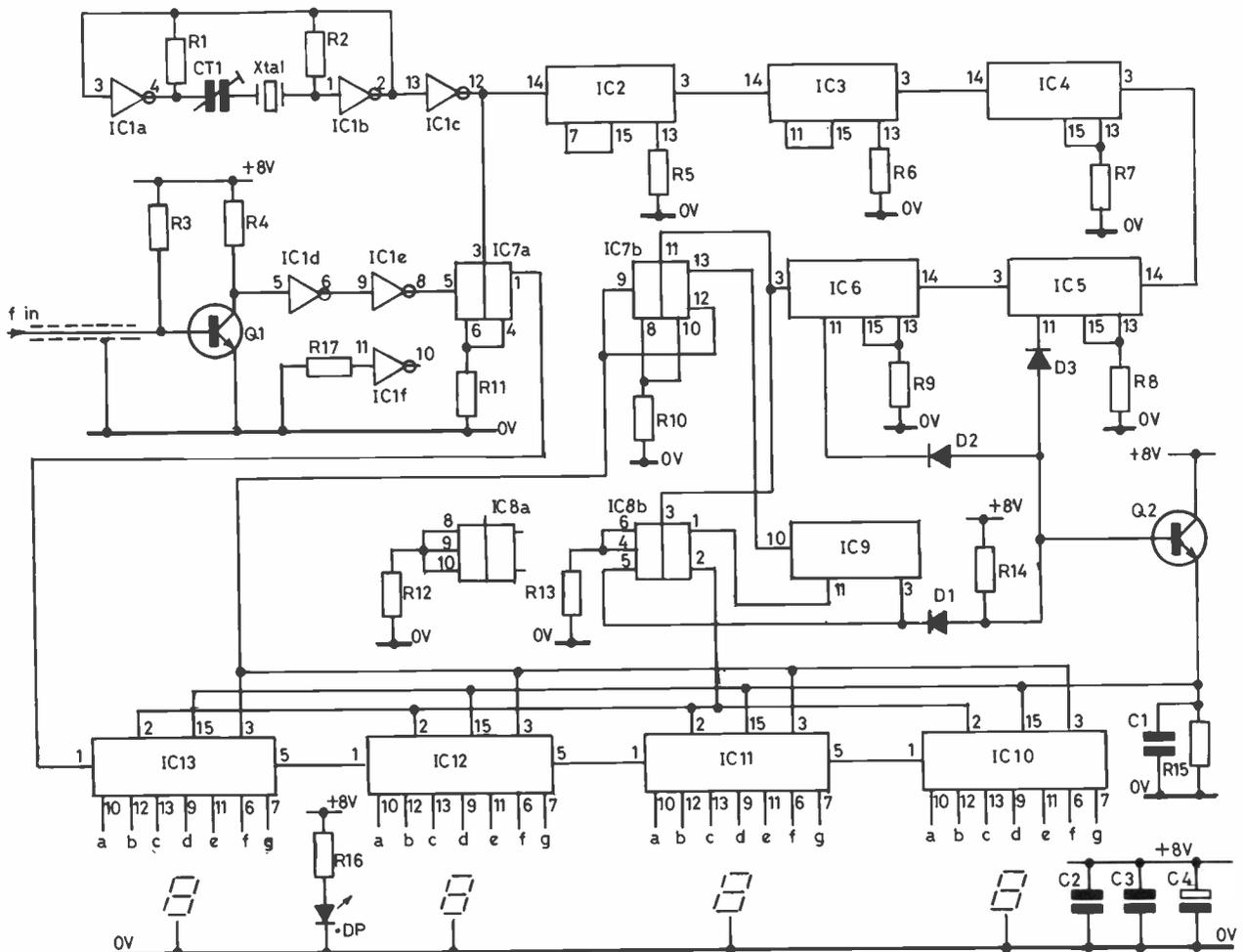


Fig. 2 KW-2000B DIGITAL DISPLAY CIRCUIT DIAGRAM

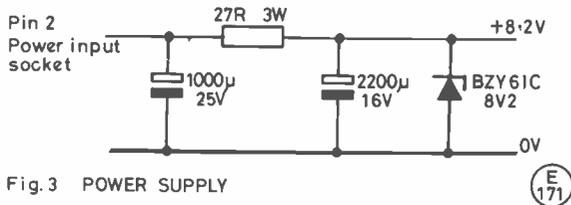


Fig.3 POWER SUPPLY

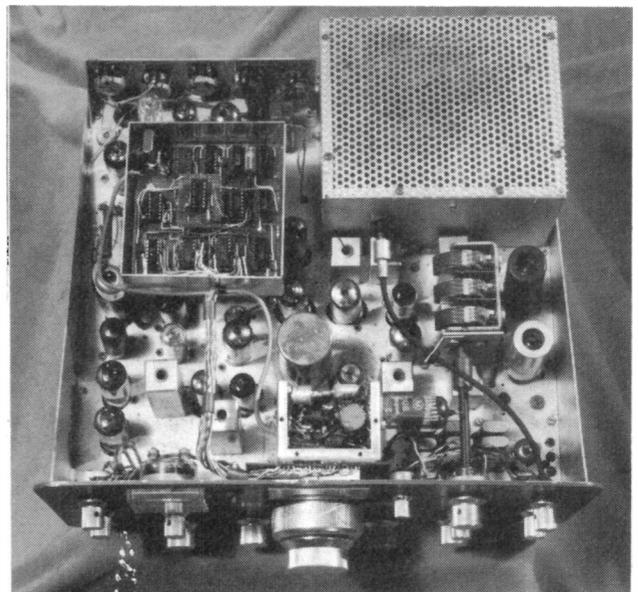
VFO during tuning. For a faster count rate of 160mS, the data input of the controller should be connected to Q3 of the ripple counter, a 640mS rate is available by connection to Q5, etc., etc. . . .

The 2.7 MHz crystal and associated inverters present fast squarewaves to the divider chain, comprising of IC2 (divide by 3), IC3 (divide by 9), followed by IC4, 5, 6 — all decade dividers. The resultant 100 Hz squarewave undergoes a further stage of division by 2, IC7b thereby supplying display enable pulses to the counter/display module, IC10, 11, 12, 13. IC7a forms the subtractive mixer, being fed with 2.7 MHz clock pulses and a squarewave representation of the VFO frequency (produced by Q1 and two associated inverters), the mixer output being applied to the input of the counter/display module. The ripple counter, IC9, is fed with 50 Hz clock pulses and is controlled by IC8b, the count interval controller, applying clock inhibit pulses to the counter/display module. D1-4, Q2 and associated circuitry forms a 3-input AND gate and is used to control reset pulses to the counters. It will be seen that a positive potential (supplied via R14), will only be present when all of the diodes are reverse biased, i.e. when pin 11 IC6, pin 11 IC5, pin 3 IC5, are all high. This will only occur during the 0.1mS period before any count period. During this period, Q2 conducts and a high pulse resets the counters.

Fig. 3 shows a suitable power supply for the display, power being drawn from the +12V DC available within the rig, used for relay switching.

Modifications

See photographs. The prototype unit was constructed on *Veroboard* (using IC sockets and usual CMOS precautions), and mounted in a small aluminium box 100 x 100 x 30mm. in dimensions, in turn mounted on three, 50mm. standoffs above the Tx/Rx relays. The original analogue dial was removed and a 4-digit, 7-segment, LED display mounted on *Veroboard* and slotted in front of the VFO box was added. To create a more 'professional' look, the perspex window was removed and a grey border (surrounding the display) was added using aerosol spray paint.



Above, general layout of G4NCA's prototype. Below, details of inside the VFO box showing the addition of Cx. (In the prototype, as a 47pF capacitor was not to hand, a 56pF was connected in series with a 470pF).

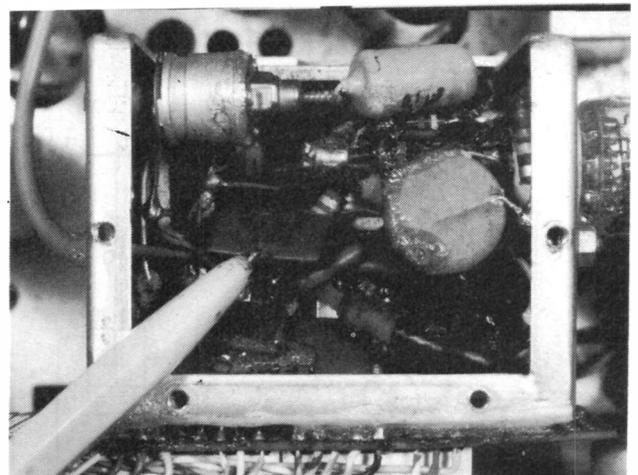


Fig. 4 details how RF pickup from the VFO was derived. Initially RF pickup was achieved from the buffered output from the VFO box; this arrangement worked fine on receive, but a 'scope placed at this point during transmit revealed a multitude of frequencies due to the action of close-coupling with the balanced mixer, V4. The addition of Cx (47pF silver mica) into the VFO proved to have not detrimental effects. Removal of the top of the VFO reveals a convenient free tag on which to mount Cx, and a small hole drilled in the side of the VFO box is used to pass the miniature co-ax. *Bostik*, or a similar adhesive, is used to secure the capacitor and other wiring from the effects of vibration.

Conclusion

The display has been in use at the author's QTH for several months, proving to be invaluable for netting and providing a very economical solution to the problem (the prototype was constructed for less than £15 inclusive). The use of a screened housing eliminated all the usual 'nasties', none being detected whilst running the rig into a dummy load.

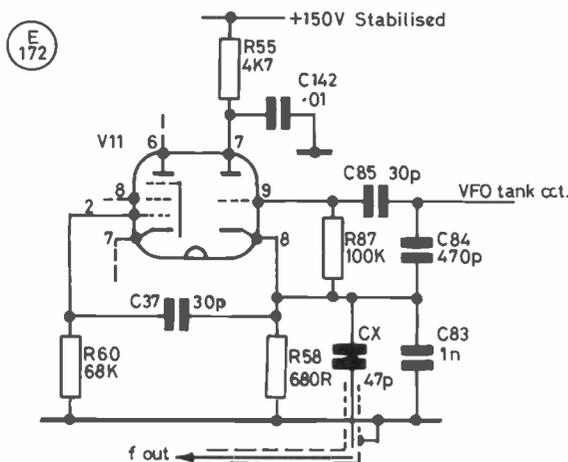


Fig.4 VFO RF PICK-UP

VHF BANDS

NORMAN FITCH, G3FPK

The Space Shuttle

THE U.S. *STS-9 Space Shuttle* was successfully launched on time at 1600 GMT on Nov. 28, with Dr. Owen Garriott, W5LFL, on board. His first, and the first ever, contact by a radio amateur in space to another on planet Earth took place on Nov. 30 with WA1JXN/7 in Montana during orbit no. 40. W5LFL was reportedly heard during orbits nos. 62 and 64 and seems to have been on before the "official" orbits.

This mission by *Columbia* received wide media coverage. What your scribe saw and heard seemed fair, although the TV exposure dwelt a little too much on GB3RS's antennas searching the Heavens, perhaps. The *RSGB* provided a daily news service from its Poters Bar HQ, the first of which were broadcast by the Assistant General Manager, John Nelson, G4FRX, an ex-BBC World Service announcer prior to his joining the Society's staff. Readers no doubt saw his BBC interview on the "60 Minutes" programme; it all sounded, and looked, very professional, a far cry from the Tony Hancock image created in his "The Radio Ham" classic.

For once, a good VHF site near London proved a great disadvantage. At G3FPK during the passes when W5LFL was in range, all the radio vandals who normally play on the London repeater frequencies seemed to descend on to the downlink on 145.550 MHz. Some who one would not normally associate with such cretinous behaviour were calling W5LFL on S22. It must be assumed that they were defeated by the complexity of the multitude of push-buttons, memories, reverse repeater and programming of unusual split frequencies on their wonder radios. Numerous self-appointed policemen were on hand to point out the errors of their ways, some politely, most in varying degrees of rudeness, which only added to the cacophony. The net result was that W5LFL was never heard at G3FPK either at the time or when playing back the tapes.

Others, away from the London phenomenon, had much better luck, however. For example, Greg Gilman, G3SCP, who has a fine VHF site near Luton, took his receiver to a "hole-in-the-ground" which cut out the London rubbish and enabled him to copy W5LFL

satisfactorily. Mike Hearsey, G8ATK, also suffered from the QRM at his Farnham home but found S22 quite silent down on the harbour in Portsmouth, so was able to enjoy excellent reception from the space craft.

Those with HF receiving facilities were able to listen to all the traffic between *Columbia* and mission control. The amateur radio club station, WA3NAN, at the *Goddard Space Flight Center* in Greenbelt, Maryland, relayed the proceedings on a 24-hour, non-stop basis in the 75, 40, 20, 15 and 10m. bands. This was interspersed with details of W5LFL's *modus operandi* and of the spacecraft's orbit details. This latter enabled computer-equipped operators to make their own predictions.

The main lesson to be learned is that in any future similar mission, the 2m. band should not be used. A far better bet would be 70cm. since all the genuine and sensible space communicators have equipment for that band, which is far less troubled by the radio vandalism heard daily on 2m. This is a sentiment echoed by Rod Burman, G4RSN, (Surrey) who heard W5LFL on orbit no. 97 on Dec. 4. John Fitzgerald, G8XTJ, (Bucks.) heard him on the 4th from home and on the next day from school on the fourth floor using an *Icom* IC2-E on its quarter wave whip, at 1206 GMT. L. C. Chandless, G6PLR, (London) is wondering if it was W5LFL he heard at 1523 on the 7th, or "... one of the idiots."

Awards News

Another reader has joined the 144 MHz QTH Squares Century Club this month. Certificate no. 30 was issued to G4MJC, Flemming Jul-Christensen from Eastbourne in E. Sussex, on Dec. 9. Of his 101 confirmed, two were *via Aurora*, five *via Sporadic E*, the rest on tropo. Apart from two FM contacts, all were SSB. Flemming comes from Denmark, where his call is OZ1EVA, although he has now lived here for 18 years. He was first licensed as G8RMA in October, 1978 and already has VHFCC Certificate no. 327 for this band.

The 144 MHz VHF Century Club has two new members. The first is Glenn Bates, G6HFF, from Bolton in Greater Manchester, whose certificate no. 361 was issued on Nov. 18. His station consists of a *Yaesu* FT-290R, home built 15w amplifier and *Zetagi* 100w PA. A *muTek* pre-amp. is used on receive and the antenna is a 6-ele. *Quad* from *Jaybeam*. Glenn is an RTTY enthusiast and uses a *Creed* 7E teleprinter, modified home built *ST-5* terminal unit and *Creed* 6S auto-transmitter. The site is 400ft. *a.s.l.* with only the westerly take-off good, and the antenna is 30ft. *a.g.l.* His wife, Val, is licensed too; she is G6MML.

The second new member is John Wimble, G4TGK, from New Romney in Kent, who was first licensed as G6JDV in

June, 1982, the G4 being obtained the following April. The QTH is at sea level on the Romney Marsh and comprises a *Trio* TR-9000 and *Microwave Modules* 100w amplifier. The antenna is a 16-ele. *Yagi* from *Tonna*, 30ft. *a.s.l.* John has 21 countries and 77 squares worked, best DX being 9H1 and 9H4 via *E's*. He is a WAB enthusiast and wishes there was more activity for WAB addicts on VHF. His certificate is no. 362 and was issued on Dec. 8.

VHF Convention

Geoff Stone, G3FZL, has advised that this year's *RSGB VHF Convention* will be on Saturday, March 24 at the Sandown Park Racecourse in Esher, Surrey. the "recipe" will be similar to that of previous years — all-day exhibition and three afternoon lecture streams — but there will be no evening buffet. It seems that the buffet is not very popular and, if it was not for the attendance by those collecting trophies, few would bother to come. Your scribe is disappointed since it did afford a convenient and convivial opportunity to meet readers and chat. More details later on.

The Tables

Next month will reveal the final placings in the 1983 Annual Table, one feature of which has been the much larger entry on 23cm. Ideally your scores should reach Welwyn by Jan. 4. Alternatively, if they reach your scribe at *QTHR* by the 7th at the very latest, that will do. The 1984 Annual Table will be in the same format as the 1983 one. The on-going squares table will continue and both tables are based on unconfirmed contacts. Space allowing, it is hoped to publish the 23cm. All-Time table more often.

CW activity on VHF is on the increase and many newer licensees are to be heard every evening on 2m. Tim Raven, G4ARI, has suggested we try a CW Only table, independent of the Annual Four Band listing, in order to encourage more activity during the year. After some discussion, it seems best to base this simply on the number of different stations worked on all the VHF/UHF/SHF bands together. There is no counties, countries or squares content; just count one point for every new station worked, *per* band, during the year. It is proposed to start in the April issue, by which time there will have been a few contests to get the ball rolling.

Syd Harden, G2AXI

Readers will be saddened to learn of the death of Syd Harden, G2AXI, who passed away in hospital on November 29. He was a regular contributor to this feature for very many years and, in spite of poor eyesight, he was always building his own VHF/UHF equipment. A keen participant in the Annual Tables, he usually

finished near the top by dint of steady operation on all the appropriate bands. Syd was truly one of that diminishing breed of real radio amateurs and we will miss his cheery voice. Our sincere condolences go to his wife and family.

Contest News

As mentioned last month, *The Swale ARC* is promoting a couple of contests. The first is on Jan. 22, 1000-1800, on 144 MHz, the second on Jan. 29, from 1400-1800, on 432 MHz. Each is in two sections; Open and Low Power, the latter defined as 25w and below on 144 MHz and 10w and below on 432 MHz. Contest exchanges to include RS(T) plus serial number starting at 001 and postal county. One point *per* contact except for the club station, G4SRC, which is worth 10. Countries outside the U.K. to count as extra counties and the final score is points times counties. Entries, post-marked no later than 15 days after the events, go to G4NPM, Leahurst, Augustine Road, Minster, Sheerness, Kent, ME12 2NB. Entrants must be *RSGB* members and declare they have operated in accordance with their licence conditions. The overall winners will receive cups to keep.

The first leg of the 70 MHz *Cumulatives* is on Jan. 29, 1000-1200 with the usual, RS(T)/serial no., QTHL and QTH exchanges; radial ring scoring. The 144 MHz CW event is on Feb. 5, 0900-1500 with RST/serial no. and QTHL information *only*. (Henceforth, in all contests 144 MHz and above, QTHs are *not* required, only the locators). Radial ring scoring.

The Q Code

The Q Code is extensively used, and sometimes abused, by radio amateurs. The erstwhile use of QRA locator instead of QTH locator is a case in point. Peter Brooks, G4UMI, has queried the use of QTF concerning beam heading, or azimuth, information, pointing out that QTF is used to request *position* which requires a fix by two or more receiving stations. The correct signal would be QTE, which is a request for a *true bearing*, useful in reporting *Auroral* signals. As old habits die hard, it is debatable whether operators will bother to abandon QTF in favour of QTE.

Beacon News

In an eleventh hour note dated Dec. 8, Brian Bower, G3COJ, reported that the 70 MHz beacon GB3ANG (YQ35c) on 70.060 MHz was temporarily off the air as its RF was getting into some of the I.B.A.'s equipment. GB3WHA on 70.04, and GB3WHA on 432.810 MHz in AL71d were still off the air at the time of editing, but Brian advises that paper work concerning a new, nearby site was in hand. However, the 10m. beacon GB3SX remains operational.

TWENTY-THREE CENTIMETRES

ALL-TIME TABLE

Station	Counties	Countries	Total
G3OSS	52	15	67
G8TFI	46	16	62
G8FMK	43	10	53
G3XDY	36	12	48
G8KAX	37	10	47
G3PBV	38	9	47
G8FUO	33	13	46
G3DAH	37	9	46
G4FRE	34	9	43
G4STO	33	9	42
G3COJ	28	10	38
G8PNN	28	9	37
G4ROA	27	8	35
G6NB	28	7	35
G3UVR	30	5	35
G6CSY	30	4	34
G8ULU	23	10	33
G8IFT	28	5	33
G2ZHDZ	24	8	32
G8HHI	24	7	31
G4NBS	24	6	30
G8ATK	20	8	28
G6DER	23	5	28
G8KBQ	21	6	27
G8LEF	16	6	22
GW3CBY	7	4	11
G4DKX	7	2	9
G3BW	3	5	8
G8OPR	3	1	4

Based on administrative counties

Moonbounce

Clive Penna, G3POI, (Kent) was active over the weekend Nov. 26/27 on 2m. on *E-M-E* and new stations worked were KX0O in Colorado, HB9SV and WD8ISK, which brings Clive's squares total to 411. Conditions were quite good, so much so that he got his own echoes back from the Moon with just 50w output to his 160-ele. colinear antenna array.

Because of the much increased 2m. *E-M-E* activity at *perigee* periods, some of the operators have suggested an amendment to the Band Plan to expand the mere 10 kHz — 144.000-144.010 MHz — segment to, say 30 kHz. This seems a sensible idea, bearing in mind that the CW portion above 144.100 MHz seems to be rather under-used, and which could accommodate terrestrial traffic.

The Satellite Scene

Oscar-10 continues to give properly equipped users excellent service. To get the best results, right-hand circular polarisation is necessary to overcome fading due to spin modulation, and the antennas should be capable of being elevated. For example, reception of the Sunday news broadcasts is not at all good using a horizontally mounted, linear *Yagi*, yet is quite satisfactory when using, say, a 6-ele. crossed *Yagi* and average receiver with a decent preamp.

Adrian Chamberlain, G4ROA, (Coventry) sent a colour print of his Oct. 2 *0-10* operation showing his gear sitting on a decorator's pasting table in the garden and the combined 6-ele. 2m. and 12-ele. 70cm. *Yagis* on a short pole nearby. With just 10w from a *Yaesu* FT-780R, he worked JA9BOH. One attraction of satellite working is that you do not need to have the antennas mounted on a high

tower. For much of the time in an *0-10* orbit, the satellite is well elevated, so all you need is to mount the antennas on a short pole stuck into the ground and hand point the array towards the "bird". This will give a few hours use without constant adjustment. What could be simpler?

Derek Brown, G8ECI, works in Saudi Arabia for long periods and operates the station HZ1AB every Wednesday evening/Thursday morning. He says the station is QRV on *0-10* mode "U" and has probably worked into the U.K.

Ron Broadbent, G3AAJ, *AMSAT-UK's* secretary, is also the Satellite Co-ordinator for *IARU Region 1*. He is seeking input for the 0-10 news bulletins from other *Region 1* societies. *RSGB* Headquarters now has a suitable antenna installation, so it may be possible to transmit these Sunday bulletins from Potters Bar, in future, if a suitable operators' roster can be compiled.

Microwave Bands

Many readers have sent their latest news and scores for the 23cm. band and it is nice to welcome another nine entries in the All-Time Table. Pam Rose, G4STO, (Lincs.) says that 23cm. is her favourite band on which she runs 1.3w to a 7ft. dish some 60ft. *a.g.l.* and fed with *Andrews* LDF4-50 cable. However, she has not done as well as she could have due to a broken rotator these past few months. Even so, in the *Cumulative* on Dec. 2, Pam added 11 1983 counties and a couple more squares.

Dave Sellars, G3PBV, (Devon) was also QRV in the Dec. 2 leg working 9 stations at an average QRB of 248 kms. It was mainly inter-G, with only a PA in CL heard at any distance. More county-chasing the next day brought a contact with G4STO for Lincs., at last, a QRB of 362 kms. After reading the GB2RS news on the 4th, Dave worked PAs in CL, CM and DM, and heard DF5LQ (EO) and OZ7UX (FO). Denis Jones, G3UVR, (Merseyside) got 18 more counties, plus France and 4 new squares on Dec. 2. Earlier successes were GW8FKB (XN) in Gwynedd on Nov. 10 and GW8TFI/P (YL) in Gwent on the 16th.

John Quarmby, G3XDY, (Suffolk) made good use of the Dec. 2 contest in which 4 new squares were worked. His list includes G8PNN (Northumberland), G4APA/P (Cheshire), and GU3KFT for the 12th county on 23cm. Graeme Caselton, G6CSY, (Kent) with two watts, lists G4STO, G3AUS (YK), G6GJD (YN), PE1CQQ (DM) and PA3DAQ (CM) for some of the Contest additions. Keith Hewitt's, G6DER, (S. Yorks.) letter was written before the early December lift so reports the earlier *Cumulatives* to, "... have been a disaster," with only 4 stations worked.

Dave Robinson, G4FRE, (Suffolk) was on 13cm. on Dec. 4 and worked G8FUO in Berks., and G3AUS in Devon and says

that DL0QQ (DL) on 2,320.025 MHz was a colossal signal for hours along with DB0VC (FO). On 9cm. DB0JO (DL48d) on 3,456.150 MHz was copied and the antenna was an array of 4 full wave dipoles etched on a PCB with a gain of 12.7dBi. This was poked out of the ventilation holes on the end wall of the house which faces east. Dave also added some new ones in the Dec. 2, 23cm. event and is a newcomer to the All-Time Table with 43pts.

G4ROA persuaded F1DED (BI) off 70cm. on Dec. 3 and worked him on 23cm. for a new one, while the previous day brought Adrian another 7 counties for this year. He also joins the All-Time list. Ray Cox, G8FMK, (Oxon.) also concentrated on 23cm. when he noticed the lift starting on Dec. 1. In the *Cumulatives* next day, he made 37 QSOs including 5 PAs, and afterwards managed to complete a difficult contact with OZ1AXX (FQ). On the 3rd, ON5SHF was audible but no Belgian stations. Conditions steadily improved on the 4th through the afternoon with DB0VC getting up to S4. Ray's successes included DC4BK (EN), DB4LT (EO), DF5LQ and OZ7LX (FP), plus several PAs.

Richard Britton, G8FUO, (Berks.) enters the All-Time list with 46 pts. He uses 5w from an MM transverter plus PA with 45ft. of LDF4-50 and UR67 feeding 4 23-ele. *Tonna Yagis* at 46ft. An MGF 1412 masthead preamp. is used and a bigger PA with two 2C39s is planned. On Nov. 11, he lists PE1CQQ; on Dec. 3 GU3KFT, with the best day being the 4th which brought Germans in DL and DN, OZ7LX (FP), OZ2LD (FO) and OZ1ABE (GP). He has been QRV on 13cm. since late October with an SSB Products transverter, its 500mw output feeding a *Quad Loop Yagi* at 48ft. More recent DX on 2.3 GHz includes PE1CQQ on Nov. 10 and, on Dec. 4, PE1DPX (DM), PA0FRE (CL), G3AUS, PA0EZ (CM), DC0DA (DL), G3LQR (AM) and G4FRE (AL).

John Pilags, G8HHI, (Hants.) also worked PA0EZ at 424 kms. on 23cm. and PA0FRE, F6DZK (AI) and some Gs. During the Dec. 4 opening, DF5LQ and OZ2LD were worked at over 700 kms. John Lemay, G8KAX, (Essex) lists G4KCT (N. Yorks.), G4BYV (Norfolk) and G4CCH (Humberts) as new in the *Cumulative* on Dec. 2. The weekend produced GU3KFT and OZ7UX. A move of about 20 miles is anticipated soon so, as that is less than 50 kms., his square scores will carry on.

John Moxham, G8KBQ, (Somerset) is now in the All-Time table and operates on 23cm. whenever he has the time. His station runs one watt to four 23-ele. *Tonna Yagis* at 60ft. and over the Dec. 2-4 period, he lists 5 PAs worked. He is contemplating 13cm. activity some time. Gordon Emmerson's, G8PNN, undated letter was likely written before the lift as he only lists G8HQM in Derby on Nov. 12 as new.

ANNUAL VHF/UHF TABLE

January to December 1983

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		23 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
G3UVR	60	7	89	26	66	18	30	5	266
G8TFI	—	—	68	19	69	21	46	16	239
G4FRE	40	6	58	16	60	20	34	9	200
G8FMK	—	—	64	14	54	12	41	10	195
G3PBV	3	1	48	24	50	18	32	8	180
G6DER	—	—	64	19	55	16	20	5	179
G8PNN	—	—	60	16	47	12	28	9	172
G3BW	42	6	57	21	37	6	5	4	169
GD2HDZ	42	5	56	13	39	12	4	4	167
G8OPR	—	—	69	20	62	15	—	—	166
G2AX1	34	6	58	14	38	9	6	2	159
G8ULU	—	—	51	22	39	14	23	10	159
G4STO	—	—	55	17	40	8	28	8	156
G4ROA	—	—	50	11	42	11	27	8	149
G4MUT	30	4	52	17	32	10	—	—	145
G8HHI	—	—	47	17	41	13	18	7	143
GW3CBBY	25	7	56	15	26	8	—	4	137
G4ARI	28	2	85	19	1	1	—	—	136
GW8UCQ	—	—	61	18	42	14	—	—	135
G6HRI	—	—	69	13	42	10	—	—	134
G8KAX	—	—	34	11	35	8	34	8	130
G4FRX	—	—	59	19	33	11	—	—	122
G4NBS	12	1	43	11	37	12	15	2	120
G4DEZ	—	—	81	27	—	—	—	—	108
G4ECM	—	—	75	32	—	—	—	—	107
G6PFR	—	—	64	14	22	6	—	—	106
GW4TTU	—	—	75	29	1	1	—	—	106
G3FPK	—	—	81	21	—	—	—	—	102
G3FIJ	17	1	39	10	18	2	—	—	87
G6TTU	—	—	66	16	—	—	—	—	82
G6CSY	—	—	10	5	23	8	30	4	80
G8RWG	—	—	59	14	—	—	—	—	73
G8XTJ	—	—	56	15	—	—	—	—	71
G6HDD	—	—	56	13	—	—	—	—	69
G4BVY	—	—	—	—	45	17	—	—	62
G8VJV	—	—	47	15	—	—	—	—	62
G8KMT	—	—	47	12	—	—	—	—	59
G4NRG	4	1	29	12	8	4	—	—	58
GU4HUY	—	—	40	10	—	—	—	—	50
GW4HBK	36	6	2	2	—	—	—	—	46
G4FKI	7	1	20	2	1	1	—	—	32
GM4CXP	—	—	18	12	—	—	—	—	30
G2DHV	5	1	7	2	5	1	—	—	21

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

Chris Easton, G8TFI, (Gloucs.) has notched up 16 countries on 23cm. this year and reports very high activity on the band. He did the *Cumulatives* sessions from Gwent as GW8TFI/P and the Dec. 2 leg was the best with 87 QSOs including 3 OZs and many PA and D stations. The Nov. 16 leg saw average conditions and produced 37 contacts, while on Oct. 31, G conditions were very good resulting in 63 QSOs.

Pete Godfrey, G8ULU, joins the 23cm. table with 33 pts. and all his QSOs have been made with one watt and a single 23-ele. antenna. 7 new countries were netted on Dec. 2 from his Kent QTH, including G3UVR (Merseyside) and GW8TFI/P (Gwent). Prize catch on the 4th was SM6AFV (GR) for square no. 31. Arthur Breese, GD2HDZ, is reasonably happy with his countries score of 8 on 23cm. but disappointed he has not got more counties. All QSOs were with one watt of SSB or 5w of CW.

Derek Brown, G8ECI, should be back home in AN square over the Christmas period. When last home in July, he enjoyed 23cm. operation with just one watt but plans to up-grade the system when time permits. Four 27-ele. *Loop*

Yagis and a pair of 2C39 PA valves are suggested. He asks if any readers can suggest a suitable device to give about 6dB. of gain from one watt of drive. (Suggest NEC NE080490 device — see *Lunar Letter Magazine*, March 1983. Ed.).

Seventy Centimetres

G3PBV kept an ear on 70cm. during the period Dec. 2-4 and did find a two hour lift to Scandinavia on the Sunday evening. He got OZ3ZW (FO) who was using 10w, and OZ1CSI (HP) with just 2w, so Dave reckons his 50w must be real QRO! He is now 101 squares worked on the band. G3XDY worked lots of OZs and SM7s in this period, yet only OZ1HTB (HP) was new. John is now 100 sq. worked on the band. On Dec. 4, Jon Stow, G4MCU, (Essex) heard all four OZ beacons, plus DL0AAD in FO. On the 1st, conditions to the south were good and F6CIS (ZE) and F1GXX (ZF) were new squares contacted. The following day brought OZ1AXX (FQ), also new, and on the 4th, DB4LT (EO) and OZ2LD were worked.

G4ROA worked a lot of the nearer Continentals at the beginning of December, but nothing new came out of it. G4STO

reckons that 70cm. is her poorest band. Pam keeps changing antennas, the current one being a 23-ele. *H.A.G.* with *Pope H-100* feeder. She has built a *Wood & Douglas* preamp. but is still not satisfied, so another *H.A.G.* *Yagi* is being sought. G6CSY only has 5w on the band and lists QSOs with PE1CQQ, DF5LQ and DL8QS (EN). G8ECI is well set up on 432 MHz with a *Yaesu FT101ZD* "prime mover," *MM28/432MHz* transverter and *4CX250B* amplifier to a 23-ele. antenna. A *3SK97* masthead preamp. is used.

G8HHI mentions the strong *Syledis QRM* during the Dec. lift. John managed to work OZ7IS (GP) and DG1BP (DN) for two new squares on the 4th, also PE0RTX (DM) and SM7AAC (GP). Michael Wright, G8SRL, (Surrey) was QRV on Nov. 13, his best DX being F1AJD (AF21d). On Dec. 2, he managed F1GXX (ZF50h) and PAs in CN and DN. The next day brought DK4LI (EO30g), but the best DX was SM6CMU (FR50b). After the 2m. contest on the 4th, OZ2LD (FO) was contacted.

G8TFI has operated from a local high spot as G8TFI/P for all but the first of the 70cm. *Cumulatives*. On Oct. 23, Chris made 96 QSOs in poor conditions but high activity; 3 GMs were worked but only two contacts exceeded 500 kms. On Nov. 8, in poor conditions with no DX, 79 QSOs resulted in a reasonably active period. Again on Nov. 24, conditions were poor, offset by reasonable activity, particularly from the north of England, resulting in 80 QSOs.

G8ULU has added a couple more squares on the band; F1AJD in AF on Dec. 1, and OZ1EYE in FQ on the 4th, which latter has eluded Pete for sometime. From the Isle of Man, GD2HDZ added your scribe's radio neighbour G4BWG (Surrey) on Oct. 23, and G8CLY (Herts.) and G3JOC (Norfolk) on the 24th Nov. for the annual table.

Two Metres

G3PBV reports that on the evening of Dec. 2, GJ3YHU heard a 3V8 station in Tunisia on CW, on 144.05 MHz with a big pile-up of French and Spanish stations. The rough distance from Jersey to Tunis city is 1,700 kms. so it is not record-breaking DX. It would be much appreciated if any of our French and Spanish readers could shed some light on this one. Despite *Auroras* being heard on about ten days in November, and the good tropo. on Dec. 1 and 2, G3UVR found nothing new for the tables. The only *Ar* noticed at G3FPK was on Nov. 14, from 1415-1530, but there was no activity from the south of England

G3XDY took time off from 23cm. and 70cm. in the early December lift to work OZ1FOW in GO for a new square to bring his total to 148. Welcome to a new contributor Gary Tuppeny, G4LOE, from Solihull in the W. Midlands. He has

Station	QTH LOCATOR SQUARES TABLE			Total
	23cm.	70cm.	2m.	
G3VYF	—	117	307	424
OZIEKI	—	116	345	461
G4J4CD	1	110	230	341
G8TFI	51	109	126	286
G3JXN	66	106	161	333
G8FUO	39	105	88	232
G3PBV	31	101	171	303
G3XDY	49	100	148	297
G4BVY	9	100	—	109
G8KBQ	22	96	188	306
G3COJ	40	91	163	294
G4FRE	33	91	46	170
G3IMV	—	90	343	433
G8ULU	31	85	115	231
G8ATK	23	82	129	234
G4TIF	—	81	157	238
G3UVR	16	79	196	291
G4NQC	56	78	152	286
G4MCU	—	77	176	253
G8HHI	20	77	135	232
GJ8KNV	12	76	191	279
G4RZP	—	76	147	223
G2AXI	9	76	121	206
G8RZO	—	75	148	223
G4NBS	14	75	94	183
G8PNN	41	72	115	228
G4JZF	—	68	140	208
G8FMK	33	68	79	180
G4MUT	—	68	100	168
G4BWG	—	64	152	216
G6DER	20	64	102	186
G6ADE	—	64	70	134
LA8AK	25	62	200	287
G4ERX	7	61	132	200
G4HFO	—	60	112	172
G6HKT	—	60	89	149
G3NAQ	—	58	128	186
GW8UCQ	1	58	104	163
G8KAX	33	57	82	161
G4ROA	17	55	61	133
G8SRL	—	53	106	159
G4AWU	—	50	150	200
GD2HDZ	13	50	91	154
G4FRX	—	49	81	130
GW3NYU	—	48	206	254
G4STO	29	48	113	190
G4NQC	—	47	113	160
G8WPL	—	47	88	135
G4RCK	—	41	108	149
G4TJX	—	40	87	127
G3BW	6	36	220	262
G4KUX	—	36	172	208
G4HMF	2	35	144	181
G6ADH	—	35	135	170
GM8BDX	—	33	53	86
G4OAE	—	31	174	205
EA3LL	—	30	261	291
GW3CBY	9	30	90	129
G6CMV	1	29	142	172
G3FIJ	—	29	92	121
GM4COK	—	28	204	232
G4PCI	—	28	167	195
G8WUU	—	27	72	99
GM4CXP	—	26	163	189
GJ8SBT	14	25	182	221
G6HRI	—	25	47	72
G8VR	2	24	237	263
G8WPD	—	24	139	163
G4RSN	2	22	81	105
G4IGO	—	19	251	270
G4NRG	—	19	74	93
G4ERG	—	16	243	259
G6DDK	2	13	127	142
G6PFR	—	13	50	63
G4MJC	—	12	120	132
9H1BT	—	11	210	221
G8JNS	1	3	106	110
GW4TTU	—	2	128	130
G4GHA	—	2	110	112
G4MWD	—	1	120	121
G3POI	—	—	411	411
DK3UZ	—	—	317	317
G4IJE	—	—	314	314
SP2DX	—	—	280	280
G4DEZ	—	—	241	241
GW4EAI	—	—	209	209
G3FPK	—	—	197	197
G3KEQ	—	—	194	194
G6ECM	—	—	170	170
G8LFB	—	—	165	165
G8TGM	—	—	158	158
G6HKS	—	—	142	142
GM4IPK	—	—	139	139
G4MEJ	—	—	135	135
GM8OEG	—	—	115	115
G8XIR	—	—	115	115
G4DOL	—	—	114	114
G6DFT	—	—	101	101
G8VVF	—	—	97	97
G14OMK	—	—	96	96
GM8YPI	—	—	94	94
G8RWG	—	—	92	92
G6ABB	—	—	80	80
G8XTJ	—	—	71	71
G6ELO	—	—	69	69
G6NWF	—	—	67	67
G4PEM	—	—	63	63
G8ZYL	—	—	54	54

Starting date January 1, 1975. No satellite or repeater QSOs.
"Band of the Month", 70cm.

recently moved and is now QRV with an *Icom IC-251E* and 40w amplifier, the antenna being a 9-ele. *Yagi* at 29ft. On Dec. 2 he worked F1GXB (XI), F1BCH (AJ), F1CKX (ZI) and OZ1IWE (EQ). The next day brought OZ1DAO (FP), OZ1DOQ (GP), OZ1HFQ (EO), DF8BA (DN), and SM7OBV and OZ2VM in GP. On the 4th SM7MRJ (GP) was worked. Beacon DL0PR was audible throughout the 3rd and up to lunch time on the 4th. OZ1IGY and SK7VHF beacons were also copied.

G4MCU found OE3CEW (II) on the 20m. VHF net on Nov. 21 and made an immediate MS sked with Erik which was successful, being completed in 55 mins. By "tail-ending" G3POI, he worked Y30CLA on CW during the lift for new square GO. Two days earlier, on the 1st, Jon used SSB mode to contact EA1OD (XD) and F1GXX (ZF). G4RSN was in on the latter part of the Dec. lift and began at 0736 on the 3rd with OZ6OL (FP) for a new square, after which a fruitless hour was spent trying to work SM7WW. However, Rod did get SM7WT (GP) at 1305 for his first SM and another new square.

Pam Rose, G4STO, reckons she will have to think about MS operation to work more squares. However, with patience and a bit of luck with *E's*, it is possible to accumulate 200 without MS mode. G6CSY is only running 5w on 2m. but nevertheless, Graeme did work some DX in the lift:— EI4AQB (VN), DB1LI (FO), OZ1DCM (FP), TO6HRP (YI) and GW6UDG/A (XN). G8SRL took part in the Fixed Contest on Dec. 4 as a single operator station and which left him speechless and with writer's cramp. Michael made 360 contacts, many into the "E" and "F" squares, best DX being OZ1KAL (FP54b) at 823 kms. The most pleasing DX was G4FDX/LX (CJ) and after the event, he got SM7NBR (GP48a).

Chris Easton, G8TFI, and Tony Collett, G4NBS, put G4NXO on the air from Chris's Nympsfield QTH for the contest and notched up 536 QSOs for a total of over 11,000 points. Best DX was to SM at 1,080 kms. 250 Ds were worked, over 170 ONs, PAs and Fs, but only 108 Gs. Bryn Llewellyn, G4DEZ, (Essex) did the contest single-handed and made 409 QSOs, with lots of OZs and SM6s and SM7s. Quite obviously, there are going to be some very high scores this time.

GD2HDZ lists a couple more 1983 counties on Dec. 4; G6XYH in Tyne and Wear, and G6SQH in Devon to make it 56 so far. Dave Lewis, GW4HKB, fed 8w of SSB to his 4m. beam and worked 3 GUs in the lift. Kelvin Weaver, GW4TTU, (Gwent) took advantage of the good December conditions starting off with 8 Fs on the 1st in AF, ZE, ZF, ZG, ZH and ZJ squares, followed by 16 PAs the next day. On the 3rd, he tried some QRP work with one watt of CW from an *Icom IC-202*,

getting into CM, DN and EN squares. He took his gear round to GW6KOJ's QTH for the contest. With 400w to a 17-ele. *Tonna Yagi* at 50ft. and 900 ft. *a.s.l.* they worked 133 Gs, GWs and GUs, 4 ONs, 10 Fs, 32 Ds and 66 PAs.

Four & Six Metres

Very little input this month on 4m. and 6m. G3PBV has added a *Trio TS-660* to his collection, described as an "All-mode quad bander," covering FM, USB, CW and AM modes on 21, 24, 28-30 and 50-54 MHz in 1 MHz bands. Dave says it produces 10w and is a sort of "simplified TS-430." He has been listening on 6m. using the 4m. 2-ele. beam and logged GU2HML, GJ3YHU, GW4HBK, G3NOX, G3COJ, G3TCU and G6XM. Sounds like an intriguing piece of kit and somewhat of a rarity at the moment.

GW4HBK, in apologising for lack of recent reports, writes that conditions have been very quiet from South Wales, in spite of regular "CQ" calls on 6m. and 4m. Dave says the Dec. lift did not seem to affect the strength of the 4m. beacons, but that 6m. did open up. He got an S9-plus report from GU2HML, and also worked GJ3YHU, G3OHH, GW3LDH and G6XM.

Bristol Resumé

Ken Osborne, G4IGO, has written after some time and has moved from his Bristol QTH to Somerset. A keen student of propagation, he has sent a brief account of his activity from the old QTH. From mid-1977 to Sept. 19, 1983, 251 squares and 40 countries were contacted on 2m. On tropo, best DX was UQ2IV (KQ) out of 155 squares and 22 countries, while *Auroral* QSOs brought 23 countries in 97 squares. Best DX on this mode were LP, LQ, LR and KH squares, the most unusual being a QSO with F2PC in AC. *Via E's*, 17 countries in 48 squares were worked, best DX being to MZ and HV. F1JG (CD) was a very short skip station contacted.

Ken mentions that in one opening this year, at the end of July or the beginning of August, there was an *E's* opening from G/GI to F, moving into the EA5 and EA7 areas. GI4OPH was heard and called by G4IGO and others on *back-scatter*, an extremely rare phenomenon *via E's* on 144 MHz. Unfortunately the GI either did not hear them or ignored them as they were not DX.

On MS, Ken worked 17 countries in 65 squares, best DX being OH3TH (MU). Only 23 squares were added by MS so 228 were worked by "normal" modes. On tropo and *Ar*, the best DX is found and worked on CW and this is true of most modes of propagation to Eastern Europe. Ken finds that *E's* is a "straight line mode" the QTE for each opening varying very little. However, it can alter by 90° or 180° in a matter of seconds if reports in *DUBUS Informationen* are studied. These are very



“. . . your quality sounds as if you are under the stairs, OM. . . .”

interesting observations of the kind which add to our general understanding of VHF propagation.

Cable Losses

The latest copy of the *AMSAT-UK* satellite calendar contains a "Cautionary Tale" from compiler Trevor Stockill, G4GPQ. He suspected his 25 metre run of URM-67 cable at 70cm. was a bit lossy so replaced it with FHJ4-50. Now, 100w fed in results in 82w at the antenna. The URM-67 had been up for less than 18 months and was undamaged. The same 100w fed to the old cable originally provided 45w at the antenna, but when re-tested, this had dropped to a miserable 15w. That represents over 8dB. loss for just 25m. at 435 MHz! Another way of expressing the deterioration is that the cable is some 4.8dB. worse after this short period.

The moral here is that, just because cable *looks* all right, it does not mean it *is*. Your scribe wonders what the exact reason is for such deterioration when proper precautions are taken regarding waterproofing, etc. Can any cable experts give us the facts?

Gems of the Month

The following two gems were heard by your scribe on 2m. during November, both from G1B. . operators. "My preamp. doesn't work very well on FM. It's much

better on SSB." "We've got a 5XY antenna, but only the X part is working at the moment; there's something wrong with the feeder of the Y part."

Finale

Next issue the final placings in the annual tables will appear, so please be sure to send in your end-of-year figures by **Jan. 4**. Make a note in your new diaries that the deadline for the March issue, when we start the 1984 annual table, is about as early as it can be, **Feb. 1**. Send all your news, etc. to:— "VHF Bands," *SHORT WAVE MAGAZINE*, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 *es* *Happy New Year de G3FPK*.

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LOW-PASS FILTERS FOR ATTENUATING RF AMPLIFIER HARMONICS PART II

A DETAILED EXAMINATION,
COMPLETE WITH NECESSARY DATA
FOR THE CONSTRUCTOR

E. E. WETHERHOLD, W3NQN

Seven-Element Chebyshev Filter with Standard-Value Capacitors

Two seven-element Chebyshev SVC lowpass filters for the 80-metre band are listed for comparison in Table 1, Nos. 6 and 7. These two designs were selected from Design Nos. 5 and 7 of Table 3 as being representative examples of this filter type and suitable for comparison with the 5-element 80-metre filters. Fig. 3 shows the attenuation response vs. frequency of all the filters. As might be expected, the 7 MHz attenuation is greatest in the two 7-element filters as compared to all the 5-element filters. Although the desired second harmonic attenuation of the 7-element filter does not always meet the attenuation criteria of more than 32 dB, the attenuation provided by this filter type will probably be sufficient for its purpose. The maximum calculated VSWR (from Table 3) is 1.036 for one design and 1.035 for the other. In addition to the better attenuation and VSWR performance of the seven-element filters, the use of standard-value capacitors simplifies purchasing and construction.

To facilitate the use of the 7-element SVC filter for amateur radio applications, thirty designs that were considered most appropriate for second harmonic attenuation were selected from a table of 76 designs having VSWR less than 1.15, and these designs are presented in Table 3. The designs for the 40-metre and higher bands all have second harmonic attenuation greater than 30 dB. All but six of the designs have VSWR levels of 1.100 or less. For the most part, these designs meet the desired performance characteristics previously mentioned, and they are recommended for future applications where harmonic filtering is needed.

Summary and Conclusion

Transistor RF amplifiers require lowpass filters for each amateur band to reduce harmonic levels to an acceptable level. Amateur radio designers apparently prefer the 5-element lowpass filter for this application, but there appears to be no agreement on a specific type of design. For example, five-element designs for the "double-pi", half-wave and modified Chebyshev filters were recommended in three articles recently published in the U.K. For such a common and reoccurring need, it seems appropriate that a type of lowpass design be available to the amateur that is easily constructed with standard-value capacitors (SVC) and that also has low VSWR in the passband and adequate attenuation at the second harmonic frequency.

Comparisons of performance and ease of construction were made between four different types of five-element filters and a seven-element type. The seven-element Chebyshev SVC type was recommended for all future harmonic attenuation applications because the advantage of greater harmonic attenuation, lower VSWR and easier construction out-weighed the disadvantages of the one additional capacitor and inductor that are required as compared to the five-element filter. Thirty precalculated seven-element SVC designs were tabulated for all the amateur bands from 160 to 10 metres, with the recommendation they be used in all future amateur transceiver designs, unless there is some compelling reason to do otherwise.

A table of 5-element SVC filter designs was given for Class-A or AB RF amplifier filtering applications where the greatest attenuation of the 7-element filter is not needed, and where it is desired to minimize cost and the number of components.

Acknowledgements

The author gratefully acknowledges the responses received from Messrs. DeMaw, Keyser, Fare and Rev. Dobbs after they reviewed a preliminary copy of this article. The information provided by Mr. Fare was especially appreciated as he brought out the point that a 5-element filter is adequate for those RF amplifiers operating on the Class-A or AB mode such as discussed in his article (Ref. 1). The author also gratefully acknowledges the assistance of Joseph Gutowski of EWC Inc., in reviewing the material in Appendix 'A'.

Appendix 'A'

This appendix contains all the information necessary for you to design an optimum inductor for the filter designs listed in Table 3.

Table A1 lists the general magnetic properties of the Micrometals iron powder toroidal cores distributed in the U.K. by Amidon and which are available from TMP Electronics Supplies. The five listed mixes were selected as being optimum for the filters listed in Table 3. Table A2 gives the core mix number, the core

Table A1. General Magnetic Properties of MICROMETALS Toroidal Cores*

Mix No.	Iron Powder Type	Permeability (μ)	Temperature Stability (+)	Typical Freq. Range (MHz)	Colour Code
2	Carbonyl E	10.0	95 ppm/Deg. C.	.25 - 10	Red
6	" SF	8.5	35	2 - 30	Yellow
7	" TH	9.0	30	1 - 20	White
10	" W	6.0	150	10 - 100	Black
12	Synthetic Oxide	4.0	170 (Non-linear)	20 - 200	Green/White

*From p. 2, Catalog 3, "Iron Powder Toroidal Cores for RF Applications," published by MICROMETALS, INC., 1190 N. Hawk Circle, Anaheim, CA 92807, U.S.A., 1982. These cores are distributed by Amidon, and are available in the U.K. from TMP Electronics Supplies.

Design No.	F-co	F-3 (MHz)	F-20	F-30	VSWR	C1,7 (pF)	C3,5	L2,6 (μH)	L4
1	2.02	2.34	2.9	3.2	1.086	1200	2700	5.415	6.403
2	2.16	2.76	3.5	4.0	1.024	820	2200	4.442	5.608
3	2.17	2.59	3.2	3.6	1.056	1000	2400	4.863	5.880
4	2.33	2.66	3.2	3.7	1.104	1100	2400	4.771	5.586
5	3.81	4.72	5.9	6.7	1.036	510	1300	2.637	3.261
6	4.10	4.82	5.9	6.7	1.070	560	1300	2.624	3.135
7	4.13	5.11	6.4	7.3	1.035	470	1200	2.434	3.012
8	4.40	5.20	6.4	7.3	1.064	510	1200	2.427	2.913
9	7.23	8.40	10.3	11.7	1.080	330	750	1.508	1.789
10	7.36	9.04	11.3	12.9	1.039	270	680	1.380	1.698
11	7.98	9.28	11.4	12.9	1.082	300	680	1.366	1.619
12	7.72	8.66	10.4	11.8	1.138	360	750	1.463	1.689
13	10.33	12.99	16.3	18.6	1.030	180	470	.952	1.188
14	10.37	11.62	14.0	15.8	1.142	270	560	1.090	1.257
15	14.40	16.41	19.9	22.5	1.109	180	390	.773	.904
16	14.45	17.26	21.4	24.3	1.056	150	360	.729	.882
17	15.17	17.56	21.5	24.3	1.086	160	360	.722	.854
18	16.82	19.29	23.5	26.5	1.099	150	330	.658	.772
19	18.93	22.89	28.4	32.3	1.048	110	270	.548	.668
20	20.22	23.41	28.6	32.4	1.086	120	270	.541	.640
21	21.48	24.09	29.0	32.7	1.141	130	270	.526	.606
22	21.55	27.62	34.9	39.9	1.024	82	220	.444	.561
23	21.67	25.89	32.0	36.4	1.056	100	240	.486	.588
24	23.28	26.60	32.4	36.5	1.104	110	240	.477	.559
25	25.24	28.94	35.2	39.8	1.099	100	220	.438	.515
26	25.68	30.95	38.4	43.7	1.050	82	200	.406	.493
27	30.66	38.24	48.0	54.7	1.033	62	160	.324	.403
28	30.90	35.40	43.1	48.7	1.100	82	180	.359	.421
29	31.66	40.52	51.2	58.5	1.024	56	150	.303	.382
30	33.00	39.02	48.1	54.6	1.064	68	160	.324	.388

Table 3. 50-ohm, 7-element Chebyshev LP Filters using Standard-Value Capacitors (for reduction of harmonic levels in transistor RF amplifiers).

Notes:

1. See schematic diagram, Fig. 2(a), for the location of C1, C3, C5 and C7, and of L2, L4 and L6.
2. F-co is the 'ripple cutoff frequency (F-Ap)', and F-3, F-20 and F-30 are the frequencies of the 3dB, 20dB and 30dB attenuation levels; see Fig. 2(b).

colour and the recommended frequency range *versus* the inductance for ten turns on five different core sizes. These five sizes were selected as being optimum for the filters in Table 3. By using the inductance value for ten turns, it is possible to calculate the turns required for any desired inductance value. A design example following this paragraph demonstrates how the data in Tables A1 to A4 are used. Table A3 gives the physical and magnetic dimensions of the core sizes selected for the filters in Table 3. The physical dimensions are useful for laying out the filter on a p.c. board, and the magnetic dimensions are needed to determine the maximum flux density for a particular power level. Also included in Table A3 is an estimation of the maximum number of turns for wire sizes from 28 to 20 s.w.g. that can be single-layer wound on each core size. Wire sizes smaller than 28 s.w.g. are too fine to be conveniently handled, while wire sizes larger than 20 s.w.g. are too stiff for convenient winding. When purchasing wire to wind these coils be sure to get wire with a polyurethane type of film insulation which vaporizes when soldered. This eliminates the need of manually stripping the film which is necessary if a non-solderable insulation such as Formvar is used. Table A4 gives the recommended minimum core size for

the five cutoff frequency ranges taken from Table 3, and for five RF power ranges up to 200 watts.

A design example demonstrates how the data in the four tables are used to select an optimum iron powder core for an RF filtering application. Assume you want to build a lowpass filter (such as Design No. 1 in Table 3) for a 160-metre band transmitter having a maximum power output of 50 watts. To do this, use the following procedure:

(a) Refer to Table A4 and select a core that is optimum for the cutoff frequency range and power level being used. A T68-2 core meets the requirements of the Design No. 1 for a power output of 50 watts.

(b) From Design No. 1 of Table 3, $L_2 = L_6 = 5.415 \mu\text{H}$, and $L_4 = 6.403 \mu\text{H}$. Using the Inductance Value at 10 turns from Table A2 and the following equation, calculate the number of turns required on a T68-2 core to give the desired L_2 and L_6 inductance value: $N = 10\sqrt{L/L_{10}}$, where N is the number of turns required for the desired inductance 'L', and L_{10} is the inductance at 10 turns from Table A2. For a T68-2 core, $L_{10} = 0.57 \mu\text{H}$. Thus, $N = 10\sqrt{5.415/0.57} = 30.8$ or 31 turns. In a similar manner, the $6.403 \mu\text{H}$ inductor (L_4) requires 34 turns on a

Table A2. Inductance at 10 turns for MICROMETALS Toroidal Cores

Core Mix Number	Colour	Inductance (μH) at 10 turns.					Recommended Freq. Range (MHz)
		Core Size Prefix					
		T37	T44	T50	T68	T80	
-2	Red	.40	.52	.49	.57	.55	1 - 5
-6	Yellow	.30	.42	.40	.47	.45	7 - 14
-7	White	.32	.46	.43	.52	.50	4 - 8
-10	Black	.25	.33	.31	.32	.32	14 - 25
-12	Green/White	.15	.185	.18	.21	.22	25 - 60

Notes:

1. The above inductance values have a tolerance of 5% and are based on a single layer of turns evenly spaced around the core.
2. The core prefix gives the nominal outside core diameter in hundredths of an inch.
3. The complete toroidal core is specified by the core size prefix followed by the material designation. For example, a T37-2 core has a nominal O.D. of 0.37 inches and an inductance of 0.40 μH at 10 turns. See the design example in Appendix 'A' for the procedure used in calculating the turns for any desired inductance value.

T68-2 core. Referring to Table A3, we see that the largest wire size that can be put on a T68 core for 31 and 34 turns is 22 s.w.g. However, it may be advisable to use a 24 s.w.g. wire size to wind the larger inductance so the fit is less critical.

If desired, the maximum AC flux density may be calculated for a power level of 50 watts using the following procedure;

(a) at 2.02 MHz, the reactance (XL) of the 6.403 μH inductor is $2\pi P1 * F * L4 = 81.3$ ohms;

(b) for an RF power of 50 watts into 50 ohms, the resulting RF current through L4 causes a voltage 'V' to be developed across L4: V (volts) = $XL * (\sqrt{P}) / 7.07 = 81.3 * (\sqrt{50}) / 7.07 = 81.3$ volts;

(c) Calculate the maximum AC flux density, Bmax, in gauss: $B_{max} = V * 100 / (4.44 * A * N * F)$ where

V = r.m.s. volts across the inductor = 81.3,

A = core cross sectional area (cm sq.) from Table A3 = 0.196,

N = number of turns on the inductor core = 34,

F = filter cutoff frequency in MHz = 2.02.

$B_{max} = 81.3 * 100 / (4.44 * .196 * 34 * 2.02) = 136$ Gauss.

Since this flux density is well below the conservative maximum value of 200 Gauss recommended for this application, a T68-2 core is satisfactory for both L2, 6 and L4.

References

1. "A modern HF transceiver, Part 1", by G. N. Fare, G3OGQ, *Radio Communication*, p. 314, April 1983.
2. "On QRP transmitters and harmonic output", by D. DeMaw, W1FB, *Sprat*, The Journal of the G-QRP Club, Issue No. 35, Summer 1983.
3. "The 'Whitfield' SSB/CW/QSK transceiver, Part V", by I. Keyser, G3ROO, *Short Wave Magazine*, p. 258, July 1983.
4. "Lowpass filters for amateur radio transmitters", by E. Wetherhold, W3NQN, *QST*, December 1979.
5. "7-element Chebyshev filters using standard-value capacitors", by E. Wetherhold, *RF Design*, February and June 1980.
6. "Design 7-element lowpass filters using standard-value capacitors", by E. Wetherhold, *EDN*, Vol. 26, No. 1, 7 January 1981.
7. "Lowpass Chebyshev filters use standard-value capacitors", by E. Wetherhold, *Electronics*, Engineer's Notebook, p. 160, 19 June 1980.
8. "Standard C, L-input filters stabilize HF transistor amplifiers", by E. Wetherhold, *Electronics*, Engineer's Notebook, p. 155, 3 November 1981.
9. "Lowpass filters (with inductive input and output)", by E. Wetherhold, *RF Design*, Vol. 4, Nos. 4 and 5, July/August and September/October 1981.
10. *Electronic Designer's Casebook, No. 5*, prepared by the editors of *Electronics*, "Lowpass and highpass (7-element) Chebyshev filters use standard-value capacitors", pp. 94-97, McGraw-Hill, 1982.
11. "7-element highpass and lowpass Chebyshev filters using standard-value capacitors", by E. Wetherhold, *Interference Technology Engineers' Master (ITEM)*, 1981, published annually by R & B Enterprises, 20 Clipper Road, West Conshohocken, PA. 19428.
12. "A BASIC program for designing Chebyshev filters", by J. Barge and E. Wetherhold, *EMC Technology*, Vol. 1, No: 2, pp. 60-69, April 1982.

Table A3. Toroidal Core Dimensions and Maximum Turns for Single Layer Winding.

Core* Size Designation	TOROIDAL CORE DIMENSIONS				Approximate Turns for Single Layer Winding				
	Physical Height inches (cm)	Inner Dia. inches (cm)	Magnetic Length (cm)	Area (cm sq.)	Wire Size (swg)				
					28	26	24	22	20
T37	.128 (3.25)	.205 (5.21)	2.32	.070	41	31	23	17	12
T44	.159 (4.04)	.229 (5.82)	2.67	.107	46	35	27	20	15
T50	.190 (4.83)	.303 (7.70)	3.20	.121	63	49	37	28	21
T68	.190 (4.83)	.370 (9.40)	4.24	.196	79	61	47	36	28
T80	.250 (6.35)	.495 (12.57)	5.15	.242	108	84	66	51	39

*The "T" designates a toroidal core and the number following the "T" designates the outer diameter of the core in hundredths of an inch.

Table A4. Recommended Minimum Core Size versus Core Material for Various Power Levels and Frequency Ranges.*

Cutoff Freq. Range (MHz)	Core Material & Colour	DESIGNATION OF SMALLEST USABLE TOROIDAL CORE				
		Power Level Range (Watts RMS)				
		<10	10 - 25	25 - 50	50 - 100	100 - 200
2 - 5	— 2 (Red)	T37	T44	T68	T68	T80
6 - 8	— 7 (White)	T37	T37	T37	T44	T50
10 - 12	— 6 (Yellow)	T37	T37	T37	T44	T50
14 - 24	—10 (Black)	T37	T37	T37	T37	T44
25 - 35	—12 (Grn/White)	T37	T37	T37	T37	T37

*The above minimum core sizes may be used for the designs in Table 3. A conservative maximum AC flux density of 200 Gauss was used to determine the minimum core size. Minimum 'Q' of the T37 core will be between 150 and 200 for the - 2, - 6 and - 7 materials, and between 125 and 150 for the - 10 and - 12 materials. A larger core may be used for higher 'Q' if desired.

13. *Electronic Databook, 3rd edition*, edited by Rudolf F. Graf, "Passive LC Filter Design", pp. 117-143, TAB Books Inc., Blue Ridge Summit, PA. 1983.

14. *Catalog 3, Iron Powder Toroidal Cores for RF Applications*, published by Micrometals Inc., 1190 N. Hawk Circle, Anaheim, CA 92807, U.S.A., 1982.

Soldering Polyurethane Wire — Safety

Editorial note: when doing much soldering of wire covered with a synthetic enamel based on a polyurethane resin (by "much" we mean the soldering associated with the inductors of, say, ten of

W3NQN's filters) ensure that there is *plenty of ventilation*. This is because when the resin melts it gives off a small amount of toluene di-isocyanate, which is both irritating and harmful to the eyes and respiratory system. For reference, see the February 1982 issue of *Rad Com*, page 143.

DATA PROCESSING THE LOG BOOK — ON A MICROCOMPUTER

I. T. WOOD, G4MCN

THE growing availability of small, powerful, computers at work, in schools, and now in the home, allows the radio amateur to process the data in their log books into conveniently sorted information. This article attempts to illustrate what an existing 32K computer can do — by means of two programs written in PET BASIC and, to whet the appetite of the complete novice, by a 'step by step' description of the first part of the simpler program.

The two programs provide a record of QSOs sorted in some predetermined manner. The first program allows five items of data on each contact (callsign, date, time, band and mode) to be fed into the computer, in a manner facilitating easy editing of any errors, before being transferred to disc. The second program processes the data now held on disc. In order to make the most effective use of computer memory, whilst keeping the program relatively simple, the data is read from the disc into the 'array' (an

indexed list of the data), which is then sorted before being output to a visible record. As each set of data is fed into the computer it may be rearranged before being stored in the array. Hence if the data is stored in the sequence — callsign, date, time, band and mode — then it will be sorted into alphabetical order starting with callsign. Alternatively, if it is rearranged in order of band, mode and callsign, then sorting will take place on those variables. See Figs. 1 and 2 which illustrate printout of a typical batch of QSOs.

Although BASIC is a programming language common to all small computers, each brand (and even variations of model within a brand) will have its own dialect. Hence whilst most of the instructions in the accompanying programs are written in 'standard BASIC' some of the statements (notably those relating to disc) are particular to PET and will need changing to suit other computers.

An idea of what scale of processing may be achieved by these 'small powerful computers' may be gauged by the writer's use of this type of program on a 32K BASIC 4 PET with 4040 disc drive. The five items of data already outlined, for each of 1089 QSOs made during a recent twelve-month period, were keyed into the computer and then stored on a 5-inch disc. When processed with a machine code sorting routine the sort took about six seconds (the standard BASIC sort routine listed in Program 2 will take very much longer — however for home use this is of little consequence). The resulting processed data occupied ten pages of printout for the alphabetic sort, and four pages for the sort by band and mode. The total run time for each activity was about five minutes (reading the data, sorting and printing) using a medium speed 132 column printer. Hence the writer is able to keep a yearly record of DX contacts in sorted form. Those who make many more contacts per year will be able to devise methods based

3B8/K1BJ	7/1/83 1009 28 P				
3V8AA	17/1/83 1435 28 P				
5N6GGJ	31/1/83 0834 21 P	5N6RED	24/1/83 1200 28 P		
5Z4CI	1/1/83 1102 28 P				
6W8AR	1/1/83 1556 28 P				
7X4BL	8/1/83 1240 28 P	7X4BL	21/1/83 1148 28P		
8P6GG&	22/1/83 1114 28 P	8P6OL&	22/1/83 1124 28P		
9N1BMK	1/1/83 1253 28 P				
A9XP	8/1/83 1626 14 P				
CE5TH	21/1/83 2135 21 P	CE8ABF	24/1/83 1852 28 P		
CR9AN	14/1/83 1038 28 P				
CT2DL	23/1/83 1711 28 P				
CX7CG	2/2/83 1914 28 P	CX8DV	2/2/83 1946 28 P		
DF6DV	1/1/83 1208 10 C				
DJ3VM	15/1/83 0436 3.5 P				
DK6AP	8/1/83 2154 14 C				
DL4AAE	1/1/83 1438 10 C	DL5AM	1/1/83 0910 10 C	DL9OAD	1/1/83 1502 10 C
EA8QL	29/1/83 1045 28 P				
F6GUR	8/1/83 2216 14 C				
FY0FOL	4/2/83 1257 28 P				
G3AOS	30/1/83 1246 28 P	G3KEF	1/1/83 0938 10 C	G3NXX	30/1/83 1232 28 P
G3VFP	17/1/83 1253 14 P	G3YBD&	23/1/83 2011 28 P	G3VFP	14/1/83 1942 14 P
G4HBI	26/1/83 1924 21 P	G4HXB	4/2/83 2000 28 P	G4HXB	7/1/83 1137 28 P
G4HXB	15/1/83 1037 28 P	G4KNB&	23/1/83 2011 28 P	G4HXB	14/1/83 1100 28 P
H18LC	1/1/83 1535 28 P	G4MAG	1/1/83 0018 10 C	G4NIN	18/2/83 1805 28 P
HV2VO	19/1/83 1715 14 P				
I8/N7HJ	21/1/83 1030 28 P				
JW/SP2BHZ	19/1/83 0352 14 P	JWOP	30/1/83 1316 28 P		
JX5VAA	9/1/83 1542 14 P				
K1BJ/3B8	7/1/83 1009 28 P				
KA7BPD	29/1/83 1729 28 P				
KB4YT	14/1/83 1932 14 C				

Figure 1

on processing only part of the alphabet at a time (G contacts, A-D, and so on).

For the User

Program 1. "QSODATA" divides into three parts. First the data for each QSO is read from the data lines numbered 1000 onwards. The data on each contact can occupy a separate line and is updated at convenient intervals, weekly, monthly, or whatever, until the computer memory is almost filled — this will occur after some 600 contacts have been entered. At this point the computer has no room left for processing and the data is offloaded to the backup store (disc). It is extremely simple to edit typing errors out of the data lines, either by retyping them, or by using the screen editing facilities now found on most small computers. The first part of the program reads the callsign back onto the screen to provide a useful check that the data is being read correctly. The number of contacts made is counted automatically. Part-two of the program performs the transfer of data to a disc file identified by the name "LOG". The number of contacts made is the first entry to this file. Part-three comprises the data block which in practice will be hundreds of lines long (one set of data per contact) and which is terminated by a 'dummy' callsign END, which is used to signal that all the data has been read.

Program 2. "QSOPRINT" may also be described in three parts. After instructing the computer which type of sort is required and opening a channel to the disc file, the first part of the program inputs the data from disc — in the same order as it was read onto the disc, callsign, date, time, band and mode — and then rearranges this data into one single 'Packet of information' per QSO. The spaces and order of the items of data are determined by the choice of printout required: either by alphabetic order of callsign (Fig. 1) or by band/mode (Fig. 2). The data is now stored in the array XS().

Part-two sorts this array in a manner that will be obvious from inspection of the two Figures. In the listing shown, sorting is

achieved by the well-known BASIC 'bubble' sort which may take a few hours to complete. This part of the program may be reduced to one instruction line if a machine code sort routine can be borrowed, lifted from a magazine, or bought for a few pounds. The sort process time will then be reduced to a few seconds and will provide a new horizon for ideas on fresh applications of data processing.

Part-three of the program prints out the sorted array in its new sequence. If the first two characters of successive QSOs are the same then printing by callsign will continue on the same line — if different, then a new line will be forced. Users with 80 column printers will reduce the value of GG in lines 470 and 540 and alter the number of blank spaces used. A running total of the number of contacts per band, per mode, is made and printed out at the end of that section. A grand total of contacts terminates the printout. The program lines which are particular to the 'sorting by band' option are shown indented in the listing. This program is capable of handling some 800-plus contacts. The writer obtained the printout of over 1000 QSOs, referred to earlier, by deleting the '/83' in each date and removing the space between the band and the mode (e.g. 28 P became 28P) — he also appended two disc files together to make one larger than can be obtained directly from Program 1. However in the interests of those who wish to preserve the full set of data, and to maintain a more elegant spacing, the accompanying two programs are suitable for up to 650 contacts.

Close inspection of the printout will reveal that two callsigns terminate with a '&' sign — this is part of the writer's personal code in which a '&' signifies a joint QSO, '£' a contest contact, '*' an aborted contact (QRM,QSB) and '!' for contacts under auroral conditions. Also, those with alternative country callsigns appear twice (for example, K1BJ/3B8 is duplicated to appear as 3B8/K1BJ).

For the Newcomer to Computing

Programming is not difficult — it just looks as though it should be! At one British school, thirteen-year-olds are taken off normal

10 C DF6DV	10 C DL4AAE	10 C DL5AM	10 C DL90AD		
10 C G3KEF	10 C G4MAG				
10 C 6					
14 C DK6AP					
14 C F6GUR					
14 C KB4YT					
14 C 3					
14 P A9XP					
14 P G3VFP	14 P G3VFP				
14 P HV2VO					
14 P JW/SP2BHZ	14 P JX5VAA				
14 P SP2BHZ/JW					
14 P VU2AU	14 P VY1CC				
14 P ZD7HH					
14 P 10					
21 P 5N6GGJ					
21 P CE5TH					
21 P G4HBI					
21 P PZ1/W6KG					
21 P VE3FXT/Z2	21 P VP2KBS	21 P VP8ANT			
21 P W6KG/PZ1					
21 P Z2/VE3FXT	21 P ZB2J	21 P ZL1UQ			
21 P 11					
28 C N9AHH					
28 C W8OQV					
28 C 2					
28 P 3B8/K1BJ	28 P 3V8AA				
28 P 5N6RED	28 P 5Z4CI				
28 P 6W8AR					
28 P 7X4BL	28 P 7X4BL				
28 P 8P6GG&	28 P 8P6OL&				
28 P 9N1BMK					
28 P CE8ABF	28 P CR9AN	28 P CT2DL	28 P CX7CG	28 P CX8DV	
28 P EA8QL					
28 P FY0FOL					
28 P G3AOS	28 P G3NXX	28 P G3YBD&	28 P G4HXB	28 P G4HXB	28 P G4HXB
28 P G4HXB	28 P G4KNB&	28 P G4NIN	28 P G4NIN	28 P G4NIV	
28 P HI8LC					
28 P I8/N7HJ					
28 P JW0P					
28 P K1BJ/3B8	28 P KA7BPD				
28 P N2BJO	28 P N7ARA	28 P N7HJ/I8	28 P N8DE		
28 P OH2TV					
28 P UA9SHE	28 P UK1AAA	28 P UK3DDJ	28 P UK7PAA		
28 P VK3PNX	28 P VK9YC	28 P VP8QG	28 P VU2NP	28 P VU2UGI	
28 P W1TAK	28 P W7IWU	28 P WA0UCV	28 P WB7VLK	28 P WD4NDD	
28 P ZP5RG					
28 P 53					
3.5 P DJ3VM					
3.5 P YV3BQS					
3.5 P 2					
TOTAL NO. OF ENTRIES = 87					

Figure 2

lessons for a one week computing course. At the end of that week they can program, use the word processor and program the control of a large model railway in 'real-time'.

Some taste of what is involved will hopefully be gained by reading the following description in conjunction with the listing of Program 1.

Programs in the BASIC language contain a list of instructions written in a form that has some commonsense meaning to the human user and is capable of immediate interpretation by the built-in dictionary inside the computer. The instructions are carried out, one at a time, in sequential order of the line number which prefaces each instruction.

One of the basic concepts of the language was that each

instruction line should contain a 'keyword' that conveys the sense of the instruction. For example, line 100 reads:

```
100 REM program name
```

The keyword REM is shorthand for 'remark' and allows the programmer to write notes in his program which the computer ignores but facilitates his later reading of the program. As soon as the computer detects the keyword REM it flips to the next instruction.

A blank line such as line 200 serves only to space out the printed list of instructions to improve readability. Line 220 could be typed as:

```
220 LET N=O
```

The keyword LET means 'set a memory location, to be labelled

as N, to take on the value zero'. As BASIC has grown in popularity some of the original concepts have been abandoned and most small computers accept the shorter form of the instruction in line 220. Also it is now common for small computers to accept multiple instructions prefaced by one common line number — each instruction being separated by the colon (:) symbol. For example, we could have

```
220 LET N=O : REM INITIALISE QSO COUNTER
```

Thus a computer performs one instruction at a time, in a predetermined sequence, and most of its working instructions manipulate the data currently held in defined memory locations. Data may be entered into these named stores in various ways.

```
220 LET N=O
```

was one way. This instruction placed the numerical value O into store N. The letters A to Z are used to define numerical memory locations. However much of the data used in real life is not numerical — packets of non-quantitative information are stored

Program 1

```
100 REM QSODATA
200
210 REM COUNT AND CHECK DATA
220 N=0
230 READ C$,D$,T$,B$,M$
240 IF C$="END" THEN 280
250 PRINTC$
260 N=N+1
270 GOTO230
280 PRINTN; "ENTRIES"
290 PRINT "WANT TO SAVE ONTO DISC NOW";
300 INPUT R$
310 IF LEFT$(R$, 1)="N" THEN END
320
330
500 REM SAVE ONTO DISC
510 RESTORE
520 OPEN15, 8, 15: PRINT £15, "S1:LOG": CLOSE15
530 OPEN2, 8, 8, "1:LOG, S, W"
540 PRINT£2, N; CHR$(13);
550 READ X$
560 IF X$="END" THEN 590
570 PRINT£2, X$; CHR$(13);
580 GOTO 550
590 CLOSE2
600 END
1000 DATAG4MAG, 1/1/83, 0018, 10, C
1010 DATADL5AM, 1/1/83, 0910, 10, C
1020 DATAG3KEF, 1/1/83, 0938, 10, C
63000 DATA END, Z, Z, Z, Z
READY.
```

in locations defined by an initial letter followed by the \$ symbol; for example, we could not put the data "Joe Bloggs" into location N\$. Some computers will allow memory locations to be given long names — such as CALLSIGN\$, DATE\$, TIME\$, BAND\$, MODE\$ — all will allow the initial letter to be used; for example, C\$, D\$, T\$, B\$ and M\$. Hence line 230 of the program instructs the computer to look for the first item of data found on the first data line (line 1000) and place it in location C\$, the second item into D\$, and so on. Commas are used to separate the items of data on each data line. Line 250 tells the computer to print the callsign onto the computer screen so that we may check the data.

The number of sets of data read are counted in line 260:

Program 2

```
100 REM QSOPRINT: COPYRIGHT IT WOOD, G4MCN
110 PRINT "WANT PRINTOUT BY (A) LPHABETIC
ORDER OR BY (B) AND";
120 INPUT R$
130 Z$=" "
140
150 OPEN2, 8, 8, "1:LOG, S, R"
160 INPUT £2, N
170 DIM X$(N)
180
190
200 FOR I=1 TO N
210 INPUT £2, C$, D$, T$, B$, M$
220 C$=C$+RIGHT$(Z$, 10-LEN(C$))
230 D$=LEFT$(Z$, 8-LEN(D$))+D$
240 T$=" "+T$
250 B$=LEFT$(Z$, 4-LEN(B$))+B$
260 M$=" "+M$
270 IF R$="A" THEN X$(I)=C$+D$+T$+B$+M$
280 IF R$="B" THEN X$(I)=B$+M$+" "+C$
290 NEXT I
300
310 CLOSE2
320
330 REM SORTING ROUTINE
340 FOR I=1 TO N-1
350 FOR J=I+1 TO N
360 IF X$(I)<X$(J) THEN 400
370 T$=X$(I)
380 X$(I)=X$(J)
390 X$(J)=T$
400 NEXT J
410 NEXT I
420
430
440 OPEN4, 4: CMD4
450 FOR I=1 TO N
460 IF I=N THEN 550
470 IF R$="B" THEN 510
480 IF LEFT$(X$(I+1), 2)<>LEFT$(X$(I), 2) THEN 570
490 IF GG=3 THEN 620
500 GOTO 550
510 IF LEFT$(X$(I+1), 4)<>LEFT$(X$(I), 4) THEN
W=W+1: GOTO 570
520 IF LEFT$(X$(I+1), 7)<>LEFT$(X$(I), 7) THEN
W=W+1: GOTO 570
530 IF LEFT$(X$(I+1), 8)<>LEFT$(X$(I), 8) THEN
W=W+1: GOTO 620
540 IF GG=5 THEN W=W+1: GOTO 620
550 PRINT X$(I) + " ";
560 W=W+1: GG=GG+1: GOTO 640
570 PRINT X$(I)
580 IF R$="B" THEN PRINT LEFT$(X$(I), 7); W
590 PRINT
600 GG=O: W1=W+W: W=W=O
610 GOTO 640
620 PRINT X$(I)
630 GG=O
640 NEXT I
650 W1=W+W
660 PRINT
670 IF R$="B" THEN PRINT LEFT$(X$(I-1), 7); W
680 PRINT
690 IF R$="B" THEN PRINT "TOTAL NO OF
ENTRIES="; W1
700 PRINT £4: CLOSE4
710 END
```

260 N = N + 1

which can be interpreted as, 'increment N by one'. It started with the value zero — we have read one set of data, hence N is now 1.

More data is read because of the jump instruction

270 GOTO 230

The computer is told to go back to the instruction on line 220 — read more data, then increment the counter N by one, and then go back to read more data. . . . And carry on reading until the test in line 240 is found to be true; *i.e.* when all the real data has been read, the dummy callsign END is placed in C\$ and the program is then diverted to line 280 which prints out onto the VDU screen the number of QSOs for which data has been read.

Line 290 uses the keyword PRINT followed by some text enclosed within quotation marks. At this instruction the computer slavishly copytypes onto the screen whatever text is held in quote marks.

At line 300, a further method of entering data is used. In response to the question now on the screen

DO YOU WISH TO SAVE ON DISC NOW?

the computer invites the user to reply yes or no. If the response starts with letter N (for no, nay, non, nein and so on) the

instruction on line 310 tests for the initial left-hand letter and terminates the program if it is found to be an 'n'. If any other response is made the program continues to the next instruction line.

The three most important ways of injecting data into a program have been described — LET, READ and INPUT — program loops have been seen — GOTO a linenumber — and the powerful conditional jump statement, IF some condition holds THEN so to another line. These few instructions, together with the variations on the PRINT instruction, allow very powerful programs to be written. However no matter how complex the program the microcomputer can do only one instruction at a time as it manipulates the information stored in its user defined memory locations.

The remainder of the program reads the data once more, printing it onto a disc file named 'LOG' instead of onto the screen. In the data file LOG we have the number of contacts followed by the set of data for each QSO.

The second program reads the data from disc and joins it together as requested by the user, before being sorted and displayed in the rearranged format.

CLUBS ROUNDUP

By "Club Secretary"

FIRSTLY, thanks to all those regular contributors to this piece for their Christmas and New Year greetings, so much appreciated by your scribe.

Secondly, a bit of a beef . . . our crystal ball has broken down, and we can't find a competent serviceman. So *please* include in your letter the name and address of the Hon. Sec. With a pile of eighty or so club letters to deal with, the chap who says "Hon. Sec. so-and-so, QTHR" to save himself a moment can cause considerable delay here, where time is of the essence and even minutes count towards the deadline. Worse still is the chap who says "QTHR" and yet owns a call too recent to be in the *Call Book!* Either he doesn't know what QTHR means, or he has forgotten his entry in the book is against his now-discarded 'B' licence call.

The Letters

We've turned the pile upside down this month, so we can kick off with a new club: **308 Club** is so named because of the room number in which many of the members are studying RAE at Kingston College of Further Education; but their actual Hq. is in the "Coach House" behind St. Mark's Church in Surbiton, every Tuesday evening at eight. They would like some offers of talks, as well as visitors for a natter — "all welcome" is the motto.

We turn now to **York** which has its Hq. at the United Services Club, 61 Micklegate, York, meeting there every Friday evening. Contact the Hon. Sec. for details — *see Panel.*

On Thursday evenings at 7.30 the **Yeovil** lads gather at the Recreation Centre, Chilton Grove, Yeovil; January 5 sees G3MYM discussing his own feelings on the Chordal Hop question, and on 12th he talks about "Your Amateur Radio Career". January 19 is down for G3GC to look at "History —

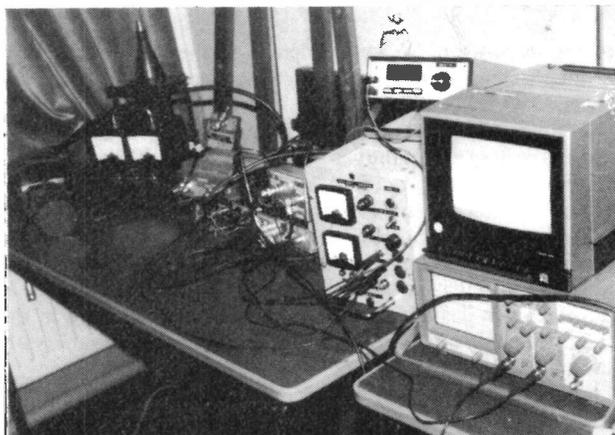
from Semaphore to Satellite". Finally, on January 26 there is a natter night.

January 9 for **Worcester** is at the Oddfellows Hall in New Street, for a discussion evening; the informal is at the Old Pheasant Inn, New Street on January 23.

The Canteen and Social Club, Milton Trading Estate, Milton, Abingdon, is the Hq. of the **Vale of White Horse** gang on the first and third Tuesday of each month, with the latter usually the natter session. For details of how to get there we must refer you to the Hon. Sec. — *see Panel.*

Second and fourth Tuesdays are the ones booked by **Thanet** at the Grosvenor Club, Grosvenor Park, Margate. G8SBS has the floor on January 10 to talk about satellite working, and on January 24 there will be a computer evening.

We are 'up against it' for details of the **Sutton & Cheam** events this month — the newsletter deals with December and March but



Mike Horrocks', G8GTP, colour video transmitting equipment which was used at the Bury end of another 'video quiz' between Bury and Warrington Amateur Radio Societies in November. Contact was maintained between the two clubs, a distance of 18 miles, by speech and video in the 144 MHz and 432 MHz bands. The Bury lads eventually won the close contest by 4 points, with a score of 115.

photo: G3VNQ/G4OAC

Names and Addresses of Club Secretaries reporting in this issue:

- ABERGAVERN: D. F. Jones, GW3SSY, 2 Dalwyn Houses, Llanover Road, Blaenavon, Gwent NP4 9HY. (0495 791617)
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- CANNOCK CHASE: K. T. Ward, G4RJW. (address wanted)
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- DUDLEY: Mrs. C. Wilding, G4SQP, 92 Ravenhill Drive, Codsall, Wolverhampton, W. Midlands WV8 1BW. (Codsall 5636)
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- G-QRP CLUB: Rev. G. C. Dobbs, G3RJV, 17 Aspen Drive, Chelmsley Wood, Birmingham B37. (021-770 5918)
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- HAVERING: A. Negus, G8DQJ, 17 Courtenay Gardens, Upminster, Essex RM14 1DH. (Upminster 24059)
- HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. (Hereford 273237)
- HORNSEA: N. A. Bedford, G4NHP, 39 Hamilton Road, Bridlington, Yorks. YO15 3HP.
- I.R.T.S.: S. Nolan, E17CD, 68 Ratoath Estate, Ratoath Road, Dublin 7.
- JERSEY (AEC): P. Johnson. GJ8KNV, Mon Repos, Fauvie Grauville, Jersey. C.I. (Jersey 53333)
- LINCOLN: Mrs. P. Rose, G8VRJ, Pinchbeck Farmhouse, Mill Lane, Sturton-by-Stow, LNI 2SA (Gainsborough 788356)
- MIDLAND: N. Gutteridge, G8BHE, 68 Max Road, Quinton, Birmingham B32 1LB. (021-422 9787)
- MID-SUSSEX: R. Hodge, G4MMI, Corner House, Manor Gardens, Hurstpierpoint. (Hurstpierpoint 833559)
- MID-WARWICKSHIRE: Mrs. C. Finnis, G4TIL, 37 Stowe Drive, Southam, Warks. CV33 0NZ. (Southam 092681 4765)
- NENE VALLEY: L. Parker, G4PLJ, 128 Northampton Road, Wellingborough, Northants NN8 3PJ.
- NORTH WAKEFIELD: S. Thompson, G4RCH, 3 Harlington Court, Morley, LS27 0RT. (0532 536603)
- PLYMOUTH: C. Stevens, 196 Lipson Road, Plymouth.
- R.A.I.B.C: Mrs. F. Wooley, G3LWY, 9 Rannoch Court, Adelaide Road, Surbiton KT6 4TE.
- RATEC: N. D. Spear, G4RWI, 58 Cheadle Hulme Road, Cheadle Hulme, Cheshire.
- ROYAL NAVY: M. Puttick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants. (Waterlooville 55880)
- SALOP: D. E. Parslow, G6UDB, 1 Willington Close, Little Harlescott Lane, Shrewsbury SY1 3RH. (0743 62737)
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- SOUTHDOWN: T. Rawlance, G4MVN, 18 Royal Sussex Crescent, Eastbourne.
- S.E. KENT: A. Moore, G3VSU, 42 Nursery Lane, Whitfield, Dover, Kent CT16 3HG. (0304 822738)
- STEVENAGE: C. Barber, G4BGP, 13 The Sycamores, Baldock, Herts. (0642 892736)
- STOCKTON: J. A. Walker, G6NRY, 7 Widdrington Court, Stockton-on-Tees, Cleveland, TS19 8UF.
- STOURBRIDGE: M. Davies, G8JTL, 25 Walker Avenue, Quarry Bank, Brierley Hill. (Lye 4019)
- STRATFORD-ON-AVON: D. Boocock, G8OVC, 181 Lower Binton, Stratford-on-Avon. Warks. (Stratford-on-Avon 750584)
- SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR. (01-642 9871)
- SUTTON & CHEAM: J. Korndorffer, G2DMR, 19 Park Road, Banstead, Surrey.
- THANET: I. B. Gane, G4NEF, 17 Penshurst Road, Ramsgate, Kent. (Thanet 54154)
- VALE OF WHITE HORSE: I. White, G3SEK, 52 Abingdon Road, Abingdon, Berks. (0235 31559)
- WORCESTER: A. C. Lindsay, G4NRD, 11 Durcott Road, Evesham, Worcs. WR11 6EQ. (Evesham 41508)
- YEovil: E. H. Godfrey, G3GC, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset BA21 4AW. (0935 75533)
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.
- 308 CLUB: D. Davis, G6YQD, 13 Maple Road, Surbiton, Surrey KT6 4AA.

nothing in between! So for the details on the January meetings and their venues, we refer you to the Hon. Sec. — see Panel for his details.

For the Surrey chaps the routine is fairly easy to remember, as it is always written across the top of their newsletter! First and third Mondays, 7.45 for 8 p.m., first floor mess deck, *T.S. Terra Nova*, 34 The Waldrons, South Croydon; and there is, at the bottom of the page, a note of a possible party at Warlingham on January 2.

Away from London now to **Stratford-on-Avon**, where the locals now foregather in the Control Tower, Bearley Radio Station, which lies about three miles north of Stratford in the general direction of Henley-in-Arden. The formal on January 9 is down for G3MXH to talk about maritime radio services.

January 2 and 16 are the dates for the **Stourbridge** lads, at "The Garibaldi" in Cross Street, Stourbridge. The first one is informal, but the main meeting on 16th is the Annual Constructors' Contest.

Every Wednesday evening the **Stockton** group are located in the Billingham Community Centre, where they have such delights as an RAE class, construction, and of course the odd guest speaker when one can be lassoed. Membership costs 50p, and then 20p to enter each meeting you attend.

Stevenage has an open date on January 3, and we don't have any official late news as to what it has been filled with, even though the grapevine says they have fixed it up. January 10 is the constructors' evening, and on 17th they have their Grand Auction; all are at *T.S. Andromeda*, Fairlands Valley Park, Shephall View, Stevenage.

South-East Kent YMCA could be regarded as another name for the Dover club; but the name is sensible in view of the venue, Dover YMCA, Godwynehurst, Leyburne Road, Dover, where they are to be found on Wednesday evenings for the club meetings. They are also there on Mondays and Tuesdays for the RAE and Morse class tuition.

A bit to the westward and one comes to **Southdown**, based on the Chaseley Home for Disabled Ex-Servicemen, South Cliff, Eastbourne, where on January 9 when they will have two short talks, at least, the subjects of which will not be known until the night.

New One

South Bristol this time, foregathering at Whitchurch Folkhouse, East Dundry Road, Whitchurch, Bristol, every

Wednesday evening, and first formed a couple of months ago. January 3 is down for a talk on early radio, on the 10th there is a lecture and demonstration on CW operating. January 17 is two-metre night, January 24 G4KUQ's home-brewing equipment talk, and on January 31 they will be on 432 MHz.

It is years since we last heard of the **Salop** gang, back in the days when G3WNI was their reporter. They are now based in the Albert Hotel, Smithfield Road, Shrewsbury, where they are to be found on Thursdays. January 5 is a discussion/calibration night, January 19 a talk by G8ARS, and January 27 the club social at Shelton Hall Hotel, Shrewsbury. Dates not mentioned are filled by natters.

Membership of the **Royal Navy** group is open to present and past RN and Merchant Navy types and those from foreign navies; details from the Hon. Sec. — see Panel for his details.

The group called **RATEC** is the Radio Amateurs Technical Engineering Club, and they are based on the British Legion Club, Moor Lane, Woodford, Cheshire, albeit they have some associate members in other parts of the country. Find them at their Hq. on any Monday evening from eight onwards.

R.A.I.B.C. cater for all those who are invalid or blind and interested in our hobby; and of course there have to be other kinds of members, like Supporters and Representatives . . . details from the Hon. Sec. — see Panel.

A change of venue is noted for the **Plymouth** group, who now foregather at Hyde Park Junior School, Hyde Park Road, Mutley, Plymouth. For the other details on the club, contact the Hon. Sec.—see Panel.

Deadlines for "Clubs" for the next three months—

February issue—December 30th

March issue—January 27th

April issue—February 24th

May issue—March 30th

Please be sure to note these dates!

North Wakefield have a good idea — a standard card with all the essential data pre-printed and a space for insertion of the current meeting data; both labour saving from their point of view and efficient from ours. January 5 sees them in session for a talk on hi-fi techniques by G3TDZ. Find the club at Carr Gate Working Men's Club every Thursday evening.

The January 4 date is deleted from **Nene Valley's** 1984 calendar. January 11 is a natter session, and on 18th Gordon Adams will talk about R.A.F. communications. January 25 is the AGM, and presentation of trophies.

Over now to **Mid-Warwickshire**, and 61 Emscote Road, Warwick. Meetings are on the second and fourth Tuesday in each month; more details of the programme from the Hon. Sec. — see Panel.

Mid-Sussex have dates of January 12 for a talk on the use of basic test equipment, and 26th for their AGM. The Hq. is at Marle Place Adult Education Centre, Leylands Road, Burgess Hill.

The **Midland** place is their own, at 294A Broad Street, Birmingham, which we are told is opposite the Repertory Theatre. January 17 is down for a talk on nuclear power, although it rather looks as though you would not be unlucky if you called at Hq. on any evening of the week. To be sure, try any Wednesday.

Lincoln has its corporate being in the City Engineers' Club, Central Depot, Waterside South, Lincoln; on January 11 there is the G2FKZ tape-slide talk on Aurora, and January 25 is an activity night. The intervening Wednesdays are used for RAE and Morse training.

Jersey's January meeting is on 11th and is a talk on the BBC Micro, by GJ4TBW, at the Communicare Centre, St. Brelade.

For anything you want to know about amateur radio in EI-



The panel of speakers at the ARRL National Convention QRP Forum at Houston, Texas, in October 1983, proudly show off their certificates of Honorary Texan Citizenship. Left to right, George Burt, GM3OXX, Adrian Wiess, W0RSP (QRP Editor of CQ), Rev. George Dobbs, G3RJV (Hon. Sec. of the G-QRP Club), Chris Page, G4BUE, Wes Hayward, W7ZOI (joint author of "Solid State Design for the Radio Amateur"). The forum was the first time that a major QRP programme had been presented during an ARRL National Convention.

photo: Jo-Anna

land, you should be talking to **I.R.T.S.** which is the national society and a local club rolled into one. Details from the Hon. Sec. — see Panel for his vital statistics.

Another new club to us comes next; **Hornsea**, which is to be found at The Mill, Atwick Road, Hornsea, N. Humberside, every Wednesday evening. They seem to have something happening at every meeting, to judge by the December programme; details from the Hon. Sec. — see Panel.

Great news for the **Hereford** crowd; they are back at their old Hq. at County Control, Civil Defence Hq., Gaol Street, where they are to be found on first and third Fridays.

HaVERing are still based on the Fairkites Arts Centre, Billet Lane, Hornchurch, Essex, on Wednesdays. January 4 is the AGM, and on 18th there is part-two of G3EUR's "War-Time Wireless" talk; the intervening dates are down for informals.

The main meeting of the **Hastings** lads is on the third Wednesday of each month at West Hill Community Centre; and every Friday evening at Ashdown Farm Community Centre they have an informal chat night. There are other meetings at Ashdown Farm Centre as well, as you will doubtless find if you become a member.

At **Greater Peterborough** the January 26 date is set aside for the AGM; the venue, as usual, the Southfields Junior School, Stanground, Peterborough with a 7.30 p.m. start.

The current **G-QRP Club** magazine has several articles of interest, and indeed your scribe is playing about with an aerial design from it. Details of the club and its low-power activities from the Hon. Sec. — see Panel for the needful.

Another aerial article appears in the **Glenrothes** newsletter, written by GM4GK, and goes into your scribe's file of 'not to be forgotten' items. For the details of what goes on at Provosts Land, Leslie, Fife, we have to refer you to the Hon. Sec. — see Panel.

The second Monday in each month sees **Exeter's** main meeting, at the Community Centre, St. David's Hill, Exeter; January 9 is down for a talk by an HM Coastguard. On all other Mondays the gang head for the Emmanuel Scout Hut, Okehampton Road, for informal nattering, some operating, and Morse practice for those who want it.

We turn now to **Edgware** where they have the Annual General Meeting on January 12 at 145 Orange Hill Road, Burnt Oak, Edgware. January 26 will be an informal with display of the club's archival material, which should be interesting.

January 5 is a natter evening for **East Kent**, and on 19th they have a talk on crime prevention and the marking of equipment. But — they don't say where they have Hq.! Get that from the Hon. Sec. — see Panel.

Now **Dudley** a new Hon. Sec. takes over — see Panel; and the same letter tells us that they are to be found at Dudley Central Library, on January 24 for a talk on running a successful cinema by Michael Jackson, who is doing just that. Meetings are on second and fourth Tuesdays.

Derby recently had a coach trip all the way to London to visit the RAF Museum while the ladies investigated the Brent Cross shopping centre — and doubtless the depth of the OM's pockets too! Normally they are to be found on any Wednesday evening at their Hq. on the top floor of 119 Green Lane, Derby. January 4 is a junk sale, and on 11th they take a backwards look at the last twelve-month; Henry Balen talks about his secret war on 18th and the month rounds off with a natter night on January 25.

The **Crystal Palace** group foregathers in the All Saints Parish Room, Upper Norwood, at the corner of Beulah Hill and Church Road, opposite the IBA mast. On January 21 they have a talk by G300U on "Computers for the Radio Amateur"; and looking ahead to February, on 18th, there is the AGM.

For the details of the **Crawley** meetings at Trinity Church Hall, Ifield, Crawley, we must refer you to the Hon. Sec. as our data does not go far enough forward; but past experience over many years says by this time they'll have fixed something up for your entertainment. Find the Hon. Sec.'s name and address in the Panel.

It is about now that, if all goes well, the **Cornish** club should move back into their old Hq. address (but new building), the SWEB Clubroom. However Murphy's Law will no doubt dictate the continued use for a little longer of Treleigh Church Hall on the old Redruth by-pass. The only answer seems to be to contact the Hon. Sec. at the address in the Panel, for the very latest details of where to celebrate the first Thursday of the month.

Deep-sea diving is the topic for the **Colchester** club on January 19, John Barnard being the speaker. January 26 will see the RSGB presentation, "The Repeater Network and its Administration". The venue is the Colchester Institute in Sheepen Road.

Turning now to **Chichester**, who have Hq. at Fernleigh Centre, 40 North Street, Chichester, we find them in the Long Room on January 3; and on 19th they head for the Green Room for a software evening.

Every Wednesday the **Cheshunt** gang is to be found at Church Room, Chuch Lane, Wormley; we can't tell you what is to happen in January, because the Hon. Sec. sent us the wrong issue of the club newsletter, with programme details up to December just past!

Over now to **Chesham**, the gang foregathers every Wednesday at the Stable Loft, Bury Farm, Pednor Road, Chesham. Contact the Hon. Sec. for more details — see Panel for the needful.

Turning now to **Cheltenham** we see they have January 6 for a talk "Getting Going in 1296 MHz"; and a natter on January 20, in the Stanton Room, Charlton Kings Library, Cheltenham.

Quite a while since we last heard of **Cannock Chase**; these days they have their Hq. at Bridgetown War Memorial Club, 60 Union Street, Bridgetown, Cannock, every Thursday.

There is no meeting for **Cambridge** on January 6 as the Hq. is closed; however they will be there on January 13, for G8OFA to talk about getting operational on 10 GHz. January 20 is an informal, and on 27th G6AZI will be showing how to get going on satellites.

Turning now to **Bury** we find they have a base at the Mosses Community Centre, Cecil Street, where they are to be found every Tuesday; the second Tuesday is the 'main' meeting. January 10 is down for G3RSM to explain the art of fault-finding.

Bromsgrove A.R.S. is based on Avoncroft Arts Centre, on the second Friday of each month; for more details on the programme, contact the Hon. Sec. — see Panel.

Bromsgrove A.R.C. is a newish club, and is based on Rigby Lane School, Rigby Lane, Bromsgrove, in the second Tuesday in

each month.

B.A.R.T.G. is the one for all you RTTY buffs; the newsletter has to be one of the best ever to come across this desk. Details of membership from the Hon. Sec. — see Panel.

Now we come to **Brighton**, who now have their place in the Seven Furlong Bar of Brighton Racecourse. For all the other details we must refer you to the Hon. Sec. — see Panel.

January 2 is the next meeting date for **Braintree** and is down for a talk "Power Supplies, Theory and Practice"; January 16 is G3OLU's for a talk on DX operating. The Hq. is at the Community Centre, Victoria Street, next to the bus station.

Bishops Stortford have the AGM on January 16, with several changes in the committee to be dealt with; and the informal is on January 5 at the "Nag's Head", on the A120 Dunmow Road, just before the golf course.

Over the water again now, to **Belfast (College of Technology)**, and first we must congratulate the Hon. Sec. on his new callsign, G1CET. There seems to be quite a lot going on with the club, although alas they have fallen foul of bureaucracy over their proposal for a multi-element HF array atop the building. More from the Hon. Sec. — see Panel for his details.

At **Biggin Hill** we find the local activities in the Memorial Library in Church Road, Biggin Hill; January 24 is the AGM. After January's meeting they seem to have organised a change to St. Mark's Church Hall, also in Church Road. Details from the Hon. Sec. — see Panel.

Again we cross the water, this time to **Bangor** where the locals have the first Friday of every month at the Sands Hotel, Bangor. And their newsletter is quite an interesting little effort — we hope they can keep it rolling.

Acton, Brentford & Chiswick have their place at the Chiswick Town Hall, in High Road, Chiswick, London W4. January 15 is the AGM and all members are asked to make a special effort to be there.

Abergavenny and Nevill Hall have every Thursday evening booked in the room above Male Ward 2, Pen-y-Fal Hospital, Abergavenny. A major activity here is the RAE and Morse classes, for which the club is now an exam centre.

Finale

That's it for another month; the deadline for next time is given in the 'box', and is to *arrive*, addressed to your "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meantime just remember it'll soon be Spring!

R.A.E. Course

Walsall: Barr Beacon Comprehensive School, Pheasey (about 1 mile from the M5/M6 junction), Thursdays 7.30 p.m., starting January 19th, £7.50 per term (free to the unwaged). Further details from the course teacher, F. A. Fear, G8CVR, on Aldridge 52706.

Intermediate Morse Class

Beckenham: For students who can already read about 8 w.p.m. a Morse class commences on January 10th (7.30-9.30 p.m.) at Beckenham Adult Education Centre, 28 Beckenham Road, Beckenham, Kent (01-650 1383); the tutors are Peter Grant and Steve Palmer. Contact the Centre for full details.

Scarab Systems

Scarab Systems offer interesting programs for the Sinclair Spectrum computer, including a new version of their SP-RTTY program written for the 48K model, a Morse tutor, and a QTH Locator. For complete information contact the company at 39 Stafford Street, Gillingham, Kent ME7 5EN. Tel: Medway (0634) 570441.

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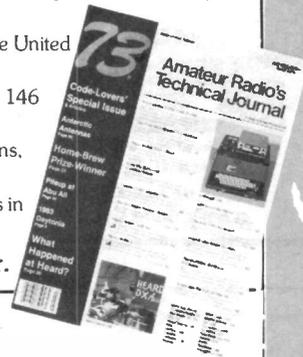
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