

The SHORT WAVE Magazine

VOL. XXXIX

JANUARY 1982

NUMBER 11

SRX-30D

A familiar name, but a whole new receiver behind it. Building on all the excellent features of the SRX-30, including the drift cancelling system covering 500 KHz to 30MHz; the selectable sidebands and AM; the easy to use tuning system; we now introduce the all new SRX-30D which incorporates the suggestions made by our customers. Outstanding new features are:

- Extended coverage 200KHz - 30MHz.
- Digital readout in large green display units which give true unambiguous frequency information - even when you switch sidebands or use the clarifier.
- All new frequency synthesis using Plessey SL6 1641 double balanced modular ICs for a new high standard of performance.
- All new audio system which produces outstandingly good quality on the built in speaker, and is capable of driving external hi fi speaker units for even better sound.
- All new IF filters with optimum bandwidth for mode in use. Automatic filter selection from mode switch.

There is so much that is impressive about the SRX-30D that you have to see it and handle it to really appreciate the performance.

We predict that the SRX-30D will be a landmark in low cost, high performance SWL receivers. Just consider how much you should pay for a receiver covering 200 KHz - 30 MHz with accurate digital readout; high performance USB, LSB, AM with switched filters; drift cancelling frequency synthesis, built in mains supply and built in speaker; high quality construction and advanced design - and so much more.

Then look at our price for the SRX-30D and you will be even more impressed.

SRX 30D £215.00 including VAT
Securicor Carriage £5.00

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JRC *Japan Radio Co., Ltd.*

NRD-515



The NRD 515 is a PLL-synthesised communications receiver of the highest class featuring advanced radio technology combined with the latest digital techniques. The new NRD 515 is full of performance advantages including general coverage, all modes of operation, PLL digital VFO for digital tuning, 24-channel frequency memory (option) direct mixing, pass-band tuning, etc. JRC's 65 years of radio communications experience will give you "the world at your fingertips". The NRD 515 is but a single item from the JRC product range which extends all the way to full marine radio installations for supertankers.

NRD 515HF Receiver

Price £ 1090.20

now
available

NSD515

matching amateur band transmitter
ring for details.

UL1000

£39.50 inc. VAT

The UL-1000 is a new concept receiving station accessories and will help any keen listener to improve the performance of his station, particularly in the difficult conditions existing in the medium wave band (500 KHz-1.6 MHz).

The UL-1000 is a self-contained variable gain, tuned pre-amplifier suitable for use with various aerial systems. A particular feature of the UL-1000 is the use of a high Q loop aerial for the 500 KHz-1.6 MHz band.



Carriage £2.00

 **TRIO**

pacesetter in amateur radio



The Trio 9500, a 70 cm multimode mobile giving SSB, FM and CW operation in a compact rig. Add the spacious 70 cm band to your operating.

TR9500 *70 cm multimode.*
£449.88 inc. VAT. Securicor carriage £5.00



TR-9000 The exciting TR-9000 2-metre all-mode transceiver combining the convenience of FM with long distance SSB and CW in a very compact, very affordable package. Because of its compactness the TR-9000 is ideal for mobile installation; add on its fixed station accessories and it becomes the obvious choice for your shack.

TR9000 *2 metre multimode.*
£374.90 inc. VAT. Securicor carriage £5.00



TR-7800 Trio's remarkable TR-7800 2-metre FM mobile transceiver provides all the features you could desire for maximum operating enjoyment. Frequency selection is easier than ever, and the rig incorporates new memory developments for repeater shift, priority, and scan. The TR-7800 by Trio, the only FM mobile.

TR7800 *2 metre FM rig.*
£284.97 inc. VAT. Securicor carriage £5.00

LE

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pacesetter in amateur radio



TS830S £694.83 inc. VAT

The TS830S has every conceivable operating feature built in for full and lasting enjoyment of the HF bands. It combines VBT (variable band width tuning), IF shift and a IF notch filter as well as very sharp filters in the 455 kHz second IF.



DFC230 £179.86 inc. VAT

A digital frequency remote controller complete with up/down microphone and having four memories. Ideal for simpler mobile operation. Compatible with the TS830S, TS530S, TS130S and V and the TS120 series.

R1000 £297.85 inc. VAT



Securicor Carriage £5.00



The TS530S is an HF transceiver based on the reputation of the TS520 series. Included are of course the new bands, and of course the rig has both digital and analogue frequency readout.

TS530S

£534.98 inc. VAT. Securicor carriage £5.00



The TS180S is the super de luxe transistorized HF transceiver from Trio. Having so many features, memories, etc. Send for a leaflet, or ring for more details.

TS180S

£679.65 inc. VAT. PS30 £88.55



The TS130S is THE mobile 200Watts PEP HF transceiver from Trio, again featuring the three new bands. Just the rig for mobile high power operation. Also available the TS130V, a 20-Watt PEP version.

TS130S

**£525.09 inc. VAT
TS 130V £445.05 inc. VAT.**

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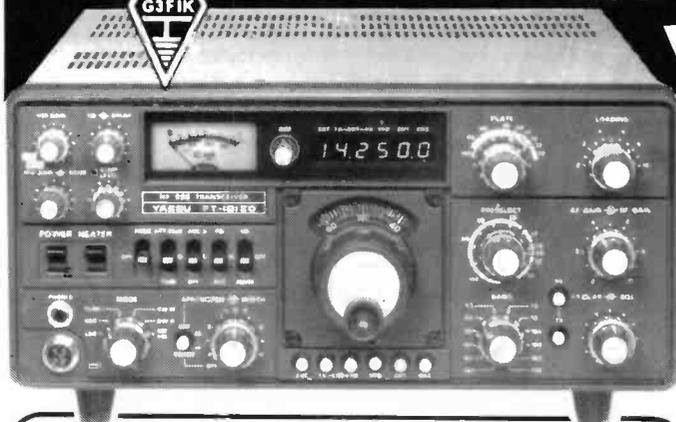
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FT-101ZD Mk III

YAESU's FT-101ZD with FM is the most popular HF rig on the market thanks to its very comprehensive specification and competitive price. Incorporates notch filter, audio peak filter, variable IF bandwidth plus many other features.

FT-480R High technology all-mode 2 metre mobile



The most advanced 2 metre mobile available today - USB, LSB, FM, CW full scanning with priority channel, 4 memory channel, dual synthesized VFO system.

FT-707 All solid-state HF mobile transceiver



The definitive HF mobile rig, digital, variable IF bandwidth, 100 watts PEP SSB, AM, CW (pictured here with 12 channel memory VFO) Latest bands

FRG-7 General coverage receiver



The set with the world-wide reputation, YAESU's famous FRG-7 out-performs many a more expensive set. Rugged and reliable, it features high sensitivity and Wadley loop stability - a delight to use for the established amateur and new SWL alike.

FRG-7700 High performance communications receiver



YAESU's top of the range receiver. All mode capability. USB, LSB, CW, AM and FM 12 memory channels with back up. Digital quartz clock feature with timer. Pictured here with matching FRT-7700 Antenna tuner and FRV-7700 VHF converter.



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For full details of these new and exciting models, send today for the latest YAESU PRICE LIST and LEAFLETS. All you need to do to obtain the latest information about these exciting developments from the world's No. 1 manufacturer of amateur radio equipment is to send 36p in stamps and as an added bonus you will get our credit voucher value £3.60p - a 10 to 1 winning offer.



FT-ONE SUPER HF TRANSCEIVER

This is the latest and most exotic product from YAESU's superb design team. The new FT-ONE provides continuous RX coverage of 150KHz - 30MHz

plus all nine amateur bands (160 thru 10m).

All mode operation LSB, USB, CW, FSK, AM, FM • 10 VFO system •

FULL break-in on CW • audio peak filter • notch filter • variable bandwidth and IF shift • keyboard scanning and entry • RX dynamic range over 95 dB! and **NO** band switch!!!

FT-708R and FT-208R Synthesized UHF/VHF transceivers

The new FT-708R and FT-208R provide new dimensions in operating flexibility for the discerning 70 cm and 2m operator. LCD display, 10 memories, memory and bandscan, priority function, internal lithium battery back-up. RF output FT-708R, 200mW low, 1 watt high, FT-208R, 300mW low, 2.5 watts high.



FT-708R



FT-708R with NC8 standard/quick charger/DC PSU



FT-208R



FT-208R with standard charger

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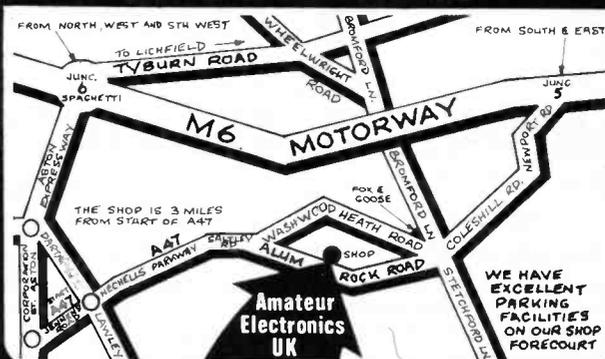
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508-516 Alum Rock Road - Birmingham 8
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Telex: 337045

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HK 707	Straight Up/Down keyer	£11.44
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MK 702	Manipulator	£22.43
MK 704	Squeeze paddle	£14.38
MK 705	Squeeze paddle on marble base	£22.43
EKM 1A	Morse code practice oscillator	£8.63
MK 1024	Automatic memory keyer	£135.13
EK 150	Semi/Automatic keyer	£74.75

LINEAR AMPLIFIERS		
2M10-80P	144MHz 10W input/80W output with 9dB preamp	£138.00
2M25-150P	144MHz 25W input/150W output with 9dB preamp	£184.00
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2M3-150P	144MHz 3W input/150W output with 9dB preamp	£209.88

G. WHIP Mobile Antennas		
Tribander 10-20 Slide		£25.88
L.F. Coil 40/80/160 MTS		£6.56
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M/Mobile Whip Telescopic		£4.26
Flexiwhip 10M Mast		£18.11
F/Whip Coils 40/80/160		£6.56
Base Standard		£6.00
Base Heavy Duty		£6.50
Extenarod		£12.00

SHURE MICS		
201	Hand ceramic omnidirectional high impedance	£14.49
202	Hand ceramic noise reducing high impedance	£15.18
401A	Hand controlled magnetic high impedance	£16.56
401B	Hand controlled mag. low impedance (200 ohms)	£16.56
444	Desk adjustable height controlled magnetic	£32.43
526T	Desk controlled response transistor preamp	£39.33

DAIWA		
CNA	1001 Auto ATU 200w RMS	£128.00
CNA	2002 Auto ATU 1Kw RMS	£185.00
CN	620A RF Power Meter 1.8 to 150 Mhz 1Kw	£49.99
CN	630 RF Power Meter 140-450 Mhz 200w	£69.00
SR11	Scanning Receiver	£49.00

STILL HELPING WHERE IT HURTS

Here's a list below to make buying easier for you — Work it out yourself — You'll see — It really is easy!

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Product	List Price	Deposit	12 Payments
Yaesu FT 1	£1,295	£600	£57.91
Yaesu FT 902DM	£885	£399	£40.55
Yaesu FRG 7700/S	£329	£139	£15.89
Yaesu FRG 7700/M	£409	£180	£19.01
Yaesu FT 101ZD/FM	£665	£300	£30.41
Yaesu FT 101ZD/AM	£650	£275	£31.29
Yaesu FT 101Z/FM	£590	£250	£28.27
Yaesu FT 101Z/AM	£575	£225	£29.15
Yaesu FL 2100Z	£425	£185	£20.08
Yaesu FT 480R	£379	£185	£16.18
Yaesu FT 707	£569	£230	£28.27
Yaesu FT 290	£249	£120	£10.82
Standard C78	£219	£99	£10.04
Standard C58	£247	£107	£11.69
Icom 730	£574	£250	£27.00
Icom 720A	£883	£400	£40.26
Icom 290	£366	£166	£16.67

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MICROWAVE MODULES		
MMT 432/28S		£149.00
MMR 432/144R		£184.00
MMT 28/144		£199.00
MMT 144/28		£99.00
MMC 28/136		£27.90
MMC 28/156		£27.90
MMC 28/144		£27.90
MMC 144/any IF		27.90
MMC 144/28LO		£29.90
MMC 70/any IF		£27.90
MMC 432/28S		£34.90
MMC 432/144S		£34.90
MMC 1296/any IF		£32.20
MMC 050/500		£69.00
MMA 28preamp		£14.95
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MMV 1296/28		£32.20
MML 144/100linamp		£142.60
MML 432/100linamp		£228.85
MML 144/25linamp		£59.00
MML 432/50linamp		£119.00
MM 2000		£169.00
MMSI		£115.00

UNADILLA/REYCO		
Antenna Traps — Precision moulded coil forms stainless - hardware - Aluminium tube irridit finish - Coated aluminium wire. Fully waterproofed.		
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3.5/30 Mhz 2.5 Kw with Lightning Arrester — Suitable Veas, Yagis, Doublets, Quads, etc.		
		£12.99

STANDARD		
C8800 2m Tcivr		£252.00
C7800 70cms Tcivr		£275.00

TRONIX PSU		
British made, 5 amp constant, 7 amp surge, fully regulated and protected.		
		£27.90

FDK Multi 700EX		£199.00
FDK Multi 750E		£299.00

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	Decoder	£15.25
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ANTENNAS		
Wide range in stock including JAYBEAM — HYGAIN — GOTHAM — TELECON — HOKUSHIN etc.		
Bantex 5/8 mobile whip complete antenna		£8.99
Bantex ¼ w mobile whip complete antenna		£3.50

YAESU CONVERTERS 7700 Series		
Model A		£63.00
Model B		£69.00
Model C		£65.00
Model D		£66.00

ICOM IC 730. All bands 10-80m including 30m, 17m and 12m, 100w RF out and 40w AM. Twin VFO, digital readout, 3 speed tuning down to 10Hz. Dial lock, RIT, N.B. and Switchable Preamp. See list for H.P. details.

SWR/RF POWER METERS		
SWR 25 3.5/170 Mhz		£12.94
LEADER LPM 885-HF 1Kw		£58.00
HANSON 3.5/150MHz 200w		£28.75
REECE UHF 74 144/432		£16.28
HANSON FS 500H		
1.8/60MHz 2Kw		£67.85
OSKAR SWR 200		
3.30 Mhz 2Kw		£40.00

ROTATORS		
Skyking SU 4000		£92.00
Hirschmann 250		£35.00
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KR 400RC		£90.85
AR 40		£59.00
KR 9502A		£50.00
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DATONG PRODUCTS

DESIGNED BY ENTHUSIASTS FOR ENTHUSIASTS!

KEYBOARD MORSE SENDER - THE ULTIMATE KEYBOARD - CHECK THESE FEATURES

- **CONVENIENCE** - no need for a power cable, four internal pen cells last for 300 hours and give continuous memory back up.
- **EXCLUSIVE COLOUR CODED KEYBOARD DESIGN** - Separate key switches beneath a tough polycarbonate membrane combine excellent feel with a splash proof wipe-clean surface.
- **LAVISH MEMORY** - four 64-character memories with auto-repeat and programmable pause function for all the routine sending.
- **BUFFER MEMORY** - ensures perfect sending despite less than perfect typing.
- **COMPREHENSIVE CHARACTER SET** - includes punctuation, procedure signals, accented letters. Plus a merge key for making any non-standard character.
- **BEAUTY AND STYLE** - only one inch thin and with four-colour panel Model MK looks every bit the thoroughbred it is. Model MK is supplied with output leads and spare connectors but without batteries (four HP7 pen cells).



Model MK

MODEL ASP - THE "INTELLIGENT" RF CLIPPER

Model ASP modifies your speech signal direct from the microphone and makes it more effective at modulating your transmitter. The effect is as if the transmitter peak power were to increase by between two and three times. "Intelligent" means that unlike other speech processors, Model ASP automatically senses your voice level and reacts accordingly to always maintain the degree of true r.f. clipping selected (in decibels) by the panel push-buttons. Special circuitry does this without the undesirable side effects of simple a.g.c. devices. Adding a Datong r.f. clipper to a normal SSB transmitter has a similar effect to adding a linear amplifier but without the high cost and risk of TVI.



Model FL2

Model PC1

Model ASP

Reviewed "73 Mag." July

G8's - ARE YOU MISSING OUT?

Unless you can monitor the other bands you are missing a lot. If you have a 2 metre all-mode receiving set up, just add Model PC1 in series with its antenna and you have a superb general coverage receiver. What better way to listen in to all the non-VHF amateur bands, not to mention everything else from 60 kHz to 30 MHz?

For sheer value for money there is no better way to get high performance general coverage reception. After all what a waste it is if your expensive 2 metre all-mode rig covers one band only!

ATTENTION VHF SCANNER OWNERS!

Did you know that Model PC1 will extend the coverage of your SX 200 type scanner to include all the long, medium and short wave bands as well? This is an excellent way to listen to your favourite short wave broadcast stations without the extra expense of a complete new receiver.

MINIATURE RECEIVING ANTENNAS

If you don't have enough space to put up traditional receiving antennas, our active antennas are the answer! They need no tuning yet have constant sensitivity from 200 kHz to well over 30 MHz. Results are quite comparable to full size conventional antennas but the space saving is enormous. The indoor version (AD270) is 3 metres long and the outdoor version (AD370) is 2 metres long.

A TV-type feeder cable of any reasonable length can be used yet because the antennas are balanced dipoles any interference picked up by the feeder is rejected. Because of their wide frequency coverage Datong Active Antennas are ideal accessories for modern general coverage communications receivers.

Model AD370

Reviewed Shortwave Mag. Aug.



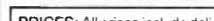
Model DC144/28

excellent combination of low noise figure and strong signal handling capability. Its input and output gain controls also help you get the best out of your main receiver without flattening it with excessive gain. Model DC144/28 is available either as a complete cased unit (die cast box S0239 connectors) or as a ready built and tested PCB module.

MODEL D70: THE GO-ANYWHERE MORSE CODE TRAINER

For building up your morse code reception speed there is no better method than the Datong "Morse Tutor". You learn the code with the characters at normal speed but with an extra delay between each one. As you improve you reduce the "DELAY" control until, with it fully reduced, you find you are reading code at the chosen speed and with correct spacing.

An important feature is that the unit is completely portable. This allows you to practise wherever and whenever you find it most convenient. The all-CMOS design gives about 60 hours of practice from a lowcost PP3.



Model D70

PRICES: All prices include delivery in U.K. basic prices in £ are shown with VAT inclusive prices in brackets.

FL1	59.00 (67.85)	MPU	6.00 (6.90)
FL2	78.00 (89.70)	DC144/28	31.00 (35.65)
PC1	105.00 (120.75)	DC144/28 Module	25.00 (28.75)
ASP	69.00 (79.35)	Keyboard Morse Sender	112.20 (129.00)
VLF	22.00 (25.30)	RFA	25.50 (29.32)
D70	43.00 (49.45)	Codecall (Linked)	24.00 (27.60)
D75	49.00 (56.35)	Codecall (Switched)	25.50 (29.32)
RFC/M	23.00 (26.45)		
AD270	33.00 (37.95)		
AD370	45.00 (51.75)		
AD270+MPU	37.00 (42.55)		
AD370+MPU	49.00 (56.35)		



ALL DATONG PRODUCTS ARE DESIGNED AND BUILT IN THE U.K.

NEW PRODUCTS PREVIEW

MODEL DF1 Direction Finder attachment for FM, VHF receivers/transceivers, gives directional readout on circle of LED's. Connects to loudspeaker and antenna jacks.

BROADBAND PREAMPLIFIER - MODEL RFA

- Wide bandwidth, 5 to 200 MHz, lets Model RFA replace a whole collection of single band amplifiers.
- Low noise figure, high intercept point (+25dbm), and moderate gain (9db) make Model RFA ideal for improving the sensitivity of HF and VHF transceivers, scanner receivers, PMR, marine VHF, without difficulties with overload.
- RF switched for convenient use with transceivers.
- Solid construction (same die cast case as Models VLF and DC144/28) with S0239 connectors.

Price: £25.50 plus VAT (£29.32 total)
Expected Availability: early January.



"CODECALL" SELECTIVE CALLING DEVICE

The new Datong Codecall adds "selective call" to any radio voice channel. A single self-contained unit at each end of the link sends or receives a coded audio signal. When the correct code is received, the receiver bleeps loudly. This practically eliminates false alarms. Full details free on request. Availability: late January. Price per unit: Link programmable £24.00 + VAT (£27.60) Switch programmable £25.50 + VAT (£29.32)

Data sheets on any products available free on request - write to Dept S.W.
DATONG ELECTRONICS LIMITED
 Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Tel: (0532) 552461

NEW BRANCHES SPECIAL OFFER

WE ARE PROUD to announce the opening of two new branches, and would be so delighted if you went along and said hello to Ian G3PRR in Grimsby or Peter G4GSA in Stoke that for the fortnight Monday January 4th until Saturday January 16th, we will be, for personal callers only, be offering, at the above mentioned shop.

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GUARANTEE

Yaesu's own warranty does not extend outside Japan. Repairs are the responsibility of the UK dealer selling the set. SMC's two year guarantee is backed, as UK distributors, by daily contact with the factory and many tens of thousands of pounds of spares and test equipment. Avoid hawkers offering sets without serial numbers, spares, service or advice back-up.

FREE FINANCE

On regular priced items from; Yaesu, Ascot SMCHS, CDE, HyGain, Channel Master, Hansen, SMC, MFJ, KLM, Mirage and Hy Mound, on invoices over £100 SMC offers Free Finance! How is it done? Simple, pay 20%, split the balance equally over 6 months or pay 50% down and split the balance over a year. You pay no more than the cash price!!

— SMC THE COMMUNICATORS —



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GENERAL COVERAGE, ALL SOLID STATE

The FT-ONE is a full-coverage all mode transceiver, equipped for reception between 150kHz and 29.99MHz, and transmission on all nine amateur bands. Commercial version transceiver 1.8-29.99MHz

KEYBOARD FREQUENCY ENTRY

Fully digital synthesised, the FT-ONE uses a front panel keyboard for initial frequency entry. A change is accomplished via the main tuning dial or the pushbutton scanner, tuning in either 10Hz or 100Hz steps. The FT-ONE permits extremely fine tuning and instantaneous band change with equal facility.

DUAL VFO SYSTEM

Ten digital VFO's with memory are provided, in conjunction with an A-B selection scheme that allows instant recall of any Tx, Rx or transceive frequency. For split-frequency operation, the operator may select TX on VFO-A and RX on VFO-B, automatically storing the calling and listening frequencies. For nets, a nonvolatile memoryboard is available as an option, (eliminates the possibility of dumping memory).

FULL CW BREAK-IN

Advances in solid-state technology have made full CW break-in reliable enough to be incorporated into the FT-ONE. Selection of traditional semi-break-in (for use with amplifiers not equipped for full break-in) or full high-speed break-in.

SWITCHING REGULATED SUPPLY

Extremely compact and light in weight, the switched mode power supply reduces substantially the space required to produce the operating voltages used in the FT-ONE. It is highly efficient, uniquely stable and offers superb reliability.

ELITE CLASS PERFORMANCE

In addition to the above and superb receiver filters, the FT-ONE is packed with subtle virtues. Rear panel jacks allow the use of both an external receiver and an independent receive antenna, when scanning, automatic halting on a received signal may be programmed, an optional Curtis 8044 keyer board is available and there is even a microphone squelch (AMGC) to reduce background noise pickup between words and sentences!

GAIN/INTERCEPT OPTIMIZED RECEIVER

Utilising up-conversion with a first IF of 73MHz, the FT-ONE RF amplifier stage uses push-pull power transistors configured to produce a typical output intercept of +40dBm. The first mixer is a diode ring module, then follows a low noise post amp, for optimum noise figure consistent with modern day intercept requirements. The result is a receiver with a typical two-tone dynamic range well in excess of 95dB (14MHz, CW bandwidth). Additional gain tailoring is provided via a PIN diode attenuator controlled from the front panel.

FILTER READY FOR COMPETITION

Three filter bandwidths are available for CW operation (two for FSK !!), using optional 600Hz or 300Hz crystal filters. Filter insertion losses are equalised for constant IF gain. Both IF Shift and Variable Bandwidth are provided, and two CW filters may be cascaded, for competition-grade selectivity. For SSB work, the Variable Bandwidth feature eliminates the need for costly 1.5kHz or 1.8kHz filters, in addition, a high-performance audio peak and notch filter is standard equipment.

EXPANDED OPERATING DISPLAYS

Digital displays for the VFO frequency, memory channel, and RIT offset are provided for quick frequency identification. The large front panel meter provides easy viewing of transceiver operating parameters, including final transistor collector current, input DC voltage, FM discriminator centre tuning, speech processor compression level, and forward/reflected relative power.

NON OPTIONS

Remember with your FT-ONE the noise blanker, speech processor and power supply are all built-in not expensive options.



SOUTH MIDLANDS COMMUNICATIONS LIMITED

S.M. HOUSE, OSBORNE ROAD, TOTTON, SOUTHAMPTON, SO4 4DN, ENGLAND
Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton

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Grimsby, Lincolnshire.
Grimsby (0472) 59388

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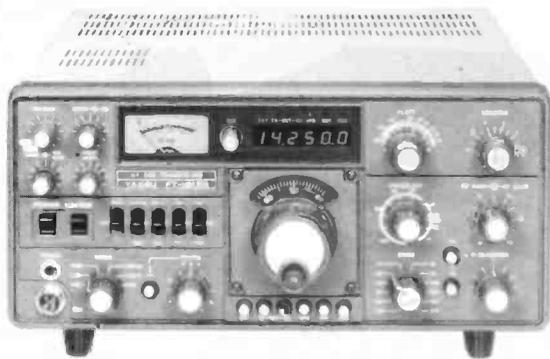
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SMC AGENTS



FT101ZD £635 inc. VAT @ 15% & SECURICOR

2 year Guarantee + Free finance available

- ★ 160-10 metres including new allocations.
- ★ Variable IF bandwidth 2.4kHz down to 300Hz.
- ★ 8 pole filters for razor edge selectivity.
- ★ Selectable CW fixed bandwidth CW-W and CW-N*
- ★ Semi-break in with sidetone for excellent CW.
- ★ Digital plus analogue frequency displays.
- ★ 6146B PA's with 6dB of negative feedback.
- ★ 180W PIP and - 31dB 3rd order intermod.
- ★ RF speech processor fitted - adjustable level.
- ★ VOX built-in and is adjustable from the front panel.
- ★ Wide dynamic range for big signal handling.
- ★ High usable sensitivity, for those weak ones.
- ★ Superb noise blanker - adjustable threshold.
- ★ Attenuator; 0-10-20dB, front panel switch.
- ★ AGC; slow-fast-off, front panel switchable.
- ★ Clarifier (RIT) switchable on TX, RX or both.
- ★ Low level transverter drive output facility.
- ★ Universal power supply 110-234V AC and 12V DC*.
- ★ Incredible range of matching accessories
- ★ 6 models: Digital/Analogue - AM/FM options.

*Option.



FT902DM £885 inc. VAT @ 15% & SECURICOR

2 year Guarantee + Free finance available

- ★ 160-10 metres including new allocations.
- ★ Variable IF bandwidth 2.4kHz down to 300Hz.
- ★ Audio Peak and independent notch controls.
- ★ AM, FSK, USB, LSB, CW, FM, (TX and RX).
- ★ Semi-break in, inbuilt Curtis IC Keyer.
- ★ Digital plus analogue frequency displays.
- ★ 6146B's with negative feedback.
- ★ VOX built-in and adjustables.
- ★ Instant write in memory channel.
- ★ Tune up button (10 sec, of full power).
- ★ Curtis Keyer - Iambic, single or straight.
- ★ Switchable AGC and RF attenuator.
- ★ Optional 350 or 600 Hz CW, 6kHz, AM filters.
- ★ Clarifier (RIT) switchable on TX, RX or both.
- ★ Audio Peak and tunable notch filter.
- ★ Plug in modular, computer style constructor.
- ★ Fully adjustable RF Speech processor.
- ★ Ergonomically designed with necessary LEDs.
- ★ Incredible range of matching accessories.
- ★ Universal power supply 110-234V AC and 12V DC.

*Option.



FT107M £725 inc. VAT @ 15% & SECURICOR

2 year Guarantee + Free finance available

- ★ 160-10 metres (including 10, 18, and 24MHz).
- ★ USB-LSB-CWW-FSK-AM multi-mode.
- ★ Full broad band "no tune" power amplifier.
- ★ 240W PIP. 75 per cent power output at 3:1 VSWR.
- ★ 12 memory channels with clarifier on memory.*
- ★ Digital Memory Shift gives offset from memory.*
- ★ Up/down scanning control from microphone.*
- ★ Variable IF bandwidth - 16 poles of selectivity.
- ★ Bandwidths: 6kHz*, 2.4kHz-300Hz, 600Hz-300Hz.*
- ★ Selectable CW "fixed" widths CW-W and CW-N.*
- ★ Tunable Audio Peak (AFP) and Notch filter.
- ★ Diode ring mixer for very high Rx dynamic range.
- ★ Noise blanker - front panel adjustable threshold.
- ★ AGC; slow-fast-off switchable from the front panel.
- ★ Attenuator 0-20dB, plus RF gain on front panel.
- ★ RF speech processor fitted - front panel adjustable.
- ★ Digital (100Hz) plus analogue frequency displays.
- ★ Meter Reads; Vcc, Ic, ALC, Compression and SWR.
- ★ Semi-break in with side tone. Vox built in.
- ★ Choice of built-in or separate power supply units.

*Option.



FT707 £569 inc. VAT @ 15% & SECURICOR

2 year Guarantee + Free finance available

- ★ 80-10 metres (including 10, 18 and 24MHz bands).
- ★ USB-LSB-CWW-CWN-AM (Tx and Rx operation).
- ★ 100W PEP. 50% power output at 3:1 VSWR.
- ★ Full "broad band" no tune output stage.
- ★ Excellent Rx dynamic range, power transistor buffers..
- ★ Rx Schottky diode ring mixer module.
- ★ Local oscillator with ultra-low noise floor.
- ★ Variable IF bandwidth - 16 crystal poles.
- ★ Bandwidths 6kHz*, 2.4kHz-300Hz 600-350Hz*
- ★ AGC; slow-fast switchable from the front panel.
- ★ VOX built-in and adjustable from the front panel.
- ★ Semi-break in with side tone for excellent CW.
- ★ Digital (100Hz) plus analogue frequency display.
- ★ LED Level meter reads: S, PO and ALC.
- ★ Convenient concentric AF/FR gain controls.
- ★ Indicators for: calibrator, fix, int/ext VFO.
- ★ Receiver offset tuning (RIT-clarifier) control.
- ★ Advanced noise blanker with local loop AGC.
- ★ 25kHz crystal calibrator feature.
- ★ Internal, xtal or external VFO control.

*Option.



FT720RV £245 inc. VAT @ 15% & SECURICOR

- FT720 Control Head**
- ★ Four easy write-in memory channels
 - ★ Rx priority channel (auto check)
 - ★ Scanning band/memory empty/busy
 - ★ Up/down tuning/scanning from mic.
 - ★ Optically coupled tuning control
 - ★ Manual and automatic tone burst
 - ★ String LED's for 'S' and PO7 status LEDs
 - ★ 1½ W of audio to internal/external speaker
 - ★ 3.3 (4.3)" D x 6" W x 2 (2.2)" H
- 720RV 10W, deck. 720RVH 25W, deck**
- ★ 144-146MHz (144-148MHz possible)
 - ★ 12½kHz synthesizer steps, 600kHz shift
 - ★ 0.3µV for 20dB quieting
 - ★ Rx 0.5A, Tx RV 3.5A, RVH 6.5A
 - ★ 5.8 (6.5)" D x 6" W x 2 (2.2)" D
- 720RU 10W, 70cm. deck**
- ★ 430-434MHz
 - ★ 25kHz synthesizer steps, 1.6MHz shift
 - ★ 0.5µV for 20dB quieting
 - ★ Rx 0.5A, Tx 4.5A
 - ★ 5.8 (6.5)" D x 6" W x 2 (2.2)" D
- S72 Switching box**
- ★ Pushbutton band change
 - ★ Auto change of steps/splits



FT290R £249 inc. VAT @ 15% & SECURICOR

- ★ 144-146MHz (144-145 possible)
- ★ Multimode USB, LSB, FM, CW
- ★ 2.5W PEP, 2.5W RMS/300m W
- ★ LED's, "ON AIR", "BUSY"
- ★ Moving coil meter for S & PO
- ★ Integral telescopic antenna
- ★ Width 2.4kHz & 14kHz @ 6dB
- ★ Optically coupled main tuning
- ★ 100Hz backlite LCD display
- ★ 10 memory channels
- ★ "Five year" memory backup
- ★ FM: 25kHz and 12.5kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ Any TX/RX split with dual VFOs
- ★ ±600kHz split, 1,750kHz burst
- ★ Mobile bracket available
- ★ Matching 10W linear Amplifier
- ★ Up/down tuning from mic.
- ★ AF output 1W @ 10% THD
- ★ 58(H) x 150(W) x 195(D) (1.3kg)
- ★ RX, 0.70mA, TX, 800mA (FM max)
- ★ 8" C" Nicads or Drys Internal
- ★ 8.5 15.2V DC External
- ★ Scan on memory (±10kHz)ll
- ★ Long battery life SMC 2.2A/Hr

FT480R(2m) FT780R(70cm.)

- ★ USB-LSB-CW-FM (A3, A1, F3).
- ★ 30W PIP A3, 10/1 W our A1 F3.
- ★ Bandpass filter no tune design.
- ★ Bandwidth 2.4kHz and 14kHz at -6dB.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx & Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ Digital receiver offset tuning.
- ★ Advanced effective noise blanker.
- ★ Memory scanning with slot display.
- ★ Up/down tuning/scanning from mic.
- ★ Priority channel on any memory slot.
- ★ Satellite mode allows tuning on Tx.
- ★ Scanning for busy or clear channels.
- ★ Size (Case): 8.3" D, 2.3" H, 6.9" W.
- ★ LED's; "On Air" Clar, Hi/Low, FM mod.
- ★ Matching PP80 Mains PSU available.



FT480R

FT480R £379 inc. VAT @ 15% & SECURICOR

- ★ 144-146MHz (143.5-148.5 MHz possible).
- ★ Excellent dynamic range sensitivity.
- ★ FM; 25, 12½, 1kHz steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ Any TX Rx split with dual VFO's.
- ★ ±600kHz standard repeater split.
- ★ Four easy write-in memory channels.

FT80R £449 inc. VAT @ 15% & SECURICOR

- ★ 430-434MHz (440-445) possible.
- ★ GaAs Fet RF for incredible sensitivity.
- ★ NMOS four bit micro control.
- ★ FM; 100kHz, 25kHz, 1kHz, steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ Repeater access by use of dual VFO's.
- ★ Four easy write-in memory channels.



1 · 6MHz shift now available

FT780R



FRG7 £199 inc. VAT @ 15%
& Securicor
2 year Guarantee + Free finance available

- ★ "Industry Standard" value for money Rx.
- ★ 30MHz to 500kHz in One MHz bands.
- ★ SSB (LSB/USB), CW, AM.
- ★ Sensitivity AM; 0.7µV 10dB S/N at 30%.
- ★ Selectivity; ± 3kHz at - 6dB.
- ★ Stability; 500Hz after 30 minutes.
- ★ Triple conversion, drift cancelling.
- ★ Direct frequency readout to 5kHz.
- ★ Fine tuning control.
- ★ AGC; DC amplified, 3 stage control.
- ★ AF; Powerful 2 watts of audio.
- ★ Forward facing internal speaker.
- ★ Record socket "volume independent".
- ★ Well calibrated "sharp" preselector.
- ★ AM automatic noise suppression circuit.
- ★ Antenna Hi to 1.6MHz, 50 ohm to 30MHz.
- ★ 3 position RF attenuator.
- ★ 3 position AF filter (LP, WBP, NBP).
- ★ 110/240VAC and 12Vdc.
- ★ Lights; battery economy switch.
- ★ Illuminated edge type "S" meter.
- ★ 2IC, 9FET, 13Tr, 16D (9Ge, 5Si, 2Z).
- ★ Weight; 7Kg (without batteries).
- ★ Dimensions; 340 (W) x 153 (H) x 285 (D) mm.
- ★ Optional battery holder.

FRG7700 £329 inc. VAT @ 15%
& Securicor
2 year Guarantee + Free finance available

- ★ Wide coverage, All mode receiver.
- ★ 30MHz down to 150kHz (and below).
- ★ 12 Channel memory option with fine tune.
- ★ SSB (LSB/USB), CW, AM, FM.
- ★ 2.7kHz, 6kHz, 12kHz, 15kHz, @6dB.
- ★ 3 Selectives on AM, squelch on FM.
- ★ Up conversion, 48MHz first IF.
- ★ 1kHz digital, plus analogue, display.
- ★ Quartz clock/timer, advanced noise blanker.
- ★ No preselector, auto selected LPF's.
- ★ Antenna 500ohm to 2MHz, 50ohm to 30MHz.
- ★ 20dB pad plus continuous attenuator.
- ★ 110 and 240Vac and 12Vdc option.
- ★ Switchable speed A.G.C. system.
- ★ Signal meter calibrated in "S" and SIMPO
- ★ Accessories; Tuners, Convertors, LPF, Memory.
- ★ FRT7700; 150kHz-30MHz, Attenuator, Switch etc.
- ★ FRV7700A; 118-130, 130-140, 140-150MHz.
- ★ FRV7700B; 118-130, 140-150, 50-59MHz.
- ★ FRV7700C; 140-150, 150-160, 160-170MHz.
- ★ FRV7700D; 118-130, 140-150, 70-80MHz.
- ★ FRV7700E; 140-150, 150-160, 118-130 MHz.
- ★ FRV7700F; 150-160, 170-180, 118-130 MHz.
- ★ FF5; 500kHz (for improved VLF reception).
- ★ MEMGR7700; 12 Channels (easy internal fitting).

FT208R(2m) FT708R(70cm).
2 year Guarantee + Free finance available



- ★ 4 bit CPU chip frequency control
- ★ Keyboard entry of frequencies/splits
- ★ LCD digital display with backlight
- ★ Ten channels of memory
- ★ Memory back up five-year lifetime cell
- ★ Up/down manual tuning
- ★ Manual or auto scan for busy/clear
- ★ Priority channel with search back
- ★ Memory scanning feature
- ★ Scan between any two frequencies
- ★ Auto scan restart
- ★ Quick change NiCad pack
- ★ 1,750Hz tone burst
- ★ Built in condenser microphone
- ★ 500mW AF to int/ext speaker
- ★ External speaker/mic available
- ★ Keyboard offers 16 tone DTMF
- ★ 168(H) x 61(W) x 39(D)mm
- ★ C/w NiCad pack, helical



FT208R £209 inc. VAT @ 15%
& POSTAGE

- ★ 144-148MHz (144-148 possible)
 - ★ 12.5/25kHz synthesiser steps
 - ★ Any split + or - programmable
 - ★ ±600kHz repeater split
 - ★ 2.5 or 0.3W RF output
 - ★ Rx: 20mA squelch 150mA max AF
 - ★ Tx: 800mA at 2.5W RF
 - ★ 0.25µV for 12dB SINAD
 - ★ Dual conversion 16.9MHz and 455kHz
- 2 year Guarantee + Free finance available

FT708R £219 inc. VAT @ 15%
& POSTAGE

- ★ 430-440MHz (440-450 option)
 - ★ 25kHz synthesiser steps
 - ★ Any split + or - programmable
 - ★ ±7.6MHz EU split standard
 - ★ 1W or 100mW RF output
 - ★ Rx: 20mA squelch, 150mA (max AF)
 - ★ Tx: 500mA at 1W RF
 - ★ 0.4µV for 12dB SINAD
 - ★ Dual conversion 46.255MHz and 455kHz
- 2 year Guarantee + Free finance available



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IC25E. 25W 2M FM Mobile.



Amazingly small, yet very sensitive. Two VFO's, five memories, priority channel, full duplex and reverse. LED S-meter, 25KHz or 5KHz step tuning, same multi-scanning functions as the 290 from mic or front panel. All in all the best 2M FM mobile ICOM have ever made.

IC290E. 2M Multimode Mobile.



10W RF output on SSB, CW and FM. Standard and non-standard repeater shifts. 5 memories and priority channel. Memory scan and band scan, controlled at front panel or microphone. Two VFO's. LED S-meter. 25KHz and 1KHz on FM – 1KHz and 100KHz tuning steps. Instant rev-repeat.

IC24G. 10W 2M FM Mobile.



This is the low-cost, easy to use economy model. Full bank – 80 channels at 25KHz spacing by easy to use press button switches. 12½KHz spacing if required, and the same reliable performance as the famous IC240. Price £169.

IC202S/402 3W 2M or 70cm. SSB Portables.

These two have been around for a long time and are well proven. SSB, CW and side-tone. They come fitted with 144 – 144.4 (IC202S) and 432 – 432.4 (IC402). Battery or 12v operation. Built-in antenna or socket for external antenna.



IC2E £159-IC4E £199



– Nearly everybody has an IC2E – the most popular amateur transceiver in the world – now there is the 70 cm. version which is every bit as good and takes the same accessories. Check the features: **Fully Synthesized** – Covering 144 – 145.995 in 400 5KHz steps. (430-439.999 4E).

Power Output – 1.5W with the 9v rechargeable battery pack as supplied – but lower or higher output available with the optional 6v or 12v packs.

BNC Antenna Output Socket – 50 ohms for connecting to another antenna or use the Rubber Duck supplied (flexible ¼ λ whip – 4E)

Send/Battery Indicator – Lights during transmit but when battery power falls below 6v it does not light, indicating the need for a recharge.

Frequency Selection – by thumbwheel switches, indicating the frequency. +5KHz switch – adds 5KHz to the indicated frequency.

Duplex Simplex Switch – gives simplex or plus 600KHz or minus 600KHz transmit (+1.6MHz and listen input on 4E).

Hi-Low Switch – reduces power output from 1.5W to 150mW reducing battery drain.

External Microphone Jack – If you do not wish to use the built-in electret condenser mic. an optional microphone/speaker with PTT control can be used. Useful for pocket operation.

External Speaker Jack – for speaker or earphone. This little beauty is supplied ready to go complete with nicad battery pack, charger, rubber duck.

A full range of accessories in stock.

		£	p
ICML1	10W mobile booster for IC2E	49.00	
BP5	11 volt battery pack	30.50	
BP4	Empty battery case for 6 x AA cells	5.80	
BP3	Standard battery pack	17.70	
BP2	6 volt pack	22.00	
BC30	Base charger for above	39.00	
BC25	Mains charger as supplied	4.25	
DC1	12 volt adapter pack	8.40	
HM9	Speaker/microphone	12.00	
CP1	Mobile charging lead	3.20	
IC1/2 3	cases	3.60	each

All prices include VAT

The IC4E is going to revolutionise 70cm!

or our agents and warranty on all equipment.

ICOM produce the complete HF line-up!

IC730. 100W HF All Band Mobile.



80 – 10M, 8 bands SSB, AM and CW. Two VFO's with 10Hz – 100Hz and 1KHz steps. Memory for each band. Noise blanker, vox, CW monitor, APC and SWR detector. Speech processor and fan. Switchable RF pre-amp and WWV. 13v DC operation or use ICPS15 mains.

IC720A. 100W HF + Gen Coverage Transceiver.



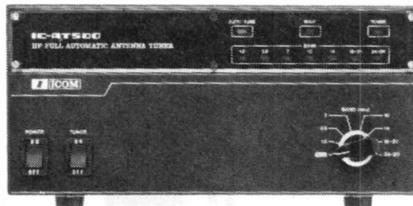
This is the best money can buy. AM, SSB, RTTY and CW. Built-in fan, speech processor, two VFO's and APC. Tuning rates down to 10Hz and memories. General coverage receiver from 100KHz to 30MHz (transmit too if you have a licence!) Run from 13vDC or use PS15 mains PSU.

For the complete station.

Controlled remotely from the ICOM range (or by one switch for other HF rigs):-
IC2KL.

The superb solid state linear to give you the legal limit on all HF bands with no tuning and a very clean signal.

ICAT500.



Automatic ATU which really is automatic and even selects the correct antenna for you! Faster than its competitors. Handles 500W (1Kw PEP) – 100W version is AT-100.

IC251E and IC451 2M and 70cm. All Mode Base Stations.



Both well proven designs with twin VFO's, variable tuning rates and power output, scanners and memory channels, automatic repeater operation with full reverse, 144 – 146 or 430 – 440, low output on FM, SSB and CW, built-in 12 and 240v supplies. None other like them.

TONO PRICE LIST

	Communications	£ p
7000E	CW/RTTY/ASC11 Terminal Tx/Rx	599.00
350	CW/RTTY/ASC11 Terminal Rx Only	259.00
CRT 120G	VDU 12 inch Green Screen Mains Power	125.00
HC900	Intelligent Line Printer 4 Cases +	590.00
HC800	Line Printer Centronics	449.00
SK7	Plug Adaptor For Printers	8.50

Linears

2M-50W	40 Watt Linear For 2 Metres	65.00
2M-100W	90 Watt Linear for 2 Metres	115.00
MR-150W	140 Watt Linear For 2 Metres	159.00
MR-250W	210 Watt Linear For 2 Metres	259.00
MR28	100 Watt Linear for 10 Metres	65.00
UC70	50 Watt Linear For 70cms	149.00

Preamps

RX-144	Mast Head Preamp For 2 Metres	65.00
RX-430	Mast Head Preamp For 2 Metres	70.00

SWR/Power

ASW-180	1.8-160 Mhz	45.80
ASW-430	430 Mhz	49.50

TASCO TELEREADER

	Communications	
CWR-685	CW/RTTY Terminal + VDU + Keyboard. Tx & Rx	699.00
CWR-680	CW/RTTY Terminal Rx Only No VDU	189.00
CWR-670	As Above But De-Luxe Model	259.00

Thanet Electronics

143 Reculver Road, Herne Bay, Kent. Tel: 02273 63859

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COMPARE OUR PRICES FACTORY FRESH IMPORTED DIRECT BY US

2m FM

FDK 700EX TOP SELLING RIG



£199 Free Delivery

FM variable output 1-25 watts. 144-146MHz 25/12½ kHz steps. Xtal tone burst unit. 600kHz normal and reverse repeater 12V

DC 2 5.5 amps. 2 programmable priority channels. Priority/main dial scanning. Ultra sensitive receiver. Large digital readout display. Microphone & mounting kit included.

2m MONITOR

TM56B THE PROFESSIONAL ONE



£89 Free Delivery

FM monitor receiver. 140-160MHz xtal control. 10 standard channels supplied. 12V DC or 230V AC. 12 xtal controlled

channels. 4 scanning channels. Manual or Auto scanning. Ultra sensitive front-end. Squelch control and speaker. Complete with mobile mount.

2m FM

AZDEN PCS 3000 DETACHABLE HEAD



£219 Free Delivery

FM switched output 5W/25W. 144-146MHz or 12½kHz. 1750Hz toneburst & 600kHz shift. Instant input listen. 12V DC 2-5A. Auto

scanning band, or memories. 8 memories/band edge stops. Removable control head. Priority channel. Remote mic. control.

2m HANDHELD

AZDEN PCS 300 NEW MODEL



£184

DELIVERY EARLY 1982

FM 1-3 watt output 144-146 MHz 12½kHz steps. Toneburst and 600kHz shift. Band and memory scanning 8 memory channels. Programmable segment scanning. LCD readout with S meter. Illuminated dial switch Comprehensive facilities etc. Complete with nicad and charger.

HUGE STOCKS OF YAESU TRIO etc. . .

NO MORE TV INTERFERENCE FROM CB OR AMATEUR! GLOBAL

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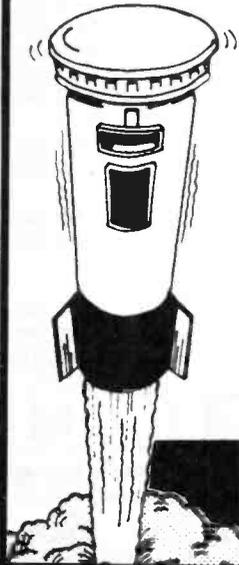
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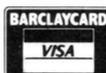
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Editor: PAUL ESSERY, G3KFE/G3SWM
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Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of A4 sheets. Photographs should be lightly identified 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 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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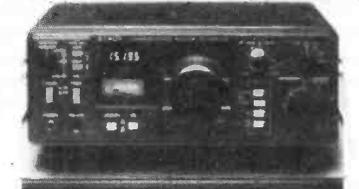
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TR9000

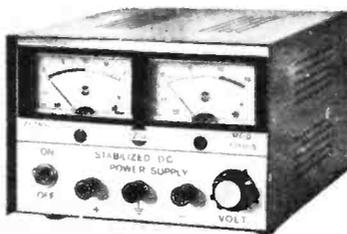
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TS830S HF SSB TRANSCEIVER £694.83

The new TS830S, the latest from TRIO. A high performance, very affordable HF SSB/CW transceiver with every conceivable operating feature built in for 160 through 10 metres including the new three bands! The TS830S combines a high dynamic range with variable bandwidth tuning (VBT), IF shift and an IF notch filter, as well as very sharp filters in the 455 KHz second IF. Together with the optional VFO230 (remote digital display VFO) which provides split frequency operation and 5 memories for frequency hold, the amateur has available today's advanced technology linked to the proven reliability and exceptional linearity of a valve PA.

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- ★ RIT/XIT
- ★ SSB monitor circuit
- ★ Expanded frequency coverage

FOR THE RADIO AMATEUR AND AMATEUR RADIO

The
SHORT WAVE
Magazine

EDITORIAL

1982

As this is written, 1981 is almost behind us. Let us hope that 1982 sees an improvement in the depressing economic condition of this country — and, indeed, the world.

By contrast, amateur radio will start off the new year in good shape, by way of the first opening of the new 10 MHz band on January 1st; but we must not let either Top Band or Ten be neglected, and we must take note of the loss of the upper 200 kHz of 70 MHz, and the change on our 1.3 GHz band to 1240-1325 MHz, both changes also with effect from January 1st.

In case there are still readers who are concerned that the coverage provided by *Short Wave Magazine* may change, it is perhaps worth re-stating that this journal in the year (and years) ahead will remain uncompromisingly true to its motto "For the Radio Amateur and Amateur Radio". We shall continue, as we always have done, to put forward and support the interests of Amateur Radio to the exclusion of all others, from our unique and fiercely-guarded independent position. To do otherwise would seriously break faith with the vast majority of our readers.

However this does not mean that we *must* adopt an intolerant or damning attitude to CB (though such an attitude could be hard to avoid sometimes!), which will have its first full year of legal operation during 1982, and which is here to stay. In spite of all the problems which have flowed from the official mishandling of the question of CB over the years, at some point in the future the separate entities of Amateur Radio and CB will have to exist at peace with one another, with appropriate understanding and recognition on both sides. It is in the interests of amateur radio if we can all start working towards that end now.

If this task is performed successfully, one result will be many, many more licensed radio amateurs.

Bill Stinson
K3KFE.

WORLD-WIDE COMMUNICATION

VHF BANDS

NORMAN FITCH, G3FPK

Awards News

KEN Willis, G8VR, is the 15th reader to become a member of the 2m. QTH Squares Century Club. QTHCC No. 15 was issued to him on November 12, 1981 for operation from Hartley, Kent, (AL42e) and his confirmed total of squares was 102. 80 QSOs were on CW, the rest on SSB, comprising 67 *via* tropo., 7 *Ar*, one *via Es* and 27 by meteor scatter mode. Ken was first licensed in 1936 with the "Artificial Aerial" call, 2CIX, followed the next year by the full licence. A very keen CW operator, he has operated on all bands from 70cm. through 160m. and the first VHF contacts were in 1938 on the old 5m. band, using self-excited oscillator rigs.

Ken has spent some years in the U.S.A. operating as G8VR/WI. He worked several States *via Ar* and through the *Oscar* 6 and 7 satellites, all with indoor aerials. He helped to build and operate the Yale University 432 MHz *E-M-E* station and has worked the U.K. on that mode from Connecticut. He is now virtually retired but still writes technical articles and manuals between bouts of all-night MS activity. Ken reckons MS CW to be the most exciting thing he has done in 45 years as a radio amateur.

Peter Thompson, G8DDY, from Shanklin, Isle of Wight, is the 343rd member of the 2m. VHF Century Club. He became interested in amateur radio some years ago when he heard AM stations on 160m. He got his licence in 1969 and operated from northwest Surrey on 2m. AM, then FM, mostly mobile, using a variety of equipment. Peter moved to the present QTH about 2½ years ago. The station consists of a *Yaesu* FT-221R with *Microwave Modules* preamplifier, an 80 watts, QQV06-40A amplifier and 16-ele. *Tonna Yagi* at 50ft., best DX so far being Norway. He is QRV on 70cm. with an *MM* transverter and 48-ele. *Multibeam*.

RTTY operators are offered three new VHF/UHF awards by the BARTG. On 144 MHz you have to work or hear 100 different stations; on 432 MHz., 50 and on 1,296 MHz., 10. Stickers for extra stations are available and for a full set of rules, send an *s.a.e.* to Ted Double, G8CDW, 89 Linden Gardens, Enfield, Middx.

Satellite Notes

Oscar 8 is now coming into 24 hours-a-day sunlight and the transponders' base plate temperature will likely rise considerably. AMSAT-UK would like any telemetry readings readers may copy, particularly channel 4. The lower the reading, the higher the temperature, the decoding formula being 95.8 *minus* 1.48N, where N is the last two figures of the group, *e.g.* 420 would indicate a temperature of 66.2°C.

UK-OSCAR 9 is still spinning at quite a rate so the suggested all-fully-operational-by-Christmas idea has gone by the board. However, the camera has been activated a couple of times to prove the system and useful particle measurement and other data has been received. There was a glitch at the University of Surrey Command Station when the PA in the Command Tx failed.

AMSAT has published data on the orbit parameters for *U-0-9* for orbit number zero. The period was 95.4635 minutes with a drag factor of *minus* 0.000161 mins. *per* orbit, and the track separation 23.8634°W *per* orbit with a drag factor of *minus* 0.000025° *per* revolution. The mean altitude is 554.596 kms. and the inclination to the equator 97.462°. Thus, in 1,035 orbits, the period will have declined by ten seconds, illustrating the considerable effect the atmosphere has on low orbit satellites. Incidentally, the frequency of the General Data Beacon is 145.825 MHz., using NBFM.

AMSAT expects to be able to supply printed circuit boards for the interface unit between an NBFM receiver and a standard TV receiver by mid-January. The circuit is in the up-dated *U-0-9* Technical Handbook. For full details and prices of the boards, send an *s.a.e.* to AMSAT-UK at 94 Herongate Road, London E12 5EQ.

For the Phase 3 satellite program, AMSAT-UK has donated £1,000 to AMSAT.

There seem to be conflicting reports concerning the launch of further Soviet amateur satellites. Leonid Labutin, UA3CR, mentioned a "severe hold-up" in the program, but the launch of an Indian satellite seems imminent and the three *RS* birds could get a piggy-back lift on that mission. If so, they would be in a high, polar orbit, like *RS-1* and *RS-2*.

On the ground, *RS0* is still operating daily from Moscow sending streams of telemetry on 29.331 MHz. A frequently copied frame format comprises lines of seven groups of two figures, preceded by one or two letters. A typical set would be:— K00 D85 O78 G00 U00 S25 and W39, was followed by *RS0*, then IK00, ID00 IO57. . . . Succeeding sequences have NK, AK, and MK prefixes, each preceded by *RS0*, before starting on the single letter prefix frame. On November 24, your scribe copied the following message from *RS0*:— "CQ CQ CQ de *RS0*

on FQ 145830 kHz K". Presumably those within 2m. range of Moscow could call *RS0* on 145.83 MHz and get a reply on 29.331 MHz.

Beaconry

As reported in the November feature, the 4m. band will be 70.025-70.500 MHz from January 1. Accordingly, the GB3SX beacon on 70.685 MHz has been shut down and will reappear on its new QRG of 70.040 MHz as soon as it is re-crystalled and overhauled.

Your scribe spoke recently to Yve Drouault, F6EOQ, who lives 500 metres from the Lannion beacon site. He said there was much trouble from QRM to other vital services which is why FX3THF on 144.905 MHz has not been commissioned.

Band Plans

Under *Operating Notes* in the October issue, mention was made — again — to the VHF/UHF Band Plans, primarily for the benefit of new licensees. Now, Ted Batts, G8LWY, the secretary of the *British Amateur Radio Teleprinter Group*, has asked that mention be made of the RTTY frequencies of 144.60 and 145.30 MHz. It seems that FM-ers, perhaps unaware of the Band Plan, have been using these frequencies and causing interference to RTTY buffs.

This leads to another plea that the internationally agreed beacon sub-band of 144.845 to 144.999 MHz be left free for those many who monitor beacons in furtherance of propagation studies. In the London area, 144.90 MHz is often used by strong FM stations, thus blotting out reception of FX0THF on 144.895 MHz. Other nets crop up on the Angus beacon QRG of 144.975 MHz and QSOs have even been heard on the GB3VHF frequency! It can only be hoped that a polite word of explanation to the operators concerned will persuade them to move.

Six Metres

Ken Ellis, G5KW, was due to leave the Scilly Isles on December 17, to return in mid-January for a couple more months. He reckons that 6m. conditions have compared very favourably with those of Autumn 1980, even though it is two years since the peak of the present sunspot cycle. October and November produced ten new crossband countries in the guise of C5AEH, HC8VHF, HI8DAF, HK0BXX, PJ9EE, TI2NA, VS6BE, ZD8TC, 8P6KX and 9Y4LL.

Ken reports that C5AEH has returned to California after a very successful DX-Pedition, but leaving one *Hy-Gain Yagi* and a 10w. transceiver behind. Sveinn Gudmundsson, who operated TF3SG on 6m., now has the call TF3T on 50.007 and 50.104 MHz. His fixed station runs 100w. and the mobile one, 10w. A 5-over-5 aerial

is promised and he is looking for crossband contacts. New 6m. stations heard at G5KW include FMOGA on 50.090 and HD1RDC. Ken says that VU2AID is active around 50.085 to 50.090 MHz and has made 6m. QSOs with several VE1s and others. Also, EL2CA will be QRV on 50.035 MHz for the next couple of years.

John Baker, GW3MHW, also reckons that conditions to the West have been as good, if not better than, those of 1980 and he reports transatlantic QSOs possible every day from XM60d in November, except for the 7th. He has managed crossband 10/6m. QSOs with all U.S.A. call areas except the 6th and 7th. John is claiming more GW crossband "firsts" with VP5D and HI8DAF on November 13, and with G5AEH on the 15th. Other DX heard on 6m., but which operators were not listening on 10m., were HC2FG on November 8 at 1245, peaking S8; HC1FM at 1330 on the 12th, peaking S4, and XE3VV at 1425 on the 13th at S3. A Colombian repeater on 50.070 MHz was also copied on the 13th. John has worked TI2NA on November 13 and Eric runs 200w. to a 5-ele. Yagi.

GW3MHW noted an odd propagation phenomenon on Nov. 11 in that at 1220, when beaming to Central America, the Gibraltar beacon, ZB2VHF, could be copied at RST339, together with VE1YX (ex-VE1AVX) at the same strength. Both signals disappeared when the correct azimuth was used. The FY7THF beacon was copied on Nov. 12 for a couple of hours from 1200.

Following the consistency of C5AEH's 6m. signals, John wonders if any VHF folk in other African countries would install 50 MHz beacons. He hopes that, when the Peace-Keeping Force goes to the Sinai Desert, it might include a radio amateur prepared to operate a 50 MHz beacon. This year, John proposes to move up to YM24e and to put up a 4 times 6-ele. array to see if he can get across "The Pond" three years after the peak of Cycle 21.

Ken Willis, G8VR, (Kent) caught the high MUF conditions on Nov. 14 and worked several VE and East Coast W stations crossband using a 4m. beam for 6m. reception and an indoor 10m. dipole for transmission. The FY7THF beacon was S9-plus for several hours on Nov. 12 and another, signing DL3MZ/YV5 was also strong for long periods. By feeding his 50 MHz converter into a Yaesu FRG-7 Rx, Ken listens to Russian TV signals on 49.25 MHz by detuning from the normal IF. While these signals have been strong with high MUF conditions, more interestingly they produce excellent MS bursts right through the day.

Mike Allmark (Leeds) mentions the F₂ layer propagation on Nov. 2 when, from 1300, he copied VE1AVX, VE1BNN, VE2EFL, W9ZV and K0GUV. On the 4th he heard VE1YX, W3ILG, W2UBH,

ANNUAL VHF/UHF TABLE									
January to December 1981									
Station	FOUR METRES		TWO METRES		70 CENTIMETRES		23 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
G2AXI	58	9	64	19	44	9	7	1	203
G3BW	42	6	66	29	41	7	7	5	191
GD2HDZ	49	7	66	15	45	9	5	4	191
G8FMK	—	—	65	17	56	11	28	3	180
G8VLQ	—	—	69	26	45	14	—	—	154
GW3NYY	—	—	78	30	35	10	—	—	153
G3FIJ	41	5	60	15	28	4	—	—	153
G3PBV	3	2	60	23	43	9	10	3	148
G8RZP	—	—	67	21	46	12	—	—	146
G8GXE	—	—	55	11	46	9	17	5	143
G8TFI	—	—	62	14	54	12	—	—	142
G4JZF	—	—	74	20	42	5	—	—	141
G8RZO	—	—	67	21	40	11	—	—	139
G8HHI	—	—	49	16	44	12	14	2	137
GW3CBY	27	6	58	15	17	6	3	2	129
G6ADC	—	—	62	11	43	5	—	—	121
G8VR	32	3	44	32	6	1	—	—	118
G8WUU	—	—	61	15	31	4	—	—	111
G4MUT	—	—	48	12	34	11	—	—	105
G4HAO	—	—	81	21	—	—	—	—	102
G8KAX	—	—	43	10	27	5	10	3	98
G4DEZ	—	—	67	30	—	—	—	—	97
G3FPK	—	—	74	22	—	—	—	—	96
G3CO	14	3	39	8	22	5	—	—	91
G4FKI	37	5	20	5	16	4	—	—	87
G8VFX	—	—	67	18	—	—	—	—	85
G4ARI	18	2	54	10	—	—	—	—	84
G8XMP	—	—	64	17	—	—	—	—	81
G4GXL	—	—	55	15	7	2	—	—	79
GM4COK	—	—	52	22	2	1	—	—	77
GW8TVX	—	—	55	15	—	—	5	2	77
G8RWG	—	—	57	15	—	—	—	—	72
G8TGM	—	—	48	18	—	—	—	—	66
G8LXY	—	—	33	6	20	6	—	—	65
G6AJA	—	—	56	9	—	—	—	—	65
G8XTJ	—	—	51	11	—	—	—	—	62
G8TIN	—	—	40	7	12	3	—	—	62
G6ABB	—	—	44	12	—	—	—	—	56
G8TRW	—	—	44	11	—	—	—	—	55
GM4CXP	3	1	35	13	1	1	—	—	54
G4LDY	—	—	42	9	2	1	—	—	54
G8RZA	—	—	44	9	—	—	—	—	53
G8SKG	—	—	39	10	2	1	—	—	52
GW3MHW	44	8	—	—	—	—	—	—	52
G4MJC	—	—	29	11	5	4	—	—	49
G8MBI	—	—	28	9	—	—	—	—	37
G6CSY	—	—	21	4	3	1	—	—	29
GM4ELV	—	—	10	3	—	—	—	—	13

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

W2EV and W5EKV in New Mexico. VE1YX was heard on the 4th and again on the 6th with VE1BPY, WA1LUB, WB2IDG, WA3EFE and W5EKV. WB2IDG was copied again on the 13th. Mike reports almost daily reception of Soviet TV on channel R1 with pictures and sound up to 56.25 MHz at times, but nothing seen from the west.

Regarding the Dutch 6m. situation referred to last month, 13 PAs have permission to operate on three spot frequencies:— 53.875, 53.925 and 53.975 MHz using A1 and F1 only. There are no Band I TV transmitters in the Netherlands but they are limited to 25w. *e.r.p.* From 1200 each Sunday morning on 53.875 MHz, for 30 minutes, test transmissions are beamed to the U.K. by at least one of the following five stations:— PA0s CRA, LSC, RYS, SWS and XMA. They monitor 144.425 MHz for replies and your scribe heard G3COJ on that QRG on Dec. 6.

Four Metres

G8VR has worked YU3ES (GF) *via* MS mode on CW with Stane operating on 2m.

The QRGs were 70.450 and 144.450 MHz respectively, the completed QSO taking just over an hour. YU3ES seeks other British stations equipped for MS work on 4m. so he can conclude more cross-band contacts. *Via* GW3MHW, news that Andras Bato, HA6NN, is getting a 4m. converter and putting up a Yagi. He would like to carry out crossband tests with British stations. His QTH is:— P.O. Box 115, H-3100 Salgotarjan, Hungary.

On Nov. 3, GW3MHW reports that Mike Probert, GW4HXO, (Dyfed) got his 4m. CW across to VE1ASJ at 1422 for a "First" GW/VE, 4/10m. crossband QSO. Derrick Dance, GM4CXP, (Borders) says he has a 3-ele. Yagi up for 4m. which is working fine.

Two Metres

Mike Allmark, (Leeds) lists the following stations heard *via* MS in November:— 1st SP6GZZ (IL), LA5IH (CU), 2nd DF5IZ (EJ), YU2RTU (HD), 12th Y22QG (FM), 14th OE5KE (HI), 21st SP6GZZ. Mike reckons he heard

some *E-M-E* signals off the setting Moon during the weekend Nov. 5/6 from OK1MBS. He caught the end of the *Ar* on the 11th hearing GM5FM (WR) on SSB plus a few local GMs on CW. From 1703 on the 14th he heard weak *Ar* signals from GMs in WR, WS and YR squares. On the 2nd tropo. propagation was good to Spain and several EAs in VD square were heard, plus EA1CR (XD) and French stations on AG, ZE, etc. The next day brought more EAs, F9NL (AD), Germans in EI, EJ and FJ, LX1DB and OE5XDL (HI). On the 6th and 7th Mike heard more EAs in VD and XD squares and Fs in the E, F and H rows. Best DX heard in the CW contest on the 7th was DK5AI (FL). On the 14th, G8MJD visited Mike's QTH and, working -/A, netted some EAs and EA2EG in YC but who seems to have a rather deaf Rx. During the Cray Valley Club's contest on the 15th DL2KAL/A (DK) and F1CYB (BH) were the best DX.

Bill Hodgson, G3BW, (Cumbria) says conditions have been quite atrocious and he is still operating with rather battered aerials following damage by gale after gale. New ones are adorning the shack floor awaiting more clement weather. Bill's sole source of satisfaction is in MS work, these days. Dave Sellars, G3PBV, (Devon) reckons he had his own private lift towards Switzerland on Nov. 5. Between 2000 and 2200 he contacted HB9PDN/P (EH), HB9MFL (DH), and HB9MTY (DG) and F1AHQ (DG), F6DKQ (DH) and several other Fs in BH, BI and AI squares. He heard EA1YY (WD) on the 7th but did not stay up long enough to work him.

Ray Elliott, G4ERX, (Essex) is now up to 104 squares on 2m. November additions being F1BOF/P (AE) on the 3rd, PA0OOS/A (DN) on the 8th and PE1DTU (CN) and GM4CXM (XP) on the 14th. In a brief trip home to Liverpool on Nov. 14, Rob Mackean, G4HAO, worked EA1ED (VD59h) for an all-time new one at 2108 in quite reasonable conditions. He mentions poor operating tactics by some amateurs who insist on holding conversations of their own inside a DX pile-up. Central and Tayside Regions still elude Rob for 1981.

Martin Blythe, G4HFO, (Cnwl.) got EA2EG (YC17a) on Nov. 14 for a welcome new one, but missed out on PD0DDA/MM on the freighter *Bloemgracht* when Jos was in rare squares. On Nov. 2 he contacted him in XI and learned he was *en route* for Algiers. A sched. was arranged for the following evening and Martin alerted G3CHN as well. By sched. time, Jos was in VF square

and, although he was S9 with G3CHN in Devon, and with G8JDX in Plymouth, there was no ducting into St. Austell. (Murphy at it again!)

Martyn Hunt, G6AJA, (Cumbria) using 12w., worked GJ6FCU, who was running 10w., on Nov. 6, for a new country on the band, and F1FH1 (ZH). He heard EA1TA in VD square but was unable to crack the pile-up. In spite of a poor take-off to the north, GM3WCS, (Fife) was worked on Nov. 1.

Adrian Chamberlain, G6ADC, (Coventry) spent some weeks in Florida a few months ago and used his *Trio* TR-2400. He managed to work into the Daytona repeaters from 22 miles away with only 2w. and a quarter wave aerial on the car. He noticed how the propagation changed around 8.00 a.m. quite suddenly when the temperature reached 75-78°F. As the sun got higher, copy became quite scratchy, this pattern occurring every morning. Since he returned to England, Adrian has added another square, ZE, thanks to F1EBQ on Nov. 6.

Graeme Caselton, G6CSY, (Kent) took part in the Cray Valley Club's 2m. contest on Nov. 15 and found plenty of activity. He now has a mobile *Halo* aerial and, with 15w. has worked PA0FHG/A for best DX. Welcome to another new contributor Graham Owen, G6DDK, (Ipswich) who passed the *May R.A.E.* and got his call on Aug. 14. As G4HMF is his father, he was on the air as soon as the licence arrived. The station comprises a *Kenwood* TS-770E and single 4CX250B amplifier, the aerial array being a pair of vertically stacked 16-ele. *Tonna Yagis*, atop a 60ft. *Versatower*. To date, 53 squares and 16 countries have been worked, including C31, HB9, OE, OZ, EA and Y.

According to Peter Thompson, G8DDY, there are probably 70-80 licensed fellow amateurs on the Isle of Wight of whom some 30 are on FM and 20 on SSB on 2m. Jackie, G8RZO, and John, G8RZP, Brakespear caught the little *Ar* affair on Nov. 11 and added a couple more GM counties and squares to their mounting tally from the Isle of Sheppey. F1DYD (CF) on the 15th and G5KW (WJ) on the 22nd, were also new.

Chris Easton, G8TFI, has not been too active from the new, Gloucs. QTH but nevertheless lists some very nice DX worked since mid-August. EA1TA was contacted on Nov. 2 and EA1CR the next day before the tropo. lift moved round to the east. That produced German QSOs with DK, EI, EJ, EL, FJ and DL squares. EA1ED (VD) on the 7th is the best

southerly DX so far, and DF3RU (FJ) the best in the easterly direction. John Cooper, G8WUU, (Essex) now has two 9-ele. *Tonna Yagis* aloft and added EA1ED and 1QJ on Nov. 2. A DK1OF amplifier is well under way now to boost the present 40w. in the hope of working further afield.

G8VR has installed the *muTek* "front end" board in his *Yaesu* FT-225RD and finds a marked improvement in strong signal handling. During November, Ken concentrated on MS mode and had completed QSO's with SM2CKR (KX), OE5XDL (HI), OH3MS (MV), SP6FUN (IL) and for the first time on MS, SSB with EA1TH in YC and F1JG in CD.

Pete Hibbard, G8XMP, is another new contributor, operating from Scunthorpe. He enters the tables for 2m. work. The 17 countries include SP and UB5 worked *via E's* in June, all the rest being tropo. QSOs. (By the way, we allow GM/Shetland Is. as a country, but *not* Orkney Is. or the Isle of Wight, Pete.)

Walt Davidson, GW3NYY (Swansea) has replaced his 9-ele. *Yagi* by a 14-ele. *Cushcraft* "Boomer" 25ft. up a mast at the bottom of the garden. He took advantage of the good, southerly propagation at the beginning of November, working a number of EAs. New squares, all SSB, were F1CDS (AH), F6FPQ (ZE), F6CCH (ZG) and EA1YY (WD). Using CW for MS operation, November yielded completed QSOs with HG8CE (KG) on the 1st, IV3HWT (GF) on the 2nd, OZ1DOQ (GP) on the 8th, 11JTQ (DF) on the 12th, Y23SJ (FK) on the 15th, DK1WB (FM) on the 22nd and OK1DPB (HK) on the 24th. The sole SSB MS contact was DF3RU (FJ) on Oct. 31. In the Nov. 11 *Ar*, Walt lists four GMs on CW in YP, YQ and YR squares.

Peter Whitburn, GW4EAI, (Gwent) is now up to 150 squares worked on the band, the latest addition being EA1YY (WD) one of a collection of EAs worked in the tropo. lift on Nov. 6/7. During compiling this offering, the 144 MHz Fixed Contest on Dec. 6 was happening. Activity was high with new licensees much in evidence. Several GMs and GIs were logged at G3FPK and, in a post-contest round-up, near neighbour Steve Marsh, G4BWG, said he had made 410 contacts, including numerous near continentals and DLs in the E squares, plus an F in BH and the usual GDX. John Regnault, G8FQO, reported that G4BPO had 375 QSOs including as far south as BG and over to FL and FM squares to the east. The proportion of grotty signals seems to be on the increase, unfortunately, perhaps time

For anything radio you want to buy, sell, or exchange, use the Readers' Advertisements columns in "Short Wave Magazine"

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3POI	—	—	346	346
G3IMV	—	—	291	291
DK3UZ	—	—	280	280
SP2DX	—	—	280	280
G3VYF	—	92	268	360
I4EAT	—	25	238	263
EA3LL	—	15	227	242
G4IJE	—	—	224	224
G3CHN	—	—	213	213
9H1BT	—	11	210	221
GJ4ICD	1	96	208	305
G4ERG	—	16	208	224
G4IGO	—	13	203	216
G3BW	5	31	189	225
G3SEK	—	—	182	182
G3FPK	—	—	179	179
9H1CD	—	13	178	191
GM4COK	—	12	178	190
G3KEQ	—	—	173	173
G4DEZ	—	—	171	171
GJ8KNV	8	73	164	245
G4CMV	14	59	157	230
G8VR	—	3	152	155
GW4EA1	—	—	150	150
GM4CXP	—	25	142	167
G8HVY	22	83	141	246
G8IXG	—	—	139	139
GW3NYY	—	35	138	173
GJ8SBT	1	—	138	139
G4BWG	—	38	136	174
G4NFD	—	32	135	167
G4AWU	—	22	130	152
G3NAQ	—	58	128	186
G8MFJ	—	26	128	154
G3COJ	24	74	126	224
G3XDY	30	83	123	236
G3PBV	14	63	123	200
G3JXN	42	86	120	248
G8HHI	6	52	120	178
G8CXQ	—	15	119	134
G4MCU	—	29	118	147
G4JZF	—	20	117	137
G8KBQ	4	46	115	165
G8ATK	6	56	113	175
G8OPR	1	38	111	150
G8LFB	—	—	109	109
G8TGM	—	—	109	109
G8JJR	—	38	108	146
G2AXI	5	58	106	169
G8VLQ	—	38	106	144
G4FBK	—	5	105	110
G4ERX	6	46	104	156
G8LEF	22	62	101	185
G8KGF	—	28	99	127
G8RZP	—	32	96	128
G4GHA	—	—	95	95
G8RZO	—	33	94	127
G8KPL	—	7	91	98
GD2HDZ	12	44	90	146
G4NBS	13	57	89	159
G6UW	—	1	89	90
G4IRX	—	—	85	85
G3F1J	—	29	84	113
G8IFT	15	34	81	130
G8JAG	—	7	81	88
G4HFO	—	55	80	135
G8KAX	9	43	78	130
G4MJC	—	12	76	88
GJ3RAX	1	27	74	102
G8RWG	—	—	71	71
G8FMK	16	57	70	143
G18EWM	—	25	67	92
G8VVF	—	—	66	66
GW3CBB	3	14	65	82
G8JGK	—	—	62	62
G8SVG	—	—	58	58
G8XMP	—	—	57	57
G8TIN	—	3	56	59
G8SKG	—	5	53	58
G6DDK	—	4	53	57
G4GXL	—	4	52	56
G4GSA	—	6	51	57
G4MUT	—	31	47	78
G8XQS	—	—	47	47
G8WUU	—	13	45	58
G6ADC	—	12	41	53
G8MBI	—	—	40	40
G4LDY	—	2	39	41
G8LXY	—	18	34	52

Starting Date January 1, 1975. No satellite or repeater QSOs. "Band of the Month" 2m.

to suggest attention to the following:— make sure any PA stage is properly tuned up and loaded; maximum output on a whistle or "W-a-a-l-l-o" will *not* result in the best linearity: don't overdo the mike gain: don't screw up the speech processor so that breath noises sound like you are rattling stones in a metal bucket. These points are raised with monotonous regularity but seem to fall on many deaf ears.

Seventy Centimetres

A number of readers enjoyed the good tropo. at the beginning of November. Mike Allmark in Leeds copied DB2VY (DJ), F1EZQ (CH), DD3UD (EI) and F9FT (CJ) on the 3rd, F1AJD (AF) on the 6th and EA1CR (XD) on the 7th who, at 1,179 kms. is the best 70cm. DX. Mike looked in on the B.A.T.C.'s *Cumulatives* on the 15th and saw pictures from G4AGE (Derbys.), G8GQS (Lincs.) and G4GPO (Suffolk). In the Dec. 1 leg, G8MJD/A was operating from Mike's QTH again and worked a number of TV stations.

G3PBV reports the Paris beacon as 20 dB. over noise on Nov. 5, fading out by 2200, not to be heard since, with the beacon in ZD square being heard weakly the following weekend. According to HB9MFL, the HB9F beacon is QRT for the time being, due to aerial problems at the 3,500m. *a.s.l.* site. Dave worked several Fs on the 5th in the A and B squares. G4HFO got three new squares in the Nov. 2/3 period:— F1BOF/P (AE), F1EEH (ZF) and F1ETX (AF) to make up for the disappointment in missing out on the Dutch/MM in VF on 2m.

Apart from the *Cumulatives* in which Graham Taylor, G4JZF, (Staffs.) worked GD2HDZ, things have been very quiet. Best DX for G6DDK from Ipswich was EA1ED (VD) worked at 2002 on Nov. 11. Graham uses the *TS-770E* with a single '250B amplifier, the 21-ele. *Tonna Yagi* being mounted between the two 2m. beams. G8RZO advises that G4HFO (XK) is looking for contacts and was quite a good signal in Sheppey on Nov. 25.

In spite of a late start in the Nov. 2 leg of the *Cumulatives*, G8TFI made 42 QSOs worth 282 pts. The next day produced DF1JC and DF3EE in DL, and DL7QY (FJ61e) at 920 kms. On the 7th, Chris got EA1ED (VD59h) at 970 kms. In the Nov. 10 leg, conditions were fairly good to the east with 39 stations worked for 230 pts. He now has one of the new *H.A.G.* 16-ele. aeriels which seems to work very well. Another three will follow soon since Chris reckons to concentrate on 70cm. this year.

G8WUU has a 15-ele. *Moonbeam* now. 10m. *a.g.l.* and reports quite a lot of activity in the *Cumulatives*. GM4CXP has overhauled his 46-ele. *Multibeam* and is now back on the band after a transverter failure. GW3NYY lists GU8FBO, F1FHI

(ZH) and F1BOF/P (AE) all on SSB on Nov. 6.

Brief results of the UHF Contest over the Oct. 3/4 weekend broadcast over *GB2RS* reveal that the Multi-op. part was won by G4JAR/P with 41,673 pts. Runner up was G8TFI/P with G3JOC in third place. G3JVM won the Single-op. section with 16,909 pts. ahead of G8EGG and G8ZRR.

Twenty-three Centimetres

Scant news this month. G3PBV writes that he has not heard the Isle of Wight beacon since Nov. 10. On the 5th Dave made his first QSO with France, with F2KX (BJ61e) who runs 200w. to four 23-ele. beams. The Multi-op. part of the SHF Contest on Oct. 3/4 was won by G3NNG/P with 5,951 pts. G4BVY/P and G3ZUD/P came 2nd and 3rd respectively. Don't forget that from Jan. 1, the band is 1.240 to 1.325 GHz, with the 1.260 to 1.270 GHz part allocated for satellite up-link work.

Final Round-Up

The 70MHz CW Contest is on Jan. 17 presumably 1000-1500 as last year. The first leg of the 70MHz *Cumulatives* is on Jan. 31, but no idea of times. Congratulations to Paul Broadhurst, ex-G8LGL, now G4NFD. Ron Ratcliffe, G4LRY, writes that the 'phone numbers for Room 208 at Lansec House are:— 01-432 5369 and 5444 — see p. 560 of the December issue. Also, to save expensive hanging on at the main switchboard, the Radio Regulatory Department's direct line numbers are:— 01-275 3316 and 3022 if you really must contact them urgently.

Finally an odd tale from G4JZF, who had been suffering a lot of interference from an elusive "sproggie" from a local station. Eventually it was found that the mains supply lead to the amplifier on 2m. was 39 inches long. The *crud* was cured by a capacitor across the P.S.U. terminals and a ferrite ring in *each* lead.

Deadlines

So it's "Goodbye 1981 and Welcome to 1982" and a Happy New Year to all readers from your scribe. If you are not all suffering from a surfeit of Christmas Fare and New Year hangovers, the deadline for February with all your final table scores is Jan. 6 and for the March piece, Feb. 3. Everything to:— "VHF Bands," *SHORT WAVE MAGAZINE*, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.

A HIGH PERFORMANCE POWER SUPPLY AND CONTROL SYSTEM FOR 4CX350/4CX250 AMPLIFIERS, PART VII

CONCLUDING THE DESCRIPTION OF THE EHT SUPPLY; CONSTRUCTIONAL DETAILS

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M. C. A. MORONEY, B.Sc.

ANOTHER possibility in the capacitor department is the use of paper capacitors. The older block-paper type, which is physically enormous for its values of capacitance and working voltage, is fine for the job if you have the room to spare in the EHT supply for it. There also seems to be a new breed of metallised-paper components coming on to the surplus market; for instance, one particular make of 40 μ F 2500V component has been available at recent rallies and so on. On the face of it, these are most attractive for the job: lots of capacitance, high working voltage and a reasonable size. But, here again, the big question mark lies over the matter of their ripple-current ratings. A long series of telephone calls and Telexes to the manufacturers and their distributors produced the information that this type of capacitor is intended for "short-time" energy storage in such things as photoflash units and laser power supplies: their maximum ripple voltage is only 200V, although the ripple current at this voltage is 8 amps. They will *not* handle 2500V continuously; their continuous rating at 500mA ripple current (100Hz) is 1800V, and much less, as mentioned above, at higher currents. So although they look, on the face of it, an alternative to the ubiquitous chain of electrolytics, they won't do for any power supply with pretensions to reliability. The statement on the side of the can — "2.5 kV-KB" — apparently signifies the intermittent nature of their intended use, so it may be worth making a note of this before spending your money.

And so finally, before returning to the thyristor-controlled unit itself, we may give some thought to the topic of fuses and fusing. This is yet another of those areas where all is not what it seems, particularly when the fuses are required to protect power semiconductors. Protection for the EHT transformer, which will probably be the most irreplaceable component, is best carried out by including fuses between its secondary winding and the input to each leg of whatever rectifier configuration is used — see, for example, F402 and F403 in Fig. 6. In the final unit, for use with a pair of 4CX350FJ valves, the values of these were set at 500mA. Protection for the rectifiers against catastrophic failure of the smoothing capacitors is provided by F404, which has a value of 1 amp. These fuses are required because the control system, although possessing protection facilities for the output load, cannot protect the transformer against, for example, a catastrophic failure of the rectifier stack; in this case, in fact, one hopes that a fuse earlier in the chain will blow. But fuses are queer things and sometimes seem to take a delight in *not* blowing when, by all the rules, they should have ruptured long before the noxious blue smoke came rolling out of the equipment . . . presumably there is a branch of Murphy's Law somewhere which says that components will usually blow to protect fuses!

In the prototype, these "anti-Murphy" fuses are mounted on the EHT rectifier board itself; panel-mounting fuseholders are emphatically *not* recommended and are anyway unnecessary since if one of these fuses fail it must signify a serious fault somewhere which will require investigation.

The example given above is a relatively straightforward use of fuses, but matters become rather more complex when the question of protection for the thyristors is being considered. On the face of it nothing could be simpler than a fuse, except that the actual mechanism of a fuse blowing is surprisingly complicated and has some repercussions when one is attempting to protect semi-conductor devices. Theoretically, even semiconductor rectifiers require something a little more subtle than the simple half-amp fuse as discussed above to protect them, especially in high-voltage supplies.

It is not proposed to write a solemn treatise on fuse rupture mechanisms, especially since the subject is covered in depth by *Ref 1*. However, a brief explanation of the problem is necessary to understand the solution.

Most devices are rated in terms of average or RMS current, which means that if they are used in a pulsed or modulating application the instantaneous current can be considerably greater than the rated current provided that the RMS value remains within the rating. Obviously there are limitations; it would not be possible to use a 1 amp device for 1000 amp pulses, even if they only lasted for one microsecond every second. The device would probably explode.

The manufacturers of power semiconductor rectifiers and fuses quote two parameters which are of some importance in defining the limitations of the device. These are the "peak repetitive single cycle current", or I_{TRM} , and the " I^2t ". The I^2t of the device is a statement of the energy that it can safely dissipate during a fault condition, and is stated for a period of time (usually one half-cycle). As applied to a fuse, it is a statement of the energy that it will allow to be dissipated in the protected device during a fault clearance. When selecting a combination of a fuse and protected device it is good practice to take both these parameters into account, together with the "prospective current" (maximum possible fault current with the fuse shorted out) to determine the ratings of the devices. However, for us lesser mortals, it is usually satisfactory to ensure that the I^2t of the fuse is less than that for the power semiconductor.

I can hear the wailings already. "I've never heard of any other value for a fuse than its rating. What the devil is this I^2t business? Nelson really *has* gone too far this time!"

Well don't worry — have another cup of tea and read on. The type of fuses habitually found in electrical shops and so on are intended for non-critical domestic-type applications; however, when electronic equipment, especially when it employs semiconductors, is to be protected, the professional engineer will employ a class of fuse distinguished by the mystic letters "HRC". This stands for "high rupture capacity" and represents a high-speed device capable of blowing much faster than the ordinary glass-type fuse link, and which limits the fault current by controlling the arc which forms as the fuse ruptures.

We can bring the discussion a little nearer home by considering the fuse in a domestic 13 amp plug; the clue here is in the magic phrase "prospective current", which was mentioned above. I can't even begin to estimate the prospective current from the mains, and it is probably enough to imagine that it will be very large. Next time you have occasion to change a 13 amp fuse, which will probably be a ceramic tube (as opposed to the ordinary glass tube of an "ordinary" fuse) try breaking open the faulty one: you should find that a small quantity of sand, or a similar material, will trickle on to the floor. This is one distinguishing mark of an HRC fuse, the purpose of the sand or whatever being to quench the arc which may, under certain circumstances, form within the fuse and hence help to clear the fault current.

In other words, a high-speed HRC fuse has the ability to (a) limit considerably the level of peak fault current from the estimated prospective value in a very short period of time, and (b)

to clear high values of short-circuit current, which is extremely useful if power semiconductors are being protected.

Again without wading into the mathematics of the situation, the points to consider when selecting a fuse for this kind of application are (a) the steady-state RMS current, (b) the prospective fault current, (c) the I²t ratings of the semiconductor device and of the available fuses, (d) the voltage at which operation is taking place, and (e) the ambient temperature. This may sound more than a little daunting but the fuse manufacturer, certainly in the case of an HRC fuse for use in this application, will have done most of the work for you: for instance *International Rectifier*, who manufacture a wide range of HRC fuses for this type of application, have a data sheet available for the asking which sets out all you need to know.

Let us consider, as an example, the present case, where it is desired to protect a BT152-600R thyristor — there are, of course, two in inverse parallel in our circuit, but the considerations will apply to both devices. At full power, we may assume a current of about 7 amps flowing in each device; the prospective fault current, since we are dealing with the mains, can simply be thought of as enormous! We know from the published data for the thyristor that its I²t is 200A²s, and we will assume that the temperature is 20°C.

If we look at the data sheet thoughtfully drawn up by the manufacturers of the fuses, we are primarily interested in two things (the maker has conducted his tests at 25°C, so the ambient temperature variable can be forgotten). We consider first the RMS current rating of the fuse, and we might consider, for example, the fuse type E1000-8 with its rating of 8 amps RMS. Since the permissible on-state current (I_{TRM}, as discussed above) for a BT152-600R is 20 amps, although we only require about 7 amps, this looks promising. We next look in the column headed "Total I²t at 700V" — we require the 700V column since this represents a worst-case for thyristors in inverse parallel and will thus give a conservative rating. For the E1000-8, the total I²t turns out to be 28A²s. Since the figure given in the data sheet for the thyristor is 200A²s for 10 milliseconds, the protection given by this fuse would obviously be very good.

In fact, this is partly because the thyristors used in this design are somewhat underrated: if one considered lower-power devices, it would be found that their I²t would not be very much higher than that of the fuse. This is a corollary of the fact that 20 amp devices are used to handle about 7 amps, both in the interests of reliability and because the BT152-600R, since it is a fairly standard device in use in industry, is very cheap. The main point to bear in mind is that as long as the fuse has a value of "total I²t" less than that of the thyristor and will pass the appropriate current (RMS) the device will be protected against untoward events taking place downstream of it. The user should also be spared embarrassing explanations of the type "ah well, you see, the thyristor blew to protect the fuses again. . ."

Having said all that, there is theoretically no reason for the "anti-Murphy" fuses F402, F403 and F404, which we said were to protect the transformer and rectifier; in fact, the odds are that a fuse of the type discussed above would blow before they would! However, it is said that an ounce of protection is worth a pound of cure, and we may as well apply the points above to these fuses. Bearing in mind that they are working at high voltages, an HRC fuse is very desirable so that any arc which might form can be quickly quenched — again, the various forms of protection used in this unit render such an event unlikely but the cost is only a few pence more than "ordinary" fuses. 20mm HRC fuses, as available from *RS Components* for example, should be used in these positions, and during the various tests they have never yet failed to clear any fault currents — heaven knows they have had enough practice at it! The current ratings of these fuses were, of course, discussed above.

That concludes our look at some of the slightly off-beat areas of interest which came in for some attention during the design of this power supply unit, and they are relevant to practically all EHT supplies whether they are slightly sophisticated or very basic. With

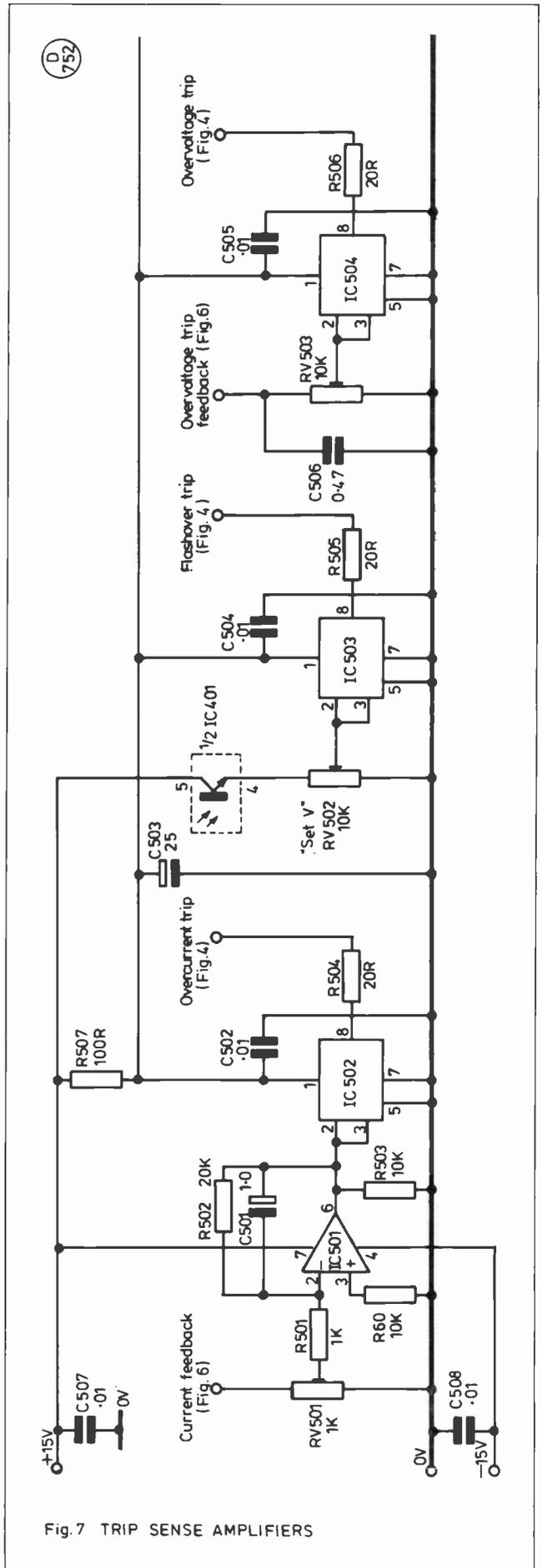


Fig. 7 TRIP SENSE AMPLIFIERS

them in mind, we may now pass on to a practical realisation of this system.

Construction

The complete unit falls naturally into two sections: the "control unit", which consists of Figs. 2, 3, 4 and 7 and which is contained in the same box as the control logic, bias and screen supplies, auxiliary transformers, etc; and the thyristor stack, Fig. 5, which may be constructed as a part of the EHT unit. Since this latter contains the EHT transformer, smoothing capacitors and other rather bulky components, it can best be treated as a separate unit from the main control system and built in a separate box placed away from the main operating position; because all its functions are controlled remotely, its existence can be forgotten (unless of course it either goes wrong or, because of its weight, falls through the floorboards . . .). There is also something to be said for this arrangement from the safety point of view, especially if there are animals or young children to be considered.

To discuss the control unit first, the final versions were constructed on single-sided PCB to fit one of the standard die-cast boxes. As usual, the necessary connexions were taken into and out of the box *via* feedthrough capacitors, with some ferrite beads on the appropriate wires. RF screening is important in this system: one of the earlier prototypes was built on *Veroboard* and as well as being a rather good broadband noise jammer (as discussed above) there was a nice rough justice in the fact that it was itself very vulnerable to RF. A couple of watts of FM from a 432 MHz handheld was sufficient to stop the system from working, and some otherwise inexplicable fluctuations in the output from the unit were finally traced to RF breakthrough from a PMR site about half a mile from G4FRX. It was not possible to establish which section of the system was being affected, but the system as described in its final form does seem completely immune to RF at any amateur power level. It is wise to make sure that the lids of the die-cast boxes, or whatever screening method is employed, are a good fit and clear of paint, etc.

As far as the control unit is concerned, there is nothing critical about it except this point. Since the transistors are carrying out simple switching, almost any of the usual devices may be used: BC548s and 557s were used in the final version simply because a quantity of new first-grade devices had been found at a rally for an extremely low price. BC184s and 214s and BFX85s and 88s have been tried and work well. The ubiquitous 741 should present no

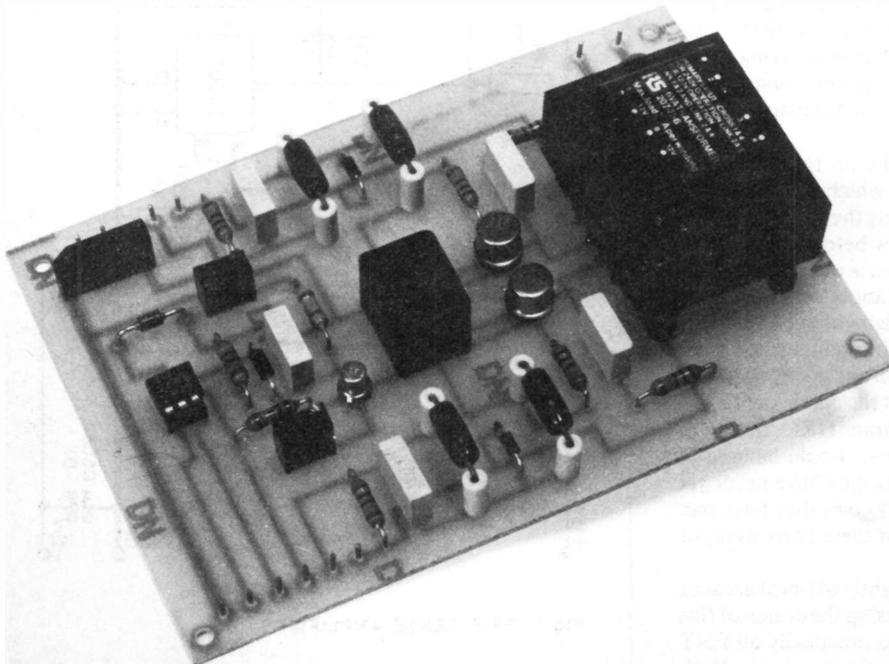
problems, and neither should the CA3046 transistor array in the gain multiplier — if a CA3086 is to hand, it will also work well in this part of the circuit. The overvoltage protector ICs have already been discussed. The voltage regulators IC1 and IC2 were standard 7815 and 7915 devices, although the *National Semiconductor* equivalents — the LM340 and LM320 — seem to be very commonly found in surplus equipment and may be used with no changes to the circuit. The SCRs shown in Fig. 4 may be any of the common TO92 or TO5 style components which seem to be available at rallies for about 5p!

Tantalum capacitors should be used where shown in the interests of low leakage and low inductance. (It is interesting to note that although the element tantalum is a rare earth and supposedly very difficult to extract and refine, the price of these devices seems to have fallen dramatically in the last year or so). All the tantalum capacitors for use in this project were purchased at this year's Alexandra Palace exhibition for the princely sum of 40p, and most of the professional-type component suppliers seem to have been quietly reducing their prices for tantalum capacitors. They are also, of course, a good deal smaller than ordinary electrolytics, which can be helpful as far as PCB layout is concerned.

The opto-isolator shown in Fig. 4 was a TIL111 in the early prototypes, although practically any of the standard types should work in this circuit. It is worth noting that the transfer characteristics of an opto-isolator are said by the manufacturers to change during the course of their working life as the LED ages, although we are not sure of the practical consequences of this.

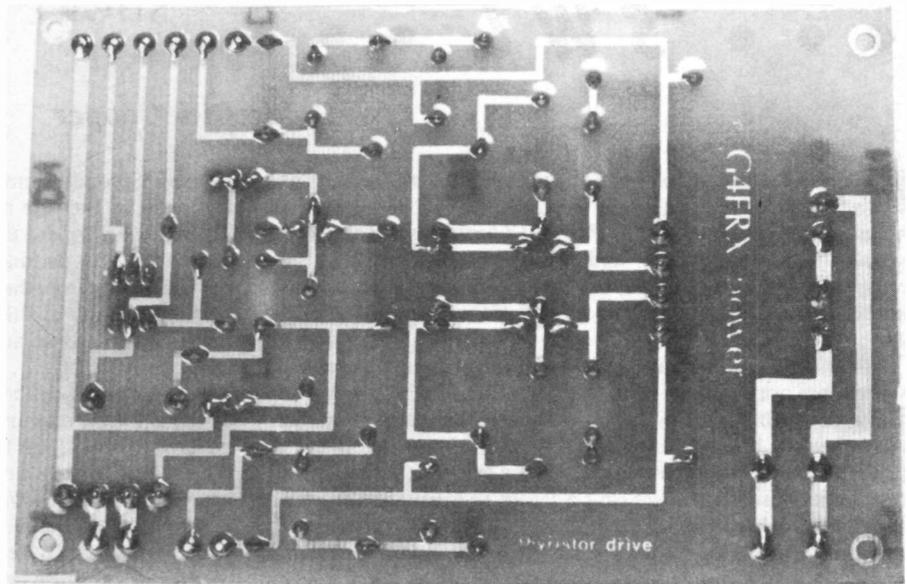
Otherwise, the control unit is a perfectly standard piece of "home-brew" and should not cause any difficulties whatever method of construction is used provided that it is RF-tight. The thyristor stack, Fig. 5, does need a little more care, although here again it could hardly be regarded as critical.

It will be remembered that the functions of R312, C304 and C306 were discussed in some detail above. Since these components will effectively spend their working life connected between mains and earth, it is essential to use properly rated components; to the professional engineer these are known as Class X and Class Y "suppression types". They are normally polyester film or polycarbonate components, and probably the easiest way to be sure of obtaining the correct types is to order them from, for example, *RS Components* or *Maplin*. They have some very interesting self-healing properties, and are a much



The PCB carrying the phase control oscillator and driver unit for the main thyristors. Note the opto-isolator IC (a 6-pin DIL device). Adjacent to it is the UJT circuitry — the second 10-turn preset visible in the photograph was used on this particular board to experiment with the source impedances, and is not shown in Fig. 5 or required in the final design. The square black object next to the UJT is the pulse transformer, with the two driver thyristors (BTX18-100 in this particular unit, although the specified 2N5061 is as good or better) adjacent to it. The 47 and 82 ohm resistors are carried on ceramic standoffs. This unit underwent a 1000 hour full-power soak test with no problems.

The track side of the same board. All solder joints were defluxed with Arklone and several coats of PCB lacquer applied in the interests of reliability.



better proposition than the ordinary polyester or mixed-dielectric types. Capacitors of this style should *always* be used when the application requires direct connexion across a mains supply — the fact that we are amateurs and not professionals does *not* give us some kind of strange exclusion from the normal laws of physics or of component reliability

The ratings of the main thyristors have already been discussed and in general terms any device for use in this type of application which possesses an adequate V_{RRM} and enough of an average on-state current rating to do the required job is practically guaranteed to work. The BT152-600R seems to be something of an industry standard and hence turns up quite often on surplus PCBs, etc, although it should only cost about £1 if bought new. The “pilot” thyristors SCR301 and SCR302 can be of the same kind as used in the output amplifier, Fig. 4.

As far as L301, L302 and L303 are concerned, it must be admitted that (a) there *must* be a better way to do the job than the way in which we have done it, and (b) we don't know what it is! The original plan was to use some *Mullard* RM10 pot core assemblies, of which half-a-dozen had been sitting in the G4FRX junk box for some time: 20 μ H implies some twelve turns round the bobbin, and it was decided that quite heavy-gauge wire should be used to minimise any heating effects or losses. Now the plastic bobbin which is supplied with a ferrite pot core is quite diabolically fragile; it is no doubt adequate for its job if the normal 28 s.w.g. or thereabouts is used, but efforts to wind up the coils with 18 s.w.g. enamelled wire resulted in the breaking of four bobbins, one after another! After a suitable period of recovery and the consideration of the matter further, it was thought that one might be able to do without the wretched things, but a few experiments did not lead to a satisfactory solution. In desperation, two of the author's friends assisted in the next attempt, and after some ten minutes' nerve-racking effort one coil was triumphantly wound and terminated on the pins of the bobbin. Sad to say, the final bobbin broke halfway through our attempts to make another one

A yield of one out of six is rather more reminiscent of VLSI manufacture than the construction of pot cores; we draw a veil over the proceedings after that, except to say that after much fiddling and cursing, three complete 20 μ H pot cores were obtained! It is suggested that when they have been wound — and any views on better ways of doing the job will be welcome — they should either be heavily varnished or “potted” in some suitable compound, since if the windings are not well fixed they will tend to rattle at 50 Hz in service.

T301 is a standard 1+1:1 pulse transformer, of the sort sometimes found in television power supplies or surplus

equipment, although the *RS Components* stock number is quoted in the components list for those wishing to purchase one new. T302 is shown in the same way, since a few of the regular rally traders seem to have large stocks of them in original boxes; the author's original component cost 30p, although it is £2.50 from *RS* themselves. Any small 12V “filament” transformer would be adequate for the job, however.

As far as the ramp and pedestal generator is concerned, there is nothing very noteworthy; the UJT T301 can be almost any small-signal device, and D306-9 may be either built up from discrete components or a small encapsulated bridge — a capacity of about half-an-amp is quite adequate. The mains filter, which was mentioned earlier in the article in connexion with RFI and dV/dT , was a proprietary 10 amp component from a surplus computer power supply and cost 50p in the Edgware Road, although any small mains-type filter would do provided that its rating was adequate for the rated current. D301 is dissipating about 700 mW, which means that the usual small Zener diode is not quite adequate; it is suggested that a BZX61 or BZX70 series device is used in this position.

Layout of the thyristor stack, with two provisos, should not be critical. The important points are that the leads to the gates of SCR303 and SCR304 must be kept as short as possible and that the suppression components mentioned above — R312, C304 and C306, plus their opposite numbers on SCR304 — must be mounted as closely as possible to the thyristors. This is to minimise the lengths of leads and thus to keep any RFI problems to a minimum. The thyristors themselves require a heatsink of about 4°C per watt each, and these could be mounted on the end or the lid of the die-cast box. The author's own solution to the mechanical design requirements is shown in the photographs, but there are many possibilities. Do *not*, however, attempt to construct the unit as though it were the screen supply, *i.e.* with the thyristors mounted on heatsinks mounted remotely from their drive circuitry, Fig. 5, since the level of RFI which may result is likely to compromise the receiving system's weak-signal performance.

(to be concluded)

Correction

In Fig. 5 (*Part VI*, December issue, p. 547), the ‘top’ terminal of R302 should be connected to the line between the positive output of the rectifier (D306-D309) and R304, and *not* as shown.

• • • SWL • • •

SHORT WAVE LISTENER FEATURE

By Justin Cooper

It seems we must address ourselves again to this old business of valves *versus* solid-state, at least insofar as it refers to the things around the shack. R. J. Payne (*Daventry*) is the one who has put up the Aunt Sally — and unwittingly also handed us the avenging coconut. Essentially, he was generalising while J.C. was discussing the particular. So, let us take Robert's points one by one.

Firstly, lots of amateurs and SWLs have stocks of valves. Agreed, but not the facilities to test 'em, without which they are, at best, doubtful for use in the station receiver, and at worst junk, unless they can be tested and listed so that one knows about each specimen. Using them as a means to obtain learning: agreed, with some limits, insofar as there isn't a fat lot to learn about how a valve itself works, and all the remaining circuit work can as easily be learned with solid state. I certainly don't think such fine receivers as, for example, the Eddystone 888 or the Racal RA17 should be slung in the dustbin, but it is very definitely a case here of taking the cream and comparing it to the cheap-and-cheerful. Finally, Robert reckons that to say a TRF receiver is a toy compared with a direct-conversion receiver is an indication that J.C. has been unlucky with TRFs — far from it, this old greybeard was trading in basic *facts* in all these cases; and so it must seem that Robert has been unlucky with his homodyne receivers!

Let's put it all into perspective. There are some very fine receivers about still, full of valves, and after 25 years they are as good as the modern receiver in many respects *if* they are in good condition. But, the valves wear out, and then one must service the beast by replacing the offending valve by another of *known* equal goodness *plus* a re-alignment. The latter requires the skill and the equipment, but the former needs an awful lot of skill (luck?) in selecting your valve supplier if you must take his "new, boxed" valve on trust and plonk it into your otherwise good receiver. But, having sorted out all this, there still remains the operational problems, of which the foremost is the warm-up drift, with microphony a close second. But they certainly *were* the best designs to appear until the last few years, simply because they had the right gain distribution to take account of the unwanted big signals, and so were far better on cross-mod and similar problems than any of the first fifteen years-worth of solid-state commercial gear. Lastly, reader Payne says there are still lots of AM stations about — most of them would be quite surprised and/or upset if you told them they were on AM!

What it boils down to is "horses for courses" — if your new SWL has a very modest sum to splash out then a good old valve receiver well-maintained will serve quite nicely. For home-brewing a receiver, the valve shortcomings and the difficulty of being sure the valve you have in your hand is a good one (*i.e.*, does what the data book says it should, or better), make it all but pointless to even think of a valved receiver. But not to chuck the old receiver straight into the dustbin — an old HRO Senior, for example is well worth buying, with a complete set of bandspread coils, just for the chassis, coilboxes drive and tuning capacitor, not to mention a *very* close look to see how National manages a stable design without the need for screening all over the place — compare with, say, a CR-100.

The Mail

Having used up our preamble on answering reader Payne — and hoping he doesn't mind that! — we must look at all the mail now.

A couple of HPX queries come from J. Hayes (*London N.9*). The answer to the first is that the shift up to the All-Time Post War table is automatic on reaching 500, by which time we reckon you have enough nous to take the old-timers on somewhere near level

pegging. Secondly, and one that doesn't seem to have cropped up for years, is the rule about no undercover or MARS stations. Taking the former, there have been cases enough where no amateur radio is permitted in a country and stations have come on the air illegally from that country. Regardless of whatever we may personally think of that country's 'isms', if they say it's illegal, that is it as far as we are concerned. There are, even in this area, some 'grey' ones . . . for instance it does seem as though the Turkish regime is deliberately turning a blind eye to amateur radio operation while retaining the embargo, on paper at least. We feel inclined to regard the TA stations therefore as valid for HPX — but it is hard to draw a *clear* line. Now, as to MARS: these stations are American, and *military*, largely handling "traffic" as they call it, and being operated by holders of amateur radio licences.

G. H. Coulter (*Whitfield*) runs an FRG-7 and a random length wire aerial, on which he recently heard VP8ANT, and he wonders about the station. VP8ANT is in fact G3CWI, and if you snag him you may well find that you have some rare DX — like Adelaide Is. and S. Georgia.

An interesting letter we have from P. Dawson (*Northam*) — a spot beloved both by the present Editor and his predecessor. Pete wants to know about using a couple of inverted-vee aerials as a Yagi-type beam for 40 and 80. The problem is fairly simply stated, in that the spacing between the elements needs to be held within limits if the thing is to work well — not closer than 0.1 and not much more than 0.2 wavelength. The biggest snag is that as they are, electrically speaking, so close to ground, the feedpoint impedance falls to a low value, lower even than a normal two-element. It thus must follow that it is important to match the feeder to the aerial, or to use a folded dipole construction for the driven element — but of course you can't really expect it to work with low VSWR right across the band on 80m.

G. Caselton (*Orpington*) wonders whether V3 is the new prefix for Belize — and so it is, Graeme.

The usual nice informative letter comes in from E. W. Robinson (*Bury St. Edmunds*); he seems to have had quite an interesting time on the air, one way and another, including hearing his first ever YO1 station.

Now we move on to J. Goodrick (*Bognor Regis*) who has some pertinent remarks on the costs involved in the direct QSL plus IRCs or s.a.e. business — indeed it is a financial pain, but there is no doubt that there are times when amateurs appreciate reports, particularly when they are obviously not pulling replies, or getting replies and not hearing them; and most of the DX-peditors will come up with a card if they get a decent report over several successive contacts.

In *Chorley*, P. Catterall now has a Drake MN-7 ATU to add to his collection of gear — he uses the ATU to obtain signals from an end-fed 132-footer and Yaesu receiver.

Congratulations to M. Cuckoo (*Herne Bay*) who is now licensed as G6ECM and will be transferring his reportage to "VHF Bands".

Appeal

R. Taylor (*Bolton*) has a problem in that he reckons his SR-550 is rather dead on 21 and 28 MHz — so he would like to hear from anyone who has successfully modified one of these receivers. As far as the writer is concerned, one needs to sound a note of warning: before modifying the front-end of the receiver, be quite sure you *have* a problem, and even more certain that you have the right solution! A pretty good test for *any* receiver on 21 and 28 MHz is to twiddle the aerial trimmer, or preselector, control on the front panel, with aerial feed disconnected, and listen to the,

'sharsh' coming out of the speaker. You should be able to 'peak' it; easy enough on the lower bands, but a stiff test on the two higher bands, and the peak will be only just audible, if at all, on 28 MHz. If the receiver meets this test, resolves SSB and CW satisfactorily (maybe with the AGC off), and works well enough on 40, then you will do well to confine yourself to improving the cooling. Drilling holes in the chassis helps a lot, as the underside of a pan-shaped chassis is a good heat trap! Make sure before you start to drill that there's nothing in the way; and stick a bit of masking tape underneath where the hole comes through. Drill the hole and remove the tape with all the swarf stuck to it. A little of this and a propping-open of the lid will help no end — most cabinets/chassis seem to be designed on the idea that hot air *won't* rise! The sooner you can get the air warmed, rising, and flowing out of the cabinet, the sooner you'll get the thing to settle down to a stable temperature and hence no more drift.

Contest

Our pleasure to mention once again the White Rose club's second SWL contest; noon January 23 to noon on January 24, listeners to be on for 18 hours out of the 24. Bands 1.8, 3.5, and 7 MHz, and they deprecate the practice of logging all the stations who call someone; so the same entry in the "station worked" column must not appear more than ten times on any one band. No CQ or QRZ or similar calls to be logged. Score one point for a station heard on a band from within one's own continent, five points likewise for a station outside one's own continent. Total points so amassed should be multiplied by the number of countries heard on each band added together. Logs to show: date, time, band, station heard, station being worked, report at SWL's QTH, and if you are claiming both ends of a contract, then both calls must appear in the "station heard" column. W, VE, VK, ZL call areas count as countries, others as ARRL countries list. Logs to arrive not later than March 16 to G4IDJ, c/o White Rose R.S., 8 Manor Court, Shadwell, Leeds LS17 8JE. Full rules can be obtained from D. Whitaker, Hill Court, 57 Green Lane, Harrogate, N. Yorks. HG2 9LN.

B. Ward (Nottingham) had quite a chat with G3KFE at Donington, but unfortunately missed your conductor. Barry has four queries in his list; the two WA4s sporting the /AT are normal WA4s, so only one can be counted, and only if no other WA4s have been previously logged; as for the two UK9s sporting suffixes, these indicate the station was operating from some other location and so they both count.

Mrs. T. Parry (Blackpool) has had to move home — not very pleasant with a tiny babe to cope with as well — and so of course most of the possessions, including the receiver are in store until the problems can be resolved. All we can say is that we hope things sort out soon, and send out best wishes to Tina, the OM, and the youngster.

Poor *J. Worthing (Shrewsbury)* — his September entry missed the 'bus, but at least it did get here and he can now stop wondering where it went! This is not usually a problem from the SWL's point of view, in that most seem to keep carbons or an overall list from which they can check — but to have to write up a four-figure score



Winner of the first White Rose A.R.S. SWL LF bands contest was Paul Tittensor (centre). On the left is David Whitaker, BRS25479, contest organiser; chairman of the White Rose club, David Macgregor, G4IDJ, is on Paul's left. Their second SWL contest is scheduled for January 23/24.

all over again would be a bit of a bind. So — glad the list arrived!

Always something new in the letters from *H. M. Graham (Chesham)*; in response to the comments last time about QSLs, Maurice checked his own lists and found his return rate was 73% — a bit above average, but he uses IRC's or an s.a.e. with his reports, and also, we guess, sends out the sort of report the transmitter likes to see and read. Changing tack again, Maurice mentioned a Pestilence in his new QTH in the form of a nasty noise every so often; it has now all but disappeared most of the time, but does crop up occasionally with much longer bursts now. It sounds to this writer that some poor old thermostat is on its last legs and spending most of its time welded solid; so the next move is to check the fire insurance, be sure it isn't in one's own patch(!) and await the arrival of the fire-engine!

The first entry from *N. G. Jennings (Rye)* is with an interesting letter; Norman seems to have made his start before Hitler's War and in those far-off days had a Sky Buddy and a five-meter receiver, with membership of the old City of London Signals (TA) to add the bit of technical knowledge. He came back to the fold in July '81, now with a Yaesu 7700 and ATU, plus a trapped vertical which seems more effective than the old end-fed wire. One problem is, at 73, a little deafness sometimes causes half of a QSO to be not copied — something for which a pair of headphones is probably as good a cure as any.

Next we come to *J. Doughty (Bloxwich)* who missed the deadline last time round; John has been enjoying the little bit of summer there was, and working hard as well, which accounted for his absence; but he is still active, as his list shows, and getting quite a bit of fun from SWL contesting and listening to 28 MHz.

We are put to rights this time by *N. Neame (Lancing)* who refers to our comments on the Hambander and the Commander. Nigel says the Hambander was a basic Rx with a mixer, IF, Det/AGC, AF and output stage, which was intended to be used with a two-valve pre-selector sold as an accessory. The receiver based on the R.1155 was a different animal altogether, called the V55R. The Hambander had a regenerative IF stage for a bit of extra selectivity and to act as BFO — common in those days among the more basic receivers. As for the Radiovision Commander, Nigel reckons this was years ahead of its time, and worth giving house-room to even today. Thanks for the convention to our somewhat weed-encrusted memories of those early years.

M. Evans (Llanbradach) is a sixth-former studying for a couple of A-levels who has a family background in amateur radio going back to Dad's R.1155 receiver in the sixties. However the present set-up for Martin shows an R-300 fed from a separate DC PSU to reduce the hum in the receiver's own PSU, an ATU, dipoles for 14/21/28 MHz, an attic long-wire, and a mast-mounted Joystick;

ANNUAL HPX LADDER

Starting date, January 1, 1981

SWL	PREFIXES		
P. J. Catterall (Chorley)	491	K. Cooke (Cardiff)	263
P. Lincoln (Aldershot)	430	R. D. Newall (Bracknell)	238
G. Caselton (Orpington)	378	N. T. P. Lewis (Swansea)	227
T. Kirby (Cheltenham)	318	M. Evans (Llanbradach)	223
D. McKinney (Portadown)	303	L. Ayres (Chalfont St. Giles)	222

200 Prefixes to have been heard since January 1, 1981, before an entry can be made. Entries in accordance with HPX Rules, (see p. 365, September 1981 issue).

HPX LADDER (All Time Post War)

SWL PREFIXES

PHONE ONLY

B. Hughes (Worcester)	2417	F. D. Barnes (Cardiff)	867
S. Foster (Lincoln)	2166	D. J. F. Gordon (Chepstow)	833
E. W. Robinson		M. N. W. Thornton	
(Bury St. Edmunds)	1957	(Romford)	790
Mrs. R. Smith (Nuneaton)	1755	P. Eggeman (Borehamwood)	774
M. J. Quintin		J. M. Short (Thornbury)	729
(Wotton-u-Edge)	1532	J. Singleton	
H. A. Londesborough		(Skelmersdale)	709
(Swanland)	1498	B. L. Henderson (Ryde, IoW)	687
J. Worthing (Shrewsbury)	1430	Mrs. T. Parry (Blackpool)	662
H. M. Graham (Chesham)	1411	A. Stevens (Crowthorne)	615
M. Cuckoo (Herne Bay)	1398	J. Dunnett (Prestatyn)	603
G. W. Raven (London SE13)	1383	N. E. Jennings (Rye)	561
M. Rodgers (Harwood)	1351	Mrs. J. Charles (Colchester)	527
M. Law (Chesterfield)	1206	J. Hayes (Edmonton)	510
N. Askew (Coventry)	1146		
P. Ford (Longlevens)	1128		
G. A. Davey			
(Bury St. Edmunds)	1044		
J. F. Hobson (Ely)	1023		
J. Doughty (Bloxwich)	1018		
D. C. Casson (Reading)	1004		
D. J. S. Williams			
(Wednesbury)	950		
L. Stockwell (Grays)	932		
B. A. Payne (Leeds 18)	923		

CW ONLY

H. A. Londesborough	
(Swanland)	1294
D. W. Waddell (Herne Bay)	1257
J. Goodrick (Bognor Regis)	1000
E. B. Ward (Ruddington)	867
J. M. Dunnett (Prestatyn)	801
N. I. Neame (Lancing)	453
A. Rowland (Bude)	287
D. J. S. Williams (Romsey)	201

Minimum Score for entry: 200 for CW, 500 for Phone. Listings to include only recent claims and are in accordance with HPX Rules. A 'Nil' return is permissible in order to hold a place.

the Partridge artificial earth system provides the grounding for the aerials that need an earth reference.

It does seem as if *J. Dunnett (Prestatyn)* has had a couple of letters going astray — our last scores are 533 on Phone, and 700 on CW. Under the circumstances we are taking in the current totals and hope to see the missing ones with the next offering.

Mrs. J. Charles (Colchester) has been indoctrinated by son G4EZA for years, but having come across this piece she finally decided to have a dabble; and there seems to be some pressure building up in the direction of that old RAE. . . . While there is a fairly constant FT-200 in the equation, aerials seem to be changed with some frequency, but at the time of writing were dipoles. We rather like the final comment: "November 2; just listened to the CB-ers — decided to enter HPX instead!"

J. Williams (Romsey) works in electronics and seems to have an interest in home-brew — an active aerial is at present on the stocks, and a noise limiter has been finished, although not too successful. This is always a difficult thing to design; in essence the problem is that the IF selectivity of the receiver, with its limited bandwidth, causes sharp high energy spikes of noise picked up to be reduced in amplitude and extended in time, so that any noise-limiter added to the back-end of the receiver is of minimal use. The best way is to have a separate receiver with a wide IF through which the spikes can travel without distortion, and then to use these spikes to silence the receiver momentarily, the holes of silence being less unpleasant than the noise. Some receivers have this sort of blanker built-in, and others, such as Collins (if memory serves aright) used a separate receiver, whose front-end was tuned to the frequency where the noise was best received, around the 40 MHz mark. This of course assumes that most of the noises are ignition based, but that assumption no longer holds valid for most people. Boiling it down, there just isn't any one type which is best on all varieties of noise.

S. Foster (Metheringham) missed Donington; he took the family to Suffolk for half-term instead. He notes the comment from G. W. Raven last time about that HH0N operation from Navassa. It seems Navassa is still US territory so the Haitian prefix was a try-on; and if the Americans were to cede Navassa it would disappear as a country for DXCC anyway, by not being the requisite distance from Haiti. So — you can't win!

F. C. D. Barnes (Cardiff) has been kept away from SWL activities by decorating and gardening, and by the fact of having just got hold of an HQ-180 receiver that needs some work doing to it; but having used one in good condition, there is the thrill of anticipation over pleasures to come.

M. N. W. Thornton (Romford) has been kept away from his shack by holidays and the rest, not to mention a first grandchild to fuss over. However, Michael reckons to be back in the hunt by the time this comes to be read.

A starter list comes to hand from *N. T. P. Lewis (Swansea)*; some 227 prefixes sorted out by an R-1000, plus ATU and end-fed wire aerial.

Another first entry comes in from *K. Cooke (Cardiff)* claiming 263, but with no details on the gear used.

Yet another new one is entered by *T. Kirby (Cheltenham)* who has a Sony ICF-2001, used either with a wire aerial in the loft, or the built-in aerial; the best reception seems to have been on Ten.

Not too much news, says *B. A. Payne (Leeds)* save that he has now made it to G4MLN — and your scribe can report hearing him round his neck of the woods with a very fine signal.

B. Henderson writes this time from 'digs' in *Ryde, I.o.W.* where he has been moved as a result of reorganisation by his employers. The snag is that although he has got a cottage on the Island, the educational needs of the family result in them and the XYL having to stay in Salisbury for another year at least — not to mention knocking Brian out of the Salisbury RAE class! However, he should have taken the December RAE before you read this, so we have fingers crossed for his success.

J. Singleton (Skelmersdale) sometimes uses his FT-767 from the family canal-boat at weekends, with a three-foot aerial out; this makes him a /M, as the /MM is used for estuary, tidal waters, or dock, or on the open sea. Most of the listening seems to have been on Ten and there is some fair DX to be had when the band is open on Joe's set-up.

B. F. Hughes (Worcester) spent three days at the Donington exhibition, and reckoned it was a good venue. There's dedication and enthusiasm for you!

Our last letter comes from *P. Lincoln (Aldershot)* who whose score we managed to leave off the last HPX ladder. Sorry Peter! However, this time he has better luck, and some 430 prefixes make a good start. On our side, we must thank him for the nice words about this column.

Others

As always, some few just sent in scores, possibly with a very brief covering note. These included *N. Beadsworth, Londonderry; A. Rowland, Bude; N. Askew, Coventry; M. Rodgers, Harwood; Mrs. R. Smith, Nuneaton; G. W. Raven, London SE13; M. Law, Chesterfield; L. Stockwell, Grays.* Thanks to one and all, and keep 'em rolling in, please!

Finale

It just remains now to thank you all very much for your support through 1981, and for your kind Christmas and New Year Greetings. Each one was greatly appreciated.

Deadline now — and it is *January 21st, 1982*, for the March piece, with your closing scores for 1981 if you are on the Annual Ladder, and we will take the first scores for the 1982 HPX Table when you send us your March offering. The address of course is to your J.C., "SWL", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

“BEN” — THE LITTLE TRANSCEIVER FOR TEN, PART I

A SIMPLE, LOW-COST QRP
TRANSCEIVER FOR THE NEW 10.10 to
10.15 MHz BAND. MAKES AN IDEAL
FIRST SUPERHET TRANSCEIVER
PROJECT FOR ANY CONSTRUCTOR

REV. G. C. DOBBS, G3RJV

RUMOUR has it, at the time of writing (and now confirmed — *Ed.*), that the new 10.1 to 10.15 MHz amateur band will be available for use after January 1st, 1982. Rumour also has it that, in line with the ARRL recommendation, this small band will be unavailable to single sideband users and kept free from contests. This adds up to a useful little band, in a convenient part of the radio spectrum, which may prove ideal for low powered amateur radio operation. With this in mind, I set about building a transceiver for the band so that on January 1st, 1982, at 0000z, my eager sweaty hand can be poised over a Morse key to be in there from the first.

Readers who have followed my previous offerings to *Short Wave Magazine* will probably expect that I am to launch out into describing a direct conversion transceiver akin to the S.C.D. or the S.C. Deluxe. Sorry to be unpredictable, but the transceiver about to be described is a superhet with crystal filter and crystal mixing. This approach is not to abandon the “kitchen table technology” approach. Ben is a simple transceiver, using easily and cheaply available parts and can be built without difficulty by the average amateur. No special tools are required and the only essential item of test gear is a multimeter, although a general coverage receiver is useful. The whole of the prototype Ben was built using my stock of components which is the result of careful buying of standard components from radio rallies and other cheap sources.

Fig. 1 shows the block diagram of the transceiver. A quick glance will show it is a typical superhet CW transceiver, with transmit and receive sections running from a common variable frequency oscillator offset by the intermediate frequency. One of the problems of building a superhet transceiver cheaply is the cost of IF filtering. I have a splendid little 20m. portable transceiver which uses a 9 MHz IF but there lurking in the middle of it is a 500

Hz bandwidth 9 MHz crystal filter; the receiver sounds nice, but so it should with a £25 filter. Ben uses the familiar old, and sadly sometimes forgotten, amateur technique of taking something that is cheaply available and pressing it into service. The IF filter and the associated crystals for the BFO and the transmit mixer oscillator are likely to be the most expensive items, so that the starting point for Ben was to look for a cheap alternative.

True amateurs prick up their ears when they hear of anything which is becoming commonly and cheaply available for their possible use. Hence in recent years some amateur comment has been around about the various crystals used in computer and television applications which are cheaply and readily available. The commonest and the cheapest seem to be the 4433 kHz ones available new and surplus as European TV colour burst circuit crystals. Don't ask me what they do — I steadfastly refuse to understand anything about the circuitry of television sets, so that when people approach me saying “You know about radio and things . . . can you have a look at my television?”, I can look them honestly in the eye and say I don't know anything about it. I rent my set! But back to Ben. . . .

The transceiver makes use of these crystals for a simple crystal filter, the BFO and the transmit mixer oscillator. They are available from a wide variety of sources, so check carefully, £1 each would be a high price to pay. At a recent rally I saw a large box of surplus TV PCBs with one on each at 20p. Although I already had quite a few of the crystals I bought a board because some had them in the small HC25u mounting; the most commonly available ones are in HC6U mountings.

The Receiver

This first part of the description of Ben contains the circuitry for the receiver. In any transceiver the receiver is the most difficult part to build. Once the receiver is working, the constructor is “home and dry” because the transmit circuitry is much more simple. One of the problems about Ben is that as the band is not yet available for use at the time of writing it has never been “used in anger”. My simple test bench set up seems to show that it is on a par with the receiver in the little 20m. transceiver mentioned above and I have heard a lot of DX on that receiver. It certainly picks up a lot of teleprinters where the band is going to be! The receiver is a lot more simple to build than might first appear and the results from the prototype were pleasing.

The Circuit

The full circuit of the receiver is shown in Fig. 2. At first glance the less experienced constructor might think that there is a lot of it. However the whole receiver is built up in sub-board sections, and each board can be built and tested in its own right and the constructor who is capable of building simple circuits like the S.C.D. series should find Ben no problem. In fact it represents a good circuit for those perhaps considering a first attempt at superhet construction. Let us follow the circuit through the various boards from the aerial to the audio output.

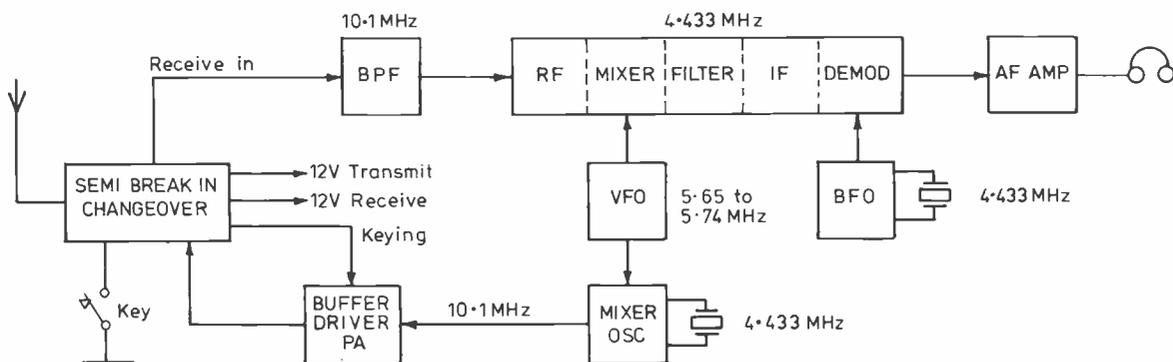


Fig. 1 “BEN” TRANSCEIVER BLOCK DIAGRAM

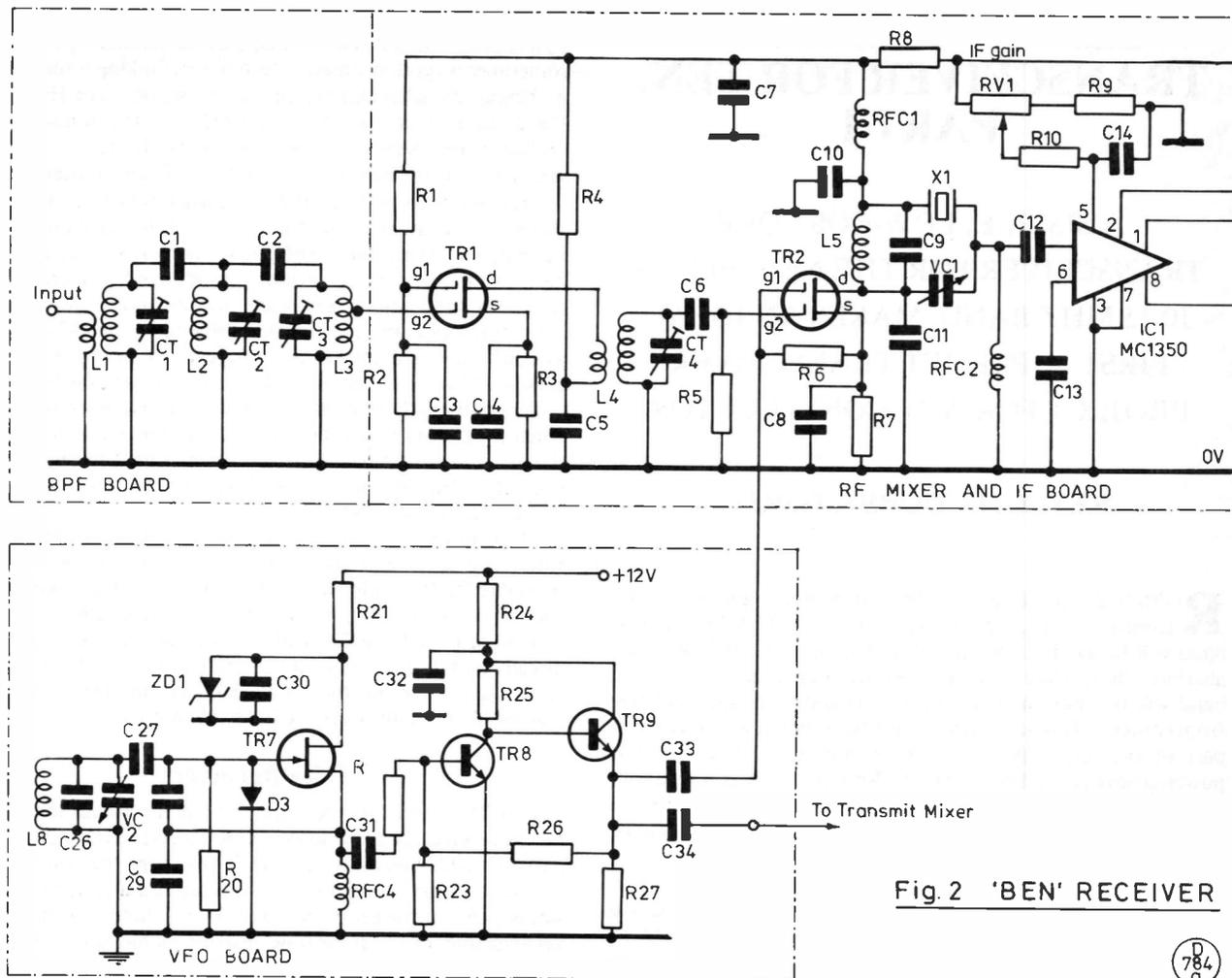


Fig. 2 'BEN' RECEIVER

Table of Values
Fig. 2

R1, R5 = 150K	C18 = 2 μ F, 10v. tant
R2, R13 = 22K	C19 = 47 μ F, 6.3v. tant
R3 = 330R	C20, C22 = 4 μ F, 10v. tant
R4, R17, R25 = 1K	C26 = 61 pF poly
R6, R20 = 100K	C27 = 450 pF poly
R7, R15 = 2.7K	C28, C29 = 680 pF poly
R8 = 82R	CT1 to CT4 = 3-6 pF, Mullard
R9 = 5.6K	CT5 = 80 pF trimmer
R10, R23 = 3.3K	VC1 = 10pF airspaced trimmer
R10a = 150R	VC2 = 10 pF airspaced variable
R11, R22 = 10K	RV1 = 10K lin
R12 = 2.2K	RV2 = 5K log
R14 = 1M	RV3 = 500R preset
R16 = 82K	RFC1 to FRC3 = 1 mH, see text
R18 = 47K	RFC4 = 8 turns on ferrite bead
R19, R21 = 100R	X1, X2 = 4.433 MHz crystal
R24 = 56R	TR1, TR2 = 40673, see text
R26 = 27K	TR3, TR5 = BC318
R27 = 470R	TR4 = BC321
C1, C2 = 6.8 pF	TR6, TR7 = 2N3819
C3, C4, C7, C15a, C17,	TR8, TR9 = BC108
C24, C30, C32 = 0.1 μ F	IC1 = MC1350P
C5, C8, C13, C14, C16, C21,	D1, D2, D3 = 1N914
C25, C31, C33, C34 = 0.01 μ F	ZD1 = 9.1v. zener
C9, C15, C23 = 400 pF	
C10, C11, C12 = 100 pF	

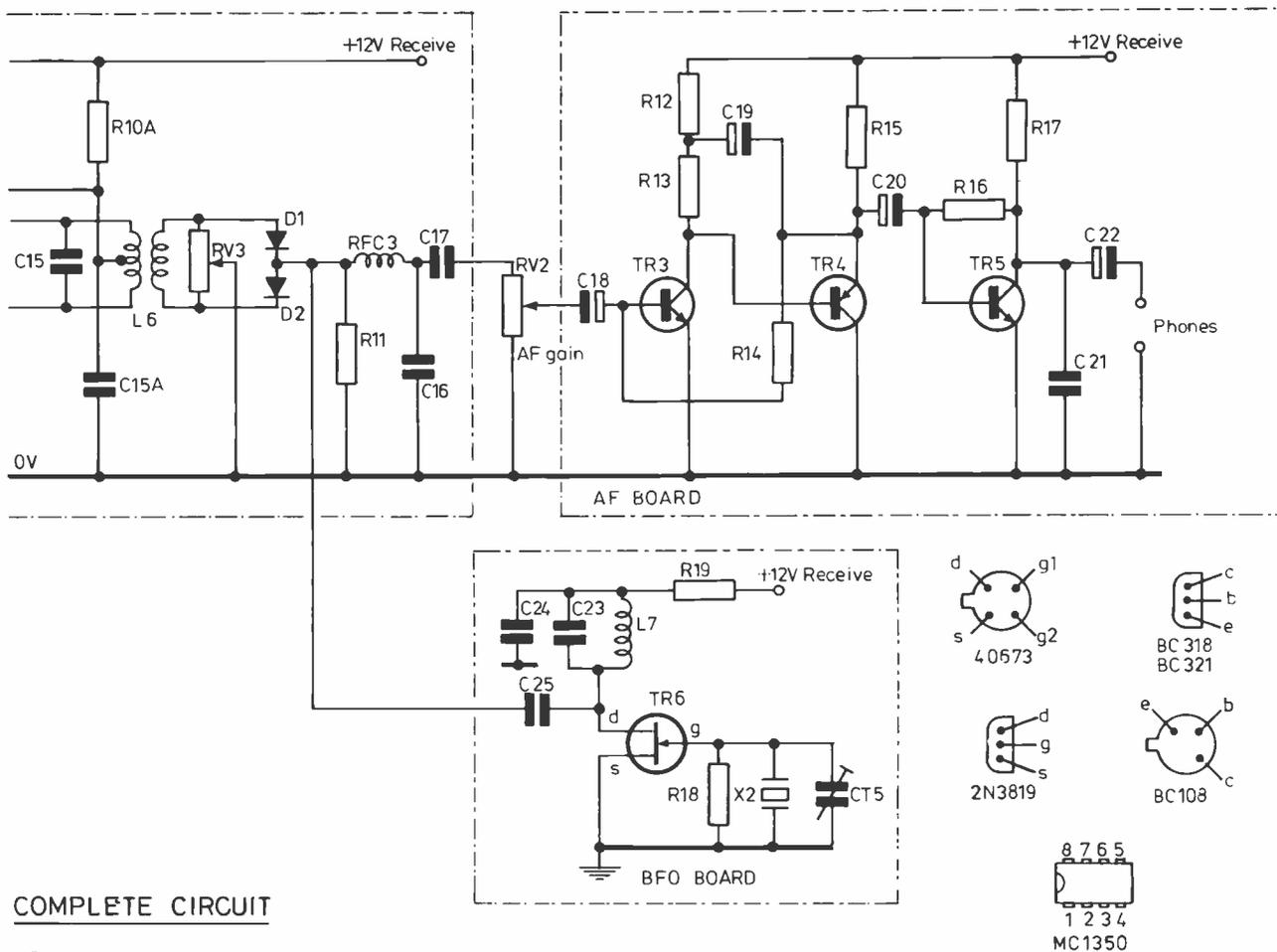
Coil winding data: L1, L4 = 25t 30 s.w.g. (primary 4t); L2, L5, L7, L8 = 25t 30 s.w.g.; L3 = 25t 30 s.w.g. (tap at 17t); L6 = 25t 30 s.w.g. centre tapped (secondary 6t: 3t either side of c/t on main winding). Note: All coils are wound on 1/8" dia. formers with slugs in screened cans.

The first board is the band pass filter board. This is merely three tuned circuits at the aerial input frequency loosely top coupled by the two capacitors C1 and C2. Three stages of input tuning may seem a luxury in a simple receiver, but poorly tuning the front-end of a receiver is, in my experience, a corner not to cut. The coils are very simple to wind on inexpensive formers. The input coil L1 has a small input winding to match the 50 ohms from the aerial and L3 has a tapped output to match it into the gate of the dual gate MOSFET RF stage. The three trimmers are used to set the coils on frequency in the centre of the band, the 50 kHz of the band can be covered without manual front-end tuning.

The RF/Mixer/IF board forms the heart of the receiver and is the largest board. TR1 is a conventional dual gate MOSFET RF amplifier. A gain control could have been added to this stage but was thought unnecessary as an IF gain control is used in a later stage; TR2 is a simple dual gate MOSFET Mixer stage. The input from the RF stage is fed into the gate 2 and the variable frequency oscillator is fed into gate 1; the VFO operates 4.433 MHz below the input frequency and the signal difference is tuned out at the drain of TR2 with L5 and C9. Both TR1 and TR2 are named as the 40673, but in the prototype the cheap equivalent of this device sold by J. Birkett of Lincoln was used. I don't know how these compare in use with a more expensive 40673 because these cheap versions are all I ever use.

The VFO is a familiar circuit. Like all good VFOs it is an old and faithful friend. I had problems with VFOs until I used this circuit . . . sounds like a television commercial for a patent medicine, but it does sum up my reasons for repeating this circuit. It is the Hachett JFET Sieler oscillator beloved of writers in America, G3RJV and a lot of constructors in the G-QRP Club. A full description of it was given in "The S.C. Deluxe" in *Short Wave Magazine*, May 1981. All that needs to be said is build it like





COMPLETE CIRCUIT



a tank and it will work without problems. The actual coverage required for the full band is 5.667 MHz to 5.717 MHz.

The filter and IF stage is the section of Ben which contains the most compromises, but the final circuit is simple and seems to work surprisingly well. The circuit shows that a single crystal is used for the filter. The immediate question must be . . . if these crystals are so cheap, why not use several of them for a better filter? Ladder filters, back ladder filters, series filters and so on were all considered and some were tried. But whenever more than one crystal is used in a homemade filter the selection of suitable crystals with appropriate relationships to the centre frequency requires test equipment of a standard that many amateurs do not own and a good supply of spare crystals for the selection process.

The filter used in Ben, like most of my circuits is a mixture of plagiarism and experimentation. What has emerged is a cross between the old HRO crystal filter and the filter used by Doug DeMaw, W1FB, in his "Mini-Misers Dream Receiver", *QST*, September 1976. I well recall the crystal filter in my old HRO with its single crystal and phasing control, and the circuitry around X1 and VC1 is very similar. A crystal offers low impedance at its series resonant frequency, a very high impedance at its parallel resonant frequency and quite a high impedance at all other frequencies: this is the stuff of crystal filters. This simple filter cashes in directly on these effects. When the series resonant frequency of X1 is that of the incoming frequency it forms a sharp acceptor circuit. The phasing control, which balances out mounting and circuit capacitances governs the parallel resonant frequency. I have no means of accurately checking performance of a filter, except for a pair of ears, but this type of filter can have a bandwidth of 1 kHz at the nose, and the rejection notch, which can be moved through the passband with VC1, can be some 40dB.

What that really means is . . . fiddle about with it and it works very well for what the circuit contains, but more of that when the construction is discussed.

The IF amplifier does follow the DeMaw circuit, which is the basic Motorola application circuit for the MC1350P, but using AGC input as a manual gain control line. (The reason for using a 1350 IC for this stage is that *J. Birkett* has been selling them for 50p each.) It proves to be a useful little device able to offer up to 40dB of gain with little noise. RV1 provides a manual IF gain control: as the slider is moved towards the 12 volt line the gain of the 1350 decreases. This is because the AGC pin of the IC is being used, so when wiring RV1 remember that R9 is at the maximum end of the IF gain control. The output of the IF amplifier is tuned by L6 and C15 and the secondary winding of L6 couples into a simple two-diode demodulation mixer circuit, formed by RV3, D1 and D2. R11 provides a load and RFC3 and C16 filter out the RF component of the signal.

Remember tuned anode, tuned grid, oscillators? Well, the BFO circuit is the FET equivalent. X2 is another 4.433 crystal and a trimmer, CT5, of quite high value serves to pull X2 to give the required beat note.

The audio stages, TR3, TR4 and TR5 follow another tried and tested circuit. This in fact is the audio amplifier used in the *S.C. Deluxe* (*Short Wave Magazine*, July 1981, which gives a full description of the circuit). TR3 and TR4 are a complementary pair of low noise transistors and TR5 is the same type as TR3. The line-up of BC318/BC321/BC318 works extremely well in this circuit, but there are many other similar transistors which would serve the purpose. The circuit gives more than adequate gain and will match into headphones of any impedance over about 80 ohms. There are many surplus headphones available with impedances in the hundreds of ohms and these work very well

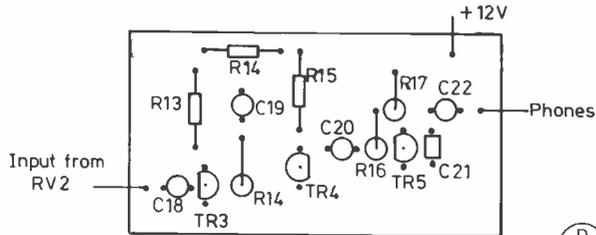


Fig. 3 AF BOARD LAYOUT (actual size).

D 785

with this circuit; I use a surplus pair of language lab. type headphones.

Construction

So much for the circuit, what about the construction? Although I consider myself to be quite an experienced constructor I still build all my equipment in small sections, each capable of individual testing. Building a large circuit board only to find that it does not work can be very frustrating, so for peace of mind, the little-bit-at-a-time method of construction is better. With receivers, begin at the back and work to the front and with transmitters begin at the front and work to the back. So with the Ben receiver I began by building the audio amplifier.

Ben was built on homemade printed circuit boards. Many amateurs new to construction flinch at the thought of making printed circuit boards. In fact once the first few boards have been made it becomes second nature to mark out and etch PCBs. I use cheap offcuts of fibreglass copper-clad board and mark them out with normal spirit felt pens; I rarely buy the special, and expensive printed circuit board pens. It is quite possible to build up all the boards in Ben on perforated circuit board: I refer to the 0.1" matrix boards, like *Veroboard* but without the copper tracks. I would not advise *Veroboard* with copper strips for RF circuit boards, the unused copper strips seem to be asking for trouble. Some experienced *Veroboard* users do use the board for high frequency work and cut the tracks short, using spare unused track as an earth mat, but this seems harder work than etching PCBs.

Fig. 3 shows the layout of the audio amplifier board. My board is quite small, but constructors can adapt the same layout with wider spacing. The audio amplifier uses tantalum bead capacitors which helps to give a neat compact layout. These are expensive, unless obtained from a cheap source, and electrolytics will serve just as well although the layout will have to be larger. Take care when mounting TR4, not only is it a *pn*p transistor, but it is on the board upside down. When the wiring is completed, check it over and apply 12 volts and some headphones; a good, well smoothed supply is important for the 12 volt source. A high gain amplifier like the one in this circuit is very prone to amplifying hum on the power line: an input can be applied to the capacitor C18, a finger on a screwdriver blade will do, and the resultant output should be heard in the phones.

The RF/Mixer/IF board (Fig. 4) appears to almost break the rule about building "a bit at a time" as it is quite a chunk of circuitry. However the stages were built one at a time, beginning from the output. The coils L4, L5 and L6 are wound on surplus 3/16" diameter cores with slugs each in their own small screened can. These are readily available as surplus items from a variety of sources including *J. Birkett*. The coils are mounted vertically on a plastic base with either 5 or 6 pins. Stiff wires can be soldered onto these pins to run parallel with the former and the ends of the windings can be soldered neatly onto these vertical wires. The full coil winding information is given in the coil winding table. L6, the first coil to be mounted on the board, is probably the most difficult to wind. It consists of a single winding of 25 turns with a centre tap. Half way through making this winding pull out about 1 1/2" of wire, twist the loop, scrape off the enamel and solder the bare wire and then complete the winding. The secondary winding consists of 6 turns wound over the centre of the first winding; the 6 turns are arranged with three each side of the tapping point.

The first section of the board to build is the circuitry from RFC2 to the output C17. The two RF chokes have a value of about 1mH. Suitable chokes can be bought, the ones in the prototype were home-wound on some unknown ferrite toroid formers. These were bought as surplus items and are about 1/2" outer diameter and painted red. About 25 turns of thin gauge copper wire wound on these formers seems to give a suitable inductance for all three RF chokes on this board. (With the exception of RFC1, it might also be possible to make do with the old dodge of winding as many turns as possible onto a ferrite bead to make inexpensive chokes.) The circuit construction follows conventional lines, but notice that D1 and D2 are mounted vertically from the outer ends of the preset RV3. RV3 is a horizontal PCB preset with the tag to the slider bent parallel to the track, mounted vertically, upside down! When this amount of wiring has been completed, a simple test can be applied by connecting the output *via* RV2 to the audio board. Listen to the amplifier alone, then apply power to the IF stage and an increase in noise should be noticed. The noise should not be great, but will increase and decrease with the operation of RV1.

Before the rest of the RF/Mixer/IF board is completed, it is a good idea to build the BFO board; the layout for this board is shown in Fig. 5. The circuit is simple to build and should give no problems, a good idea is to earth the metal can of the crystal X2, with a soldered lead to reduce stray radiation. Note that C23 is mounted under the circuit board directly across the coil L7, this applies to all the capacitors used to tune windings in this receiver. In the prototype receiver small polystyrene capacitors were used for C9, 10, 11, 15 and 23 to enable them to fit under the board, but silver mica types are also suitable. The BFO can be tested by listening for its signal on a receiver which tunes 4.433 MHz or, if you are lucky enough to have one, it can be checked on a frequency counter. CT5 should give a little over 1 kHz of shift, enough to produce a beat note in the 4.433 MHz IF. If a signal generator is available it can be used to test the IF stage and BFO by injecting a

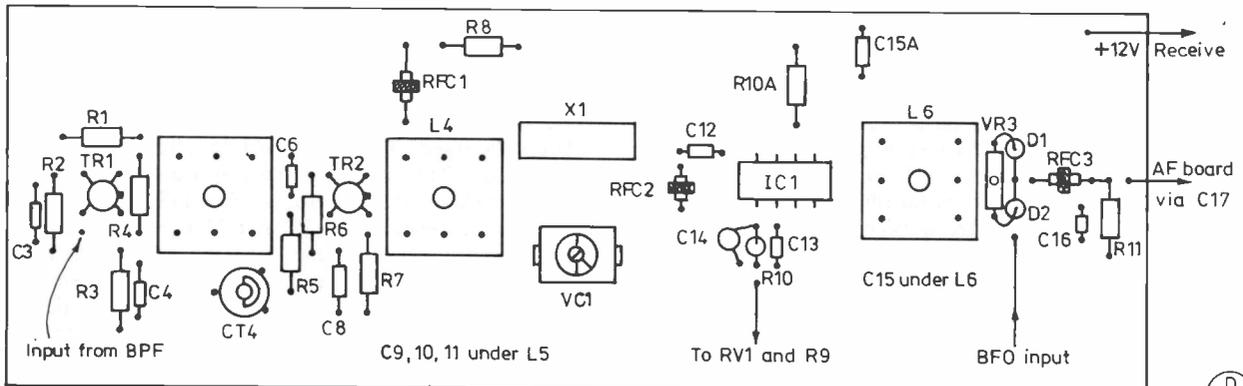


Fig. 4 RF, MIXER AND IF BOARD (actual size).

D 786

CLUBS ROUNDUP

By "Club Secretary"

DESPITE deletions for lack of updates this time, we still have plenty to mention. Before we dive in, may we ask readers to note our comments in the MCC report on p. 609, and try and organise debate on the question with a consensus view being sent to your scribe, who will collate all views received before passing them to the Contest Committee.

The Clubs, In Brief

Acton, Brentford & Chiswick have the AGM on January 19, 1982, at Chiswick Town Hall, High Road, Chiswick.

A.R.M.S. caters for the keen /M operator or SWL. The details can be obtained from the Hon. Sec.—see Panel.

At **Ashford** they are at the top of Hart Hill, near Charing in Kent, every Tuesday evening; no formal programme but lots going on.

Aylesbury Vale have their AGM on January 26 at Elmhurst Youth Centre, Fairfax Crescent, Aylesbury. Latest news from the Hon. Sec.—see Panel.

On to **Barking** who have Mondays to Thursdays at Westbury Recreation Centre, Westbury School, Ripple Road, Barking, Essex, the 'main' meetings being normally on Thursdays. High spot is January 28, for the AGM.

Barry College of Further Education have their Hq in Weycock Cross Annexe, next door to the zoo, every Thursday; talks and other activities are arranged as and when possible.

The locals foregather at "The Angel" in **Bolsover**; it seems to be a weekly effort with something special fixed up once or twice a month. For the rest, quiz the Hon. Sec.—see Panel.

Borders Hon. Sec. found himself writing a quick alteration so that we could advise that they are no longer to be found at the usual place, and that a search is going on for a new Hq. Latest details on the state of play from the Hon. Sec.—see Panel.

At **Bournemouth** there is a new Hon. Sec.—see Panel—and a note of a new Hq; the first and third Fridays at Kinson Community Centre, Pelhams, Millhams Road, Kinson, Bournemouth.

The first and third Mondays are down for **Braintree**, and the venue is Braintree Community Centre, Victoria Road, next to the bus station.

Brighton have an Amateur TV Night on January 13, and what they call an 'RSGB Night' at which we gather they will have a speaker from Hq. They meet at 47 Cromwell Road, Hove, Sussex.

It seems quite a while since we last heard of **Bristol City RSGB** group; they are based on the Queens Building, Bristol University, and have their AGM on January 25.

At the recent AGM of the **B.A.R.T.G.** a new Hon. Sec. was elected, and his details appear in the Panel. This club is the one for those readers interested in radio teletype activities.

Now **Cambridge**, where the Hq is at the Visual Aids Room, Coleridge Community College, Radegund Road. They have a regular Friday evening session, and are always on the look-out for new members.

Chelmsford's Hq is Marconi College, Arbour Lane, where they foregather on the first Tuesday of each month. For January they have a film show—but we wonder about the December effort entitled "Junk Sale or Chinese Take-away"!

The **Cheltenham** crew will be looking at Dud Charman's, G6CJ, famous Aerial Circus video tape on January 7, and this will no doubt be the main topic on 19th's natter night. The meeting-place is the Old Bakery, Chester Walk, Clarence Street.

The place for **Chesham** is the Whitehill Centre on the second

Wednesday in each month; January 20 is a chat on Raynet by G4BSM.

The Spitfire Social Club, Tangmere, is now the Hq for the **Chichester** gang, where they have the first and third Mondays booked.

Every Friday evening the **Clifton** club foregathers at the New Cross Inn, which lies at the junction of New Cross Road and Clifton Rise, London; January 15 is set apart for a contest discussion.

Always looking for new members are the **Cheshunt** group, according to their chairman; they are to be found on any Wednesday at Church Rooms, Church Lane, Cheshunt. This is just north of the Berni Inn on the A1170 road from Broxbourne.

Next we head for **Chiltern** where January 27 is down for the AGM; this is at the John Hawkins' furniture works, Victoria Street, High Wycombe, off the main Oxford Road.

The **Colchester** Hq is Colchester Institute, Sheepen Road. January 7 is for G3PED to talk about the electronic keyboard; and on January 21, G3WRT will be talking about the local repeater, GB3CE.

The **Conwy Valley** club revival continues apace with new members showing at almost every meeting; find them on the second Thursday of each month at Green Lawns Hotel, Bay View Road, Colwyn Bay. We have it that a programme is fast being pulled together at the time of writing, and it will doubtless be completed by the time this reaches you.

Deadlines for "Clubs" for the next three months—

February issue—December 31st

March issue—January 29th

April issue—February 26th

May issue—March 26th

Please be sure to note these dates!

Cornish have a remarkable record; bearing in mind that they have to be to a large degree self-supporting in the programme direction, they seem to have been pulling full capacity houses for as long as the writer can recall, with 60 attendances the norm. Find them at the SWEB Club Room, Pool, Cambourne; and for this month the date is to be January 7, when G3WKP will be talking about "Beetling around Africa."

On to **Crawley** and the United Reformed Church Hall at Ifield. January 13 is informal—which is a visit to a member's home—and January 27 for the AGM.

There is a slight change to be noted for **Cray Valley**; January 7 is a natter night, and on 28th G3FWI will be talking about television outside broadcasts, at Christchurch Centre, High Street, Eltham.

We now head up to **Derby** and 119 Green Lane, where the club has the top floor complete, and use it on Wednesdays. We see January 6 is a junk sale, with films on 13th. A visit to British Midland Airways at E. Midlands Airport is down for 20th and they have a night on the air on 27th.

The second Tuesday in each month is the date for the **Edenbridge** members to head for the Women's Institute Hall, Station Road, where they are booked into the Conference Room.

The second and fourth Thursdays, at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, is booked by the **Edgware** group. January 14 is the AGM and there is an informal on 28th.

Next we have the **Ex-G Club**; as its name implies it is for those of British nationality or naturalisation, who are domiciled abroad. The details may be obtained from the U.K. Hon. Sec. at the address in the Panel.

We must now head for **Exmoor** (January too—Brrr!) and in particular to Loughrigg, East Street, South Milton, every

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- AYLESBURY VALE: M. J. Marsden, G8BQH, Hunters Moon, Buckingham Road, Hardwick, Aylesbury, Bucks. (0296 64 783)
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- HAVERING: A. Negus, G8DQJ, 17 Coutenay Gardens, Upminster, Essex RM14 1DH. (Upminster 24059)
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- SOUTHGATAE: Mrs. V. Austin, G4MGD, 89 Caseville Park Road, Winchmore Hill, London N21. (01-360 5832)
- STEVENAGE: S. Clarke, G8LYX, 126 Putteridge Road, Stopsley, Luton. Beds. LU2 8HQ.
- SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR. (01-642 9871)
- THAMES VALLEY: M. C. Bell, G8RLB, 6 Park Road, Hampton Hill, Middx. TW12 1HD. (01-977 6122)
- TORBAY: H. Davies, G4DZH, 18 Bowland Close, Paignton, Devon TQ4 7RT. (Paignton 523063)
- TYNESIDE: J. Dingwall, G4ILW, c/o Tyneside A.R.S., The Community Centre, Vine Street, Wallsend, Tyne & Wear.
- UNIVERSITY OF KENT (Canterbury): P. Cockerell, G6CSZ, Keynes College, U.K.C., CT2 7NZ.
- VALE OF THE WHITE HORSE: I. White, G3SEK, 83 Portway, Didcot, Oxon. OX11 0BA.
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- WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent TN14 5AF. (0732-56708)
- WIMBLEDON: E. G. Allen, G3DRN, 30 Bodnant Gardens, Wimbledon. (01-947 3914)
- WIRRAL: G. O'Keefe-Wilson, G4MIA, 20 South Drive, Upton, Wirral. (051-677 1531)
- WORCESTER: D. Pritt, G4TZE, 15 Paxhill Lane, Twynning, Nr. Tewkesbury, Glos.
- YEovil: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset. (Yeovil 24956)
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

Thursday evening, and we have it that they have various activities planned.

Fareham are based on Portchester Community Centre, Room 12, each week. January 6 is down for G4ITF to talk about logic, and on 13th there is a natter night. G4ITF and G8VOI combine forces for a session on RTTY on 20th, and January 27 is the AGM.

The **Farnborough** group are to be found at the Railway Enthusiasts Club in Hawley Lane on the second and fourth Wednesdays; January 13 is a talk by *Messrs. Wood & Douglas*, and on 27th G3ZUM will talk about his prize-winning automatic ATU.

We go north of the border now, to **Glenrothes**, but sad to say

the letter doesn't give us any more details; so we refer you to the Hon. Sec. for the information.

Now **Guildford** where they are found on the second and fourth Friday evenings at the Model Engineer's Hq in Stoke Park. Details of the rest from the Hon. Sec.—see Panel.

January at **Harrow** goes like this: no meeting on 1st, and on 8th a talk by British Telecom on their Radio Phone and Radiopagers. There follows a film show on January 22, with informals on January 15 and 29. As for the venue, look for the Roxeth Room, Harrow Arts Centre, High Road, Harrow Weald.

Let's now go to **Hastings** where the third Wednesday of each month is the formal at West Hill Community Centre, and on every Friday evening they have a chat night at 479 Bexhill Road, while

on Monday evenings there is a computer group at the same place.

At **Havering** the venue is Fairkytes Arts Centre, Billet Lane, Hornchurch; January 6 is the AGM, and they are there every Wednesday evening in addition.

It seems the Hon. Sec. at **Hereford** was struck by lightning (or rather his house was) which made the shack look as though a grenade had gone off in it. Nonetheless, he still got the newsletter out, and we see they are still at County Control, Civil Defence Hq, Gaol Street, Hereford, on the first and third Friday of the month.

At **Horndean**, the Merchiston Hall, Horndean is the focus for the local club, every second Thursday in the month.

A change of Hq is noted by the **Hull** Hon. Sec., to West Park Recreation Centre, Walton Street, Hull; more details from the Hon. Sec.—see Panel.

Next stop **Ipswich** at the “Rose & Crown”, on January 12, for an “Illustrated History of Suffolk” by Phillip Willis; and on 27th, there will be an explanation of the RAE by G8XYP. There is often Morse practice on the other Wednesdays; and the pub is at 77 Norwich Road, Ipswich.

Over to EI now, and **IRTS**; this is the EI equivalent of RSGB and should be able to give you all the gen if you are interested in amateur radio in any part of Eire. The Hon. Sec. is at the address in the Panel.

Next we have the **Isle of Wight**; look for the Sloop Inn, and then nearby you will find Unity Hall, Wooton Bridge; Tuesday evenings are for operating, and Friday evenings for a natter.

Into the Black Country now, and **Kidderminster** where we are given an update of the Hon. Sec.’s address—see Panel. As we have no other details we must refer you to him.

At **Kilmarnock & Loudoun** they are now meeting at the Broomhill Hotel, London Road, Kilmarnock on the second Tuesday in the month—more details from the Hon. Sec. see Panel.

Malvern Hills have their base at the “Red Lion”, Great Malvern on the second Tuesday of each month. Again, more from the Hon. Sec.—see Panel.

January 7, at the Royal Ship Hotel, Dolgellau, is the date for the **Meirion** constructor’s contest.

Melton Mowbray on January 15 will have a talk on VHF DX by G8RBY, at St. John’s Ambulance Hall, Asfordby Hill, Melton Mowbray.

A brief note from **Mexborough** says that they are still at Harrop Hall, Dolcliff Road, Mexborough on every Friday evening, for Morse, RAE, talks, films and whatever.

January 14 and 28 are the dates for **Mid-Sussex**; on the former we have no details but the latter is the AGM. The venue is Marle Place Further Education Centre, Leylands Road, Burgess Hill.

The **Midland** Hq nowadays is at 294A Broad Street, Birmingham, and we understand they will be there on January 19 for RSGB films.

Now we go to GI, where **Mid-Ulster** is to be found on the first Sunday in each month *chez* GI4BAC in Banbridge, Co. Down, the start being set for 3 p.m. The programme mentioned for the first part of 1982 seems a very good effort.

A change of evening falls now to be noted; the **Mid-Warwickshire** gang are now in session on the first and third Tuesdays at 61 Emscote Road, Warwick, starting at 8 p.m.

Pontefract look forward to their Component Fair on March 14 at Hq, but meanwhile they have January 7 for the AGM, and 21st for a junk sale. Find them on the top floor of Carleton Community Centre.

R.A.I.B.C. look after the interests of the blind and invalid radio amateurs and SWLs; and of course they could always do with some supporters and representatives—get the details from the Hon. Sec.—see Panel.

The **St. Helens** group has a place at the Conservative Club, Boundary Road, on Thursdays. We don’t have the current data, for which contact the Hon. Sec.—see Panel.

At **Southampton** it is again a weekly meeting, this time on Wednesdays, at Toc H, Little Oak Road, Bassett, Southampton.

Once in each month they have a lecture, with the remaining dates informal.

A change of Hon. Sec. is noted for **South Birmingham**, but they are still meeting at Hampstead House, Fairfax Road, West Heath, Birmingham 31, and on January 6 have G4EQI talking about the workings of the RSGB Bureau. The club is open every Thursday and Friday as well.

The first Monday in every month sees the **Southdown** members heading for the Chaseley Home for Disabled Ex-Servicemen, Southcliff, Eastbourne. We don’t know what’s on for January, as the previous date was the AGM—but they have something lined up every month.

Now **Stevenage**; they have a Computer Evening on January 7, and a talk by G3WTV on the QSL Bureau on 21st. The venue is the Staff Canteen, British Aerospace Dynamics, Six Hills Way, Stevenage.

David Evans of RSGB is to show his versatility on January 4 at **Surrey**, by talking (a) on RSGB, and (b) on GASFETS. The club also have an informal on January 18, and both are slated for *T.S. Terra Nova*, 34 The Waldrons, South Croydon.

Thames Valley have their base at Dittons Library, Watts Road, Thames Ditton, where January 5 will be taken by G3FTR talking about the time he spent in Russia.

Torbay meet monthly on the last Saturday, and every Friday as well, at Bath Lane, rear of 94 Belgrave Road, Torquay.

The Community Centre, Vine Street, Wallsend, is home to the **Tyneside** club, where they may be found every Monday evening, with a varied menu of activities.

University of Kent, Canterbury get together on Wednesdays in Eliot Seminar Room 4, and they are often heard on two metres where S15 is a favoured chat channel. More details from the Hon. Sec.—see Panel.

Next we head for the **Vale of the White Horse**, where the card-index says the first Tuesday in every month at the “White Hart” in Harwell village. Firstly in the bar, with a shift upstairs to listen to the chairman’s talk on aeriels.

The **Wakefield** group have alternate Tuesdays; this says January 12 for a talk on crime prevention, and 26th for a junk sale. The Hq is at Holmfield House, Denby Dale Road, Wakefield.

West Kent are to be found at the Adult Education Centre, Monson Road, January 8 and 22. The first date is for a talk on “System X and Beyond” by G8CAA, followed on 22nd by a junk sale. Informals are taken on the Tuesday of the week following the main meetings, at the Drill Hall, Victoria Road; both venues are in Tunbridge Wells.

Nice to hear from **Wimbledon** again; they now foregather at the St. Johns Ambulance Hall, Kingston Road, Wimbledon. The dates are the second and last Fridays—more details from the Hon. Sec.—see Panel.

The new Hq of the **Wirral** crowd is Minto House School, Birkenhead Road, Hoylake, on the first and third Wednesdays each month.

It is nice to hear that a club is increasing its attendances, the more so when one can recall it having been in the doldrums; **Worcester** can now boast that late-comers may have to stand—on the first Monday of each month at the Old Pheasant, New Street, Worcester.

The base for the **Yeovil** operations is Building 101 at Houndstone Camp; they have a videotape on January 7, called the Secret Listeners, and on 14 G3MYM will tell how to use JFETs. January 21 lets G3DSS talk about receiver front-ends, and on 28th there is a natter night.

Finally, **York** who are in session every Friday (except the third) in each month, at the United Services Club, 61 Micklegate, York.

Finale

That’s it for another month; all your news and future programmes should be sent to your conductor, at SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts AL6 9EQ. Deadlines for arrival are as shown in the ‘box’.

1981 "MAGAZINE CLUB CONTEST"

THIRTY-FIFTH ANNUAL EVENT

By "Club Secretary"

HOW indeed have times changed over the last ten years or so! Only twelve clubs entered logs this time round, plus a couple of check logs. Clearly a rethink of the whole structure of MCC is required, for which a great deal of feedback from clubs is necessary, before we can run another contest to help fill the club calendar: but we can leave theorising for the moment in favour of reporting.

Those who did enter all had points to make, and in general the contest was as well-liked as of yore. The snag was just the lack of clubs actually taking part. The winners were **Plymouth, G3PRC**, making some 43 QSOs on the first evening and 112 on the second, of which 14 on the first night and 15 on the second were clubs, for a final score of 16344 points. This success makes them first winners of the MCC Cup — and we would like to think not the last. Anyway, congratulations to Plymouth! Whipping-in the locals had something to do with the length of their logs — they had a member with a /M Top Band station who went around all the likely lads and got them on the air to the tune of 18 QSOs they would not otherwise have made. Runners-up (and last year's winners) Tyneside again used their tactic of going to their favourite contest site north of the border to net the extra points from the GM prefix. They also had a super aerial — 918 feet of it, supported on five masts and a handy tree, on a south-facing hillside, and with a maximum height of 55 feet. This put very strong lobes into the SE and the SW, and in the other directions seemed as good as the shorter wire of last year; the ground was made up of three quarter-wave radials plus several good long earth spikes. The logs were kept up to date by the use of a Commodore CBM 4030, which noted the time, said whether the QSO was a 'multiplier' and whether there was a duplicate contact; and at the end of the contest the calculations of scoring and totalling were also done, with the result being a very good log — G4HUX wrote the program for this, as a preliminary to use on other contests in the future. Someone had done their homework in the matter of silencing the RFI from the computer, as their photograph — alas not good enough for reproduction — shows the computer display in the background to the operational station. They made 44 contacts on CW and 103 SSB.

At the other end of the list were Grimsby, who made 13 CW and — oddly enough — twice that number of SSB as G3CNX.

Results — 35th MCC

Place	Club Name & Call	Score
1	Plymouth (G3PRC)	16344
2	Tyneside (GM3ZQM/P)	13992
3	BBC, Pebble Mill (G2BBC)	9119
4	Swansea (GW4IOI)	8570
5	Edgware (G3ASR)	6949.5
6	Pontefract (G3FYQ)	5717
7	Sutton & Cheam 'A' (G2DMR)	5058
8	Sutton & Cheam 'B' (G4HSD, G4CMU/A)	4296
9	Penenden Heath (G4DUT)	3798
10	Acton, Brentford & Chiswick (G4HIO)	2695
11	Silverthorn (G3SRA)	2593
12	Spalding (G4DSP)	2556
13	Grimsby (G3CNX)	1670

Check logs were sent in by G3ADV and SWL J. Dunnett.



G2BBC operators in MCC 1981. Left to right, G3NKC, G4JGV (CW ops), and SSB ops G3YXM and G4FPH. Their FT-101Z with keyer and Datong FL-1 is on the left, next to the FT-101E.

Gear

Of those who mentioned their equipment, the majority used Yaesu FT-101 series equipment, with some Trio TS-520 series, and one Drake station using a TR4-C plus an SSR-1. We have already noted one of the aerials; G2BBC came on from the Pebble Mill transmitter site, with one end of the aerial at 120 feet and t'other at 70 feet, set out in the form of an end-fed half-wave. At the other end of the scale there was an invigilator using around forty feet of wire, end-fed, 10 feet above ground at the highest and 18 inches at the lowest, fed against a very good ground system, one radial of which was completely under water; he heard most of the goings-on, and in particular noted DJ8WL as 59, and an EA3 who obviously thought he was missing-out on a world-wide contest as a result of hearing Gs swapping numbers at the tail-end of the Phone leg.



MCC 1981 at Pontefract and District A.R.S, G3FYQ. Left to right, SWL Bill Hartley, Reg Greenhough G4KMW (logging), Brian Booth G3SYC (check list), and John Arundel G3HCX on the key.

photo by G4ISU

Conditions

Difficult to tell with any degree of certainty, but we got the impression that the Saturday evening was not exactly helped by the conditions, which perked-up no-end towards the back-end of Sunday's contest-hours. One or two stations noted the noise level as compared with last year with comments that were, so to say, self-cancelling!

Check Logs

We received two this time, from J. Dunnett (Prestatyn) and G3ADV, who came on to give the gang a point or two; to both these gentlemen our thanks for their time and trouble. SWL Dunnett suffered from time-base hash on both nights; he notes on the CW leg too many long CQs, and several stations not listening long enough to pick up calls to them before returning to the CQ-grinding. As for the SSB leg, Jim noted some confusion resulting from non-use of phonetics and lack of clear statement as to whether a station was or was not a club.

Future

Clearly a change is called for, if MCC is to continue. We want, and *need*, some feedback as to what sort of event could fill the bill

— should it stay on 160m. (which is perhaps the most important question) should it be Phone or CW, or both; if not 160 what band would be preferred, and so on and so forth. We shall keep plugging away for this feedback in the next few months in order to see what the consensus opinion is; and, of course, look into ways of making the dates and details more widely known. We need *your club's* views!

Conclusions

As always, good clean contest operating and no sign of serious deficiencies of signal quality; but there just weren't enough clubs active. Nonetheless, our thanks to those clubs which did participate, and congratulations once again to the winners, Plymouth Radio Club.

A WEEKEND AT SUTTON WINDMILL

THE STORY OF GB2SW

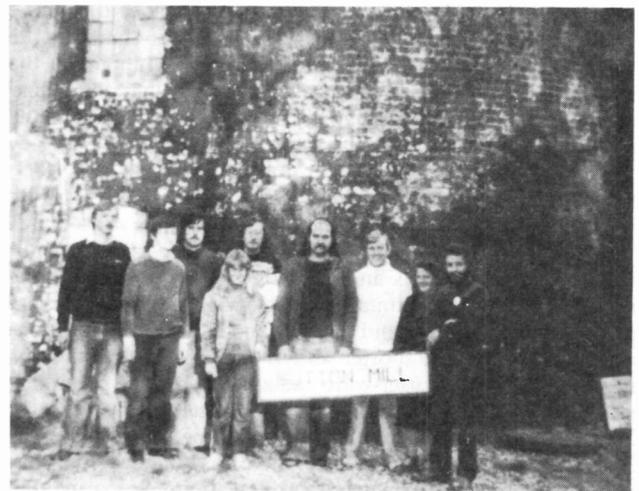
KEITH HAYNES, G3WRO

WHILST on holiday in Norfolk last July, the writer and his family visited Sutton Windmill, near Stalham. The mill was built in 1789, has nine floors, and is mentioned in the *Guinness Book of Records* for being the tallest windmill in England. The mill is in the process of being completely renovated, and the owners Chris and Marian Nunn, together with their daughter Robyn, are hoping that the mill will be completely working by the end of 1983/early 1984.

It was mentioned to the Nunn's that the writer is a radio amateur and that the windmill would be an ideal location for a special activity station for one weekend, which would be good publicity for both amateur radio and the windmill. The offer was readily accepted and it was agreed that the event be organised before the end of September, as then the mill is closed to the public until the Spring. The dates decided on were 12/13th September and arrangements were put under way. The party (all members of the Harlow & District Amateur Radio Society) consisted of Keith Haynes G3WRO, Terry White G8LXB, Terry Maton G4GHU, Alan Martin G4JRO, Tony Haas G4LDY, Les Adams G4KUI, and Mark Cracknell G6ABB. Application was made *via* RSGB to the Home Office for a special callsign and GB2SW (Sutton Windmill) was granted.

Rendezvous point for the beginning of the weekend was the club's headquarters at Mark Hall Barn, First Avenue, Harlow, at 6.30 p.m. on Friday, 11th September. All the gear was piled into respective cars and consisted of a Trio TS-510 for HF, FT-225R for 2 metres, and a separate rig owned by G4LDY for use on 70cm. In addition to these and the usual accessories and aerials etc., it was made very sure that the club's tents were also put aboard as the only other alternative for sleeping would have been the cars! The heavily laden brigade then set off around 7.00 p.m. up the M11/A11 towards Norwich. By about 9.15 p.m. the back of the journey had been broken and all respective mobiles in the convoy (on S23) agreed to find a place for a pint. The windmill was reached by around 10.00 p.m. and after being very warmly received the tents were pitched; everyone was grateful that the weather was dry for this operation!

It was very hard not to rise early the following morning as in this part of Norfolk there seem to be thousands of pigeons with a dawn chorus resembling "AE" in Morse. Perhaps this was a reminder to us that the aerials still had to be fixed up! After



At Sutton Mill in September. Left to right, Mark Cracknell G6ABB, Les Adams G4KUI, Alan Martin G4JRO, Robyn Nunn, Terry Maton G4GHU, Tony Haas G4LDY, Keith Haynes G3WRO, Marian Nunn and Chris Nunn. The picture was taken by the other member of the party, Terry White G8LXB.

breakfast the 2m. beam was fixed to the very top of the mill (unfortunately it couldn't be rotated easily), an 80m. dipole strung out with the two legs sloping to ground either side of the mill, and a long wire — which loaded beautifully on 15 and 20m. Once the public were admitted, the station GB2SW went on the air and it was very apparent that not only were there people far afield taking interest, but many of the locals also took a particular interest, and indeed many visited the mill during the course of the weekend to personally claim their QSL card. Meal breaks were taken on a rota basis and on the Saturday evening a few pints were 'downed' in one of the locals in Stalham. The sleeping arrangements was the same as for Friday except that G3WRO found the back seats in the car more conducive to a good night's sleep than the hard Norfolk soil plus a sleeping bag!

The Sunday proved most successful, with an even larger public attendance than on Saturday and a tremendous amount of interest shown in the station. Most of the local amateurs were expressing their disgust at not having thought of the idea themselves! The QSL cards used for the event were a standard postcard of the windmill with a callsign embossed on the front (every station worked will receive one *via* the RSGB bureaux).

The hospitality the party received during the entire weekend was second to none, and Sutton Windmill is certainly a very worthwhile place to visit. It is open from April until September,

and inside, apart from the interesting features of the mill itself, there are many items of local historical interest on view including old farming implements, woodworking tools etc., and on one whole floor there is a very comprehensive gift and souvenir shop. Warm thanks are indeed due to Chris, Marian and Robyn Nunn for a most enjoyable weekend, with obvious benefits to Sutton Windmill and amateur radio.

Donington Raffle Prizewinners

These were, in first to eighth place: G4JCH, G8JVB, G8YDF, G4DCS, G4EGB, G3SMK, G8CHC, and G4DMX.

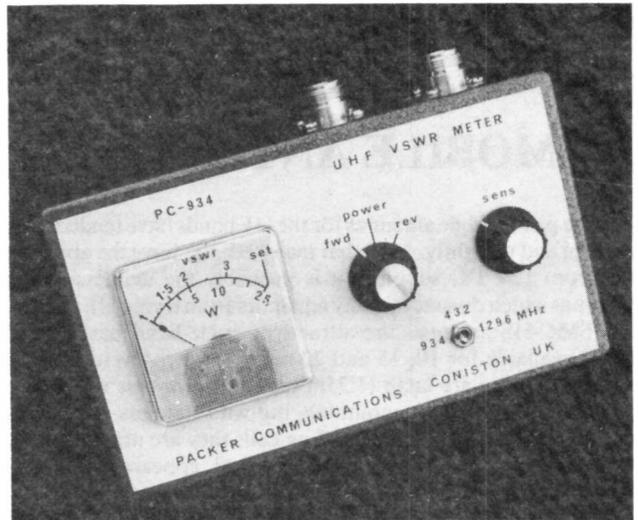
ZX81 Program Correction

In "VHF Contest Scoring with the Sinclair ZX81" (December issue), there are two errors in Table 1 on p. 541. Line 70 has been omitted, which is LET T = C; in line 300 the expression COS(D - B) should appear, *not* COS(C - B).

Please mention "Short Wave Magazine" when contacting Advertisers — it helps you, helps them and helps us.



muTek Limited announce the availability of their new SLNA144s switched, low noise pre-amplifier for the 144 MHz band. The design combines excellent RF performance, including first-class bandpass filtering, with a sophisticated switching control circuit; it is suitable for use with all currently available transceivers. Noise measure is typically 1.2dB, and gain typically 15dB; bandwidth is 144-146 MHz plus/minus 1dB greater than 40dB rejection at 130 and 160 MHz. The unit costs £34.50 including VAT and post/packing. Further information is available from muTek Ltd., Bradworth, Holsworthy, Devon EX22 7TU. (Tel: 0409-24543).



Packer Communications have designed this new UHF VSWR meter specially for the 1296 MHz band, which has a maximum VSWR of 3:1 and a maximum insertion loss of 0.15dB. Price for single band is £39.95, and for multiband £44.45 (including VAT and post/packing). Contact Packer Communications, Old Station, Coniston, Cumbria (09664-678) for full details.



Shown here is the Sommerkamp TS-800, latest in their range of VHF transceivers. The unit covers 140 to 149.9875 MHz, and thus has a wide range of applications. Features of the TS-800 include instant frequency selection, and 600 kHz offset for Simplex or reverse repeater operation; the receiver section incorporates low noise FET's double-conversion and varicap tuning so that the transceiver is peaked automatically for whatever frequency is selected within the 10 MHz range. The basic unit incorporates a tone squelch circuit so that, if required, it can only be activated by another similar equipment. The TS-800 is also designed to operate with the Sommerkamp TS-851 Cityplex Autopatch. Full details may be obtained from the importers, Arrow Electronics Ltd., 7 Coptfold Road, Brentwood, Essex.

In next month's "Short Wave Magazine": a review of the Icom IC-730 all-band mobile transceiver.

EQUIPMENT REVIEW

SMC-HS HF MOBILE ANTENNAS

IN the past, mobile antennas for the HF bands have tended to be large and unsightly. Now that many HF rigs have the ability to run from 12V DC supplies, it is probably the ugliness of the antennas which dissuades many amateurs from trying HF mobile. The SMC-HS antennas are attractive, single-band base-loaded whips available for 10, 15 and 20 metres, which overcome this objection. They are large (1.75m high) and for this reason are unsuitable for magnetic mounting, but with stainless-steel whips and black-and-chrome base loading coils they are not obtrusive. A two-metre 1/8-wave whip of identical appearance is also available.

The antennas are supplied disassembled, with a stout lower whip section, jointing piece, flexible top whip section and the loading coil. No instructions are provided, but assembly is obvious with the *Allen* key supplied. The loading coil fits a readily available SO-239 type mounting, which permits easy removal for band-changing or garaging. By lifting a spring-loaded sleeve on the base, the antenna may be folded back so it is not necessary to remove it for garaging.

Because no instructions were provided, it was assumed that it was not necessary to cut the whips to achieve resonance. However this is not the case, and about 3 inches had to be cut from the 10m. whip in order to achieve a satisfactory SWR. About 1 inch was cut from the 20m. whip to allow the phone part of the band to be covered at 1.7:1 or less. The 15m. whip was not cut. The SWR curves obtained are shown at Fig. 1.

Coverage of the CW portion of 20m. may be obtained by sliding the whip out of the base coil a small amount and re-tightening the *Allen* screws.

Cutting the stainless steel whip was accomplished by filing a notch and then snapping off the excess. While adjusting for resonance, it was found easier to put a piece of stout copper wire in place of the top section. This could then be trimmed a little at a time with pliers, the whip then being cut once to the final correct length.

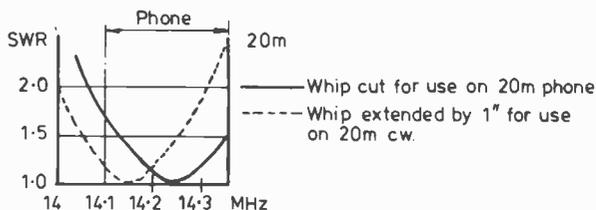
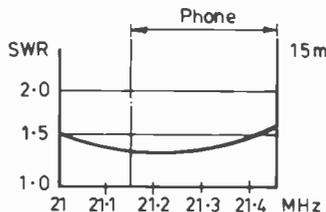
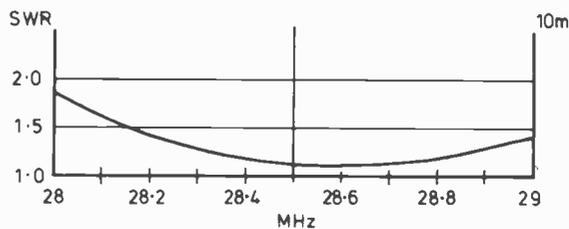


Fig. 1 SWR Curves for SMC-HS 10SE 15SE and 20SE Mobile Antennas

D 769

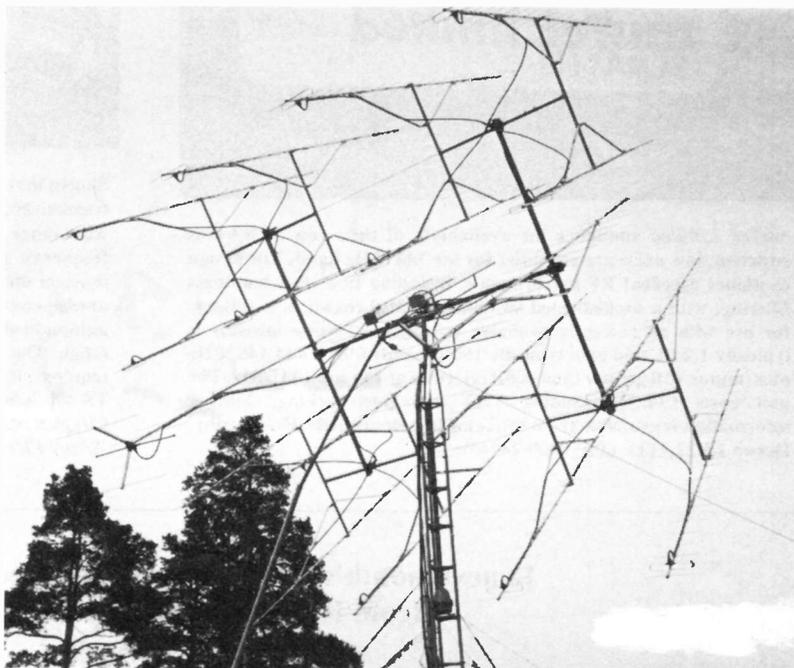
On the air with the writer's FT-7 running about 10 watts, reports have been very gratifying, typically one or two S-points lower than the station being worked. During the summer stations from all over Europe were worked mostly on 20m, including one Italian who said "you are so strong OM I would not have realised you are working from a car!" Best DX is VK at RS56 on 10m.

The reviewer strongly recommends these antennas to anyone contemplating HF mobile operation.

J.V.M., G4ILO

The formidable aerial array of Pertti Mure, OH3TH, a well-known VHF/UHF operator from Tampere in Finland. Closest to the tower are two 27-ele loop Yagis for 23cm., and on the other side of them are two 16-ele Tonna Yagis for 2m. The main array consists of sixteen 21-ele Tonna Yagis for moonbounce work on 70cm.

Photo by OH3MS



“A Word in Edgeways”

Letters to the Editor

The views expressed here are not necessarily those of the Editor, nor should they be taken to represent any particular SHORT WAVE MAGAZINE policy.

Dear Sir — I really must take issue with Justin Cooper (SWL, November 1981), over his statement that there is no reason why anyone today should build a receiver using valves.

Two excellent reasons are (a) you have them to hand and are a bit short of money, and (b) you feel happier using them.

Now whether or not you can build a better receiver using transistors rather than valves is debatable. It depends entirely on what you are personally building, and not the professional state of the art. The main thing is to build something yourself: you will learn a lot and get much pleasure no matter what technique you use.

G. P. Stancey, G3MCK

Dear Sir — As a G6 of only nine months standing, I read with dismay some of the letters in “A Word in Edgeways”, and I suggest that the RAE should embrace aspects of amateur radio which would ensure that a new operator on the air understands exactly what he/she is doing.

The various suggestions put forward for novice bands by ‘superior’ gentlemen, and the antics of irresponsible people to annoy these folk, will do nothing but inflame a difficult situation; nor will the witch-hunting of CB-ers help either. Character and temperament are the real problem, together with anger and resentment; radio is irresistible to both amateurs and CB-ers alike.

Amateurs — the chosen few — have enjoyed many years of pleasure in their hobby, and I have found them generous and helpful. Most give their time unstintingly, and many of the technically very efficient are assisting CB-ers in many ways. New amateur licensees will have their teething troubles, unavoidably, but learning as we go along we can all take care if not to help, then at least not to hinder the activities of our fellow, long-standing, amateurs. Change is never very pleasant to old-timers (I am one), but our hobby is widening rapidly. The great joy to us all is to be in touch, listen to the more knowledgeable and be able to ask questions. If you segregate the novices, how will they learn?

Many, like myself, must hate this endless outcry by the “few of the few”. Let us not have exclusive new bands: there are enough already.

name and callsign supplied

Dear Sir — In reply to G3RKH and G3DRN (December) — yes, Class B licensees theoretically have rights to a little more of the spectrum, as the Morse requirements were internationally changed at WARC '79. When implemented this should entitle us to operate in the little used, diminishing, 70 MHz band. Referring to *Rad Com*, as suggested, this band is said to be a privileged band “B’s” won’t be granted. So what chance do we stand of one day getting a 50 MHz allocation. That’s not to say I don’t appreciate and enjoy my current ‘B’ licence.

I’m sorry to annoy G3DRN as I, like most amateurs, are fully aware of the worthwhile work he does — but the RSGB does have the image of a lot of old boys sitting on many committees, and regretfully I’ve seen nothing to change this view.

This chaos on 27 MHz is something I’ve never wanted any part of, and my reference to CB is not unfortunate but perceptive, for I’d like to ensure that the 28 MHz band is not taken over by outsiders. Like many others who don’t wish to just play, I’m doing as suggested, hoping to earn my G4 by learning Morse.

CB has shown that, when a determined body legally pursues its aims, the seemingly impossible can be achieved. So there is a need for a body to correlate the many views expressed in our media, relating to the ‘B’ licence, be it 28 MHz, 70 MHz, or whatever. Regrettably this type of organisation and campaign is not my forte; yet like the CB-ers did, I’m willing to support those who are skilled in this area.

But why another organisation, when we already *have* a body claiming to represent the views and interests of radio amateurs, which could if it wished pursue these aims — yes, the RSGB, which G3DRN omitted from his democratic list. Perhaps with only approximately 6% of its many committee positions being held by “B’s” its views may not be as progressive as mine, but I look optimistically to the future.

P. Thurlow, G8SUH, and p/p G8WAS G8XWG, G8ISH

Dear Sir — In view of G3RKH’s status as ‘Reverend’, it seems a pity that he opted for cheap sarcasm instead of Christian charity. No, there is no reason why anyone *must* be satisfied with the limitations imposed by authority, particularly when they don’t make sense. As for “rights” — well, I suppose we all realise that in reality there is no such thing as “rights”: there are only opportunities — and opportunities can be created. As the CB fraternity has shown us, the most effective way to create opportunities is to make one heck of a row about what you want. It is clear that the RSGB won’t help in any campaign of this sort, as they have their feet under the Home Office table and don’t want to rock the boat.

I think that neither G3RKH nor G3DRN have appreciated the important point, which is that CW is as irrelevant to the average ‘A’ licensee as it is to the average ‘B’ licensee. No, the new licence did not “separate the real amateurs from those who only want to play” (and, by the way, why should it?). This is shown by the number of ‘A’ licensees who have forgotten their CW, probably more than 90% of them!

Since the majority have no interest in CW, except as a whimsical hurdle to surmount before operating below 144 MHz on Phone, it follows that, ideally, CW tests should be directed at those who wish to use that mode, with no reference to frequency. In such a situation there is no reason why ‘B’ licensees should not operate on Phone on the DC bands, other than a totally illogical international agreement.

I defy anyone to make out a sound logical argument in defence of the current situation, including the incompetence of the average ‘A’ licensee on CW.

Personally, I have no wish to join the dinosaurs on the DC bands, nor do I wish to operate CW, and the relative antiquity of my callsign must indicate my sincerity in this. However, I cannot join G3RKH and G3DRN in their irrational yearning for the status quo. They aren’t in too good a position, either. Just consider: they have just lost 200 kHz of 4m., have no chance of getting their hands on 6m., and are about to lose the low end of 10m. to rampant CB-ism. Perhaps they ought to have a re-think about their targets and deploy their “usual democratic methods” more usefully.

Brian Carter, G8ADD

Address your letters for this column to “A Word in Edgeways”, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

BACK again, and with thanks to all who enquired after my health — no, it *wasn't* your scribe who got the new heart! But at least one kind soul was moved enough to telephone the Papworth hospital to make sure. Thanks to you all, and my very best wishes to my namesake and his new heart — long may it serve him, and well.

For myself, I have been interested this past month with the concept of proving that, on Top Band at least, the earth is a darned sight more important than the aerial or for that matter the power of the rig. At the /A place there is some forty feet of wire out N/S, with its highest point at about seven feet, and lowest a measured 20 inches above ground. On the earth side we are at the confluence of two rivers, and so some fifty feet of wire is down to one of 'em as the ground. The ATU doesn't seem to want to play with this at the moment — with maximum L and minimum C it is trying but not quite there. Even so, it is astounding what this bit of wire it capable of with things as they are. One wonders just how effective it will be with some RF pushed up it from the transceiver, but it certainly has been an eye-opener on receive despite noises-off from power-lines far too close for comfort, though mitigated by the absence of TV timebase QRM. But we are talking of Top Band, so we ought to make a heading!

Top Band

Despite some fearfully loud 'cracks' from the power-line, we can still listen as the Trio TS-830S noise blanker just about eliminates them. But enough of our own doings for the moment; let's turn to G4AKY (Harlow). An apology is due for a couple of howlers we made last time round when we were talking about his graphical plottings of grey-line paths to ZL; for a starter we said 'West' when we meant 'East' and for a second thing we made the obvious one about four minutes of time being one degree of longitude — anyone with elementary knowledge of navigation knows four minutes of time go to one minute of longitude . . . sack-cloth and ashes again! Anyhow having put that one straight for the record, it will be recalled that Dave was dead keen to see what could be done in the matter of Oceania for his last continent from Harlow, to give him the second WAC on 160 (his first was from Croydon). Now, it was known that VK6HD was going to be on the band (indeed Mick is audible as we write this piece), and that the two were each aware of

the other's plans. Well — they didn't really need to be: G4AKY worked VK6HD *six* times, and to make sure also connected with KP4KK/DU2. VK6HD has been dishing out joy to all and sundry who have the nous to call him in the right place on the band, and has been audible when the band is open for as long as an hour! And most of it is down to whatever VK6HD has in the way of an aerial system, as the genuine ten-watt chaps have been doing as well as anyone. For example, G4AKY has managed all six continents in the past month with about six watts of output RF, and Dave is seriously thinking of having a little dabble with the QRP rig — a few milliwatts. This month, he found Africa in the form of EA8AK, Asia by way of eight assorted Asiatic Russians and 4X4NJ, 22 EU countries not counting G, North America by way of W1, W2, W3, W4, W8, Canada VE1, VE2, VO1, Oceania as already mentioned, South America in PY1ARS; he missed VS6DO who was working simplex on 1820-ish kHz, and heard but couldn't raise a couple of JAs and N9MM.

Nice to hear again from GM3IAA (Inverness) after a long silence; Jim is just back on the air, and writes to note that he too worked VK6HD, heard the KP4KK/DU2 signals weakly, and later still heard GI3OQR after VS6DO. Now, this is quite something, insofar as GM3IAA is on a known poor site for Top Band, suggesting VK6HD must have been working quite hard on the skywires.

Turning to more parochial activity, were very disappointed to have such a low turn-out for MCC, and we would like some feedback, as suggested in the report elsewhere in this issue. If there ain't any interest in keeping MCC going in some form or another, then we'll just have to drop it. (And as we type that last sentence VK6HD has just dipped below the noise after almost an hour of audibility.)

G2HKU (Minster) spent a lot of time checking the behaviour of his new FT-101ZD for, among other things, drift, and ended with the box going back to the dealer for replacement, and some days off the air. However, as ever there were SSB QSOs with PA0PN, and CW with GW3NNY, OH2AW, PA6WW, UA9SAX, UP2BAW, OY7ML, SP9DH, OK3FF, EA3CNY, LA6U, LA6K, DL7GW, UB5WAL, UR2RRJ, OE1JNB, UQ2PQ, UK2PRC, UQ2GDL, EI9J, GM4IPS, DL1BU, GM3OXC, UQ2GDL, and OL8CMY.

GW3NYY (Swansea) mentions his Top Band doings. Walt was on for the CQ WW

CW contest at the end of November, by courtesy of GW4IOI and his aerial farm; conditions on the band were mediocre on the first night and fair on the second, but it ended up as 340 QSOs in 41 countries and 11 Zones, and some simple arithmetic shows it as a better score than last year's winner but not quite up to the all-time best, by G3SZA back in 1979. Walt took the shine off G4AKY's Top Band WAC in one month by doing one in the single week-end of the contest, and among his scalps we note VP8ANT, UM8MAZ, EA9EO, 4X4NJ, EA8AK, EA8QO, VO1HP, VK6HD, UA9YE for Zone 18, OH0XX, OH2FS/O, TF3YH, many Ws and VEs, not to mention gotaways in the form of PY1MAG, a UD6 and a UL7.

G3PKS (Wells) kept up his usual skeds on SSB, and some CW activity too, once the rig had been beaten into submission. Perhaps the choicest QSO was with OH0NA — he was heard around noon, but had to be left in favour of a meal already on the table; however, he resurfaced at around 1630 and was snaffled on the first call.

"CDXN" deadlines for the next three months —

February issue — December 31st
March issue — February 4th
April issue — March 4th

Please be sure to note these dates

Eighty

Quite a crop of stuff this time. G2NJ (Peterborough) starts the ball rolling by mentioning the CW net of the RAOTA, the lynchpin of this being G2OT/A, the club call, with G2UV at the controls for the full hour, 1500-1600. Find them on Wednesdays around 3515 kHz. As it's an OT assembly rather than a net, you may find other OTs around the same area and time. Working G2OT/A results in a special QSL, which will be issued to all contacts up to March next year. On a different tack, G2NJ mentions that he has been hearing Russian signals at the low end of Eighty from as early as 1430; at that time Nick heard, November 4, UK2RDX peeling off a string of JAs, and on the following day at the same time W7ZRC was worked.

Now G4LDS (Chelmsford) who continues his running battle with the rig; this month a little tweak here and there

at the front-end raised the sensitivity, and an 80/40 inverted-vee trap dipole was put up. The latter was found to be quite effective both audibly and as seen by the SWR indications.

G3ADV (Basingstoke) emerges, so he says, from many years hibernation; he put in a check-log for MCC, and on 80 SSB contacted SP2JDI, SP2JJJ, SP9YP, SN0MSP, YU2ACF, OK3CKA, OZ1XL, and I0KJX; all in the cause of learning — to drive a Japanese grey box!

In Wells, G3PKS found the early-morning period between 0700 and 0740 quite nice; two sessions adding in all to about thirty minutes accounted for WA8QZA, OZ7BW, W1KM, DJ2YA, W1YN, KO8TU, W2LYL, and N9MM. The daylight period, however, Jack covers with some rude words.

Turning to G2HKU, we find he has had just one QSO on Eighty, this being with PA3AF1, using the QRP CW rig.

Nice to hear again from G3CED/G3VFA (Broadstairs), who seems well recovered from his recent massive body blow, and is now back to work and enjoying it. His current ploy is the Joyframe aerial and his super-compact two-foot long 'thing' — and of course the low power, normally two watts. Eighty was pretty flat whenever he looked at it, George reckons, but he did manage QSOs with G3WNG, G4GZQ, LZ1KSZ, Y26TL, and G4JRE.

Forty

Most people "pass by on the other side" but it is a good band on which to learn the tricks of the trade. We know several people who have the secret, but it seems they just aren't going to write in, lest more come on to fill up the pool! G3PKS says he found things quite excellent: ground wave contacts with Bristol, over the Mendips, giving reports more suited to BBC signals, and plenty from over the pond like K4KQ, K1OX, WA8YVR, W3GM, W1MX, OH0XX, N4MO, K4YF, K1EA, and K4PI all hooked in the CW leg of the CQ WW contest.

Our other reporter is G3CED/G3VFA. He started with the Joyframe and raised, on QRP CW, PA0JQ, G3GRJ/A, G3GUV/QRP at three watts from Darlington, DL6LY, DJ5NT, DK2IO; then a change to the two-foot device, to work G8AK, G3YAA, G3AWL, G3KF, F6DZS, and G3OCK.

Here & There

Most important, maybe, is the opening of the first of our new bands; January 1 sees the first QSOs being made on the 10 MHz band. The position is this: the band is

shared with the amateurs being the secondary users — this means it is up to us to avoid interference with the primary users. It extends from 10.1 to 10.150 MHz, a spread of a mere 50 kHz. Of this, the agreed band-plan internationally allows 10.1 to 10.14 MHz as CW operation, and 10.14 to 10.15 as CW and RTTY.

As to the 18 and 24 MHz bands, the starting date is an open question — it may be as late as 1989, by which time the fixed and land mobile services already there must shift to their new frequencies, but we can hope the we may be able to have some use of the band on a secondary user basis before then.

Some while back, we used to hear on occasion from GM3RFR, up there in Unst, of his quest for a QRP SSB DXCC. Now we hear, by way of K8EEG's column in *CQ Magazine* that Sam has indeed managed this, for QRPP DXCC No 25. GM3RFR has a problem with aerials, in that he lives with high winds. Thus he has his work cut out to keep them in the air. There have been a succession of loops for this or that band, mostly with the feed-point in the vertical section, plus a vee-beam on South America, with legs 197 feet long at about fifty feet, fed by twin feeders; this is a useful leg length which allows the vee to be used on 10, 15 and 80 metres. Congratulations to GM3RFR on a good effort.

We should have mentioned last time round that we have a letter from Northern California DX Foundation Inc., and the words have the unmistakable stamp of Cass, WA6AUD. Anyone who wishes to have it should send a stamped addressed envelope to PO Box 717, Oakland, Ca, 94604, USA — 'it' being the latest newsletter and a copy of the questionnaire on your DX interests. There is also a form for membership and a little note that says that to us in the UK membership may be had for 15 IRCs. As to what NCDXF does, well, it works in various ways to get stations on the air from rare DX spots — at the time of writing there were about half a dozen ready to set off, partly at least helped by NCDXF. Another point of interest is their beacon WB6ZNL, and reports on its signal on 14.100 MHz will be appreciated — same address as above. Finally, if you have been receiving the newsletter and have moved, let them know your new address . . . the crystal ball is playing up!

Silent Keys

For as long as your scribe can recall, G2HKU has been reporting his regular skeds, and this month it is his sad task to make note of the death of both ZL1VN

and ZL3SE; both passed away after a long period of suffering. ZL1VN long had an ambition to make 1000 sked contacts with G2HKU, and he indeed achieved this just a couple of days before he died. Both will be much missed.

More Snippets

We have notice of BARTG's Spring RTTY Contest on March 20-22, 1982. This is the big one — a world-wide RTTY contest. There are some minor changes, and we suggest the intending entrant gets in touch with the Contest Manager, E. Double, G8CDW, 89 Linden Gardens, Enfield, Middx. EN1 4DX, enclosing, in UK, a 9" by 6" *s.a.e.*, or from overseas 2 IRC's for a copy of the rules, summary sheets and log sheets. Completed logs to be received by May 31.

Turning now to the future, we see that DL1VU hoped to be on Norfolk Is. (VK9N) sometime in December; and of course as we write we should be hearing ZA2HAM from Albania — but we haven't heard anything much yet.

As to the possibilities of Heard Is. operation *TDXB* notes the chances as of mid-November as being about 50-50. There is it seems another scientific group going there, but space is a problem.

There seems to be some undignified scuffling going on over the recent San Felix operation; on the one hand the president of the Radio Club de Chile says KF10/CE0X was not legal and never set foot on San Felix, and that the data in *TDXB* issue 113 was a load of boloney. On the other, *TDXB*'s editor has seen the papers put up to ARRL's DXCC desk and accepted as OK by ARRL. It sounds a bit like sour grapes from where we sit.

To add to the sporadic operations of Y11BGD, we hear that Y11AS is on, and will be there for a couple of years: QSL route is DK2OC.

Twenty

To GW3NYY we give the first over. Walt notes that on CW, new ones were 9U5WR and TJ1GH, while Iris Colvin was noted on SSB signing 9Y4KG.

Next we have a relatively short note from G3NOF (Yeovil); Don had things other than amateur radio to occupy his mind, and so was not very active. He listened around 0800z, and found conditions usually good to W6/7, VK and ZL; his only SSB QSOs were with FM7CD, KC4USV, KL7IZZ, V2ADX, and V2AU.

Our next reporter is G3VXJ (Findon) who runs a Ten-Tec Delta to an 80-metre Windom at thirty feet, has a separate QRP rig, and makes his contacts as he says, at

civilised hours, like evenings and weekend days. All CW, and including KC1Q/KC2 (where's that??), TI2PZ, HL1CX, PJ2JB, KH6IJ, 9M2AV, and AH2G for the fortieth Zone worked in 1981 from Findon.

The two watts QRP and two-foot Thing at G3VFA/G3CED were applied to Twenty, and we note CT4BK, UK2GAT, HA5WG, W1WKP, WB8ZJY, W4FMR, 4S7AL/MM in the North Atlantic, DK9TY, UK5OAA, HA8KCU, a QRQ UB5CI, and small fry.

At G2HKU Ted managed to work both ZL1VN and ZL3SE before they died, plus SSB with ZL3FV, ZL3RS and K0EHT; on CW K8MFO/C6, UM8NAP, HK4UT, UK0KAF, and JA3JYX were also booked in.

Then there was G3ADV who harks back to the J-O-T-A weekend, and some 'heavy breathing scouts' from UK Jamboree stations; and AP2AC, VK6AOK, and ZL3MA show that the hand has not lost its cunning.

21 MHz

G3TVW (Henham) operated 21 MHz in the CQ WW CW contest, using his HW-100 and a ZL Special in the skywire department — the latter actually stayed up this year for the full contest period. This combination netted some 678 scoring QSOs, 72 countries and 26 Zones, of which the pick of the crop were, on the Saturday: 9K2DX, UK0FAA in Zone 19, AL7H, KL7FRA, YW5A, EA9EO, A4XJO, P41E, FM0GA, P47A, EL2AV, V3MS, XE2BC, XE2MX, HH2VP, J6LZA, V2AAW, ZP5XJA, ZD8TC and GW3RRS on back-scatter. Sunday contacts included PY2RAN, N6BT/AH0 in Zone 27, SU1AA whose CQ WW contest QSOs only go *via* OH2MM, HK3A, SP2BHZ/JW, CN8CY operated by G3GJQ, HC8M in Galapagos, FC0FOO, and 6Y5HN who was wrested from a pile of Ws, and as already indicated, much small fry.

GW3NYY managed 9U5WR on CW, plus HC8, and a couple of Falkland Is. VP8s, plus W5NUT/PJ7 all on SSB.

21 MHz for G3CED/G3VFA included LZ1KDP, UC2SE, UA6JBC, UA3VAD, EA7AQL, and four very smart QSOs with TY9ER.

Now to G3VXJ, who keyed with XE2MX, KL7RA, XE2BC, HK3A, SP6BHZ/JW, 8P6J, SU1AA, K8MFO/C6A, 9Y4VT — all these in the CQ WW CW contest — FO0CV, KH6CC, 5Z4CS, 3B8CD/7, TF3GCN for a two-way QRP contact, and for the month's best ZK2RU with just five watts input. Interesting to note that the FO, KH6, and ZK2 were all worked by replying to their CQ, with no other takers noted.

Most of what little time was available to G3NOF on this band was spent beaming over the short path to the VK area around 1000-1130z, when it was often good to VK,

P29, VK9, FK8, JAs, YJ, and other such. It added up to SSB QSOs with CT3AB, FK8DH, H13PGJ, JD1BAT on Minami Torishima, K8CW/C6A, KH6CF, P29FV, TF3A, VK9NND, W7KTI, W7LXR (Oregon), YJ8NMP.

Now to G4LDS who offers W2ZQ, A9XP, J5HTL, V3ME, KA3GBU, KE4DQ, W7FOF, WB0II, AF7A (these last three being from the Honeywell computer station), HC8MD, KG4DI, SM0GMG/P/OH0, VE1BEF, AC0N, KA2, W0TXW, VP8ANT, VK4NUJ, VK8JC, VE3MBJ, VE3KXU, 8P6OL, VE3KAD, and VE2GFS (the last five resulting from CQ calls), then VE3DZT running 10 watts, and VE3HAB at two watts.

Ten Metres

First G3VXJ; Bob notes ZP5XJA, W4UY/PJ7, LA2Q, 9K2DX, and FR0GGL, all in the CQ WW CW contest, V2ARS and YV1AD raised with QRP five watts, and K8LX with just 100 milliwatts.

GW3NYY notes that signals have been good in the mornings around 1000 to VK, with Africa and South America dominating early evenings, peaking around 1830-1930. The short-skip has not been so much in evidence, so the CB-ers have not been such a nuisance to 28 MHz CW operation. Light relief was provided by a UA3, who asked if there was a reason for the signals around 27-28 MHz, like perhaps a special band for Western Europe, as he had heard people calling CQ DX! Walt tried to explain to him, but had great difficulty as the UA3 couldn't grasp how such a thing could be permitted!

G4LDS is another one to note how the short-skip has fallen away and so reduced the CB QRM. His ten-metre SSB offerings include VE6CAW (for whom Chris was his third QSO), VE3KM, JA2AQV RP2PDH, HG5VP, YU1ND, VE3FYN, VE3JPS, VE3LIH, VE2GAM, ZS5FG, N6YK/VP2A, G4COA/P/W0, VE3BSA, W5OC, PP5VK, VE2AMP, VE3JW, VE3KBP, W6NCO, KN8J/M and KA1BLW/M who were both running converted CB SSB rigs, C5AEG who was dug out of a pile-up of folk calling him while he was transmitting, and finally a gotaway VK9YC. Oh, yes, we nearly forgot to mention P29PS, who was notable for an echo of two or three times around, and DU6BOB.

At G3NOF, North Americans have been heard from 1130 to 1900z with the W6 and W7 areas peaking about 1600. A few Asiatic and VKs came in short path around 1230. SSB QSOs were made with AP2P, AP2ZR, CP1EQ, CR9AN, FH8OM, FM7CD, FY7BY, G4COA/W0 in North Dakota, HK0FBF, J3AH, J73PP, KB6SL, KL7JFY, VE7CVM, VP2MR, VS6CT, W7IAA (Idaho), WB7RGN (Wyoming), WD0BFT (Colorado), YV4BDB, ZD7BW, 4U1UN, and 8P6OR.

First, we will take the G3CED/G3VFA efforts with the Joyframe: UA6LNY, UK4CBB, UK4FAV, UK6HBV, RG4C raised as G3VFA for a computerised 599, UA9FIS, UA4ADG, RG4C again (this time as G3CED) which netted another 599 report as "5NN" for an op in a hurry(!); then came the mini-aerial and UA6ABM, UB5MFY, UA6HC, JA1BWD, and the two TY9ER contacts already mentioned.

G4HZW (Knutsford) is all-ten metres, with a TS-820 into a two-element quad at 24 feet. Tony reckons that not all the 'list' operations are all bad, as some people just aren't able to cope with a full-blooded pile-up on their own — to which one must comment that they'd soon learn! The month started and ended well, but had a soft centre. He worked SSB to wake himself up in the mornings before a quick bike-ride to work, and then dug around in the evenings; around midnight to 0200 the band opened up on occasion to W6/W7, which is fun but hard work next morning at work! Tony used SSB to 7X2BK, 8Q7AZ, A4XCB, AP2ZR, FY7BW, GU4EON by back-scatter for a new country, HC8MD, OH1TD/4U in Syria, HL9RH, JAs by the dozen, JR6QHA (who had only ten watts but a six-over-six beam!), JL1MUT, JW2CF (Spitzbergen), JD1BAT, JT1KAI for that elusive last Zone 23 for a complete set on Ten; KH6IBA; lots of CW W6/W7 in the CQ WW CW contest, KA7GZD, W0ZTL (N. Dakota), LA4NY who had five watts to a long wire, TA1AB, UA9s including UA9OIS who was running one watt, UL7s, UW1ZD, UA0CDN, RA0JBP, UK0SAY, UK0AMM who had a six-over-six beam and a rock-crusher of a signal, VU2NR, SM0GMG/OH0, VK1-6, VS6CT, VS6JS, VS5DD (Brunei), ZL4BO, ZL2BFU (twice, for discussion of their mutual interest in ornithology), ZS6XC, Z21AR (Zimbabwe). Plus a QSL from Tennessee to make the set of fifty states, confirmed on Ten.

Finis

All done for another month. Thanks very much to you all for your greetings and cards, and thanks to those who came up this time to report for the first time — keep up the good work!

On the other hand, heartiest maledictions to the character your scribe found one evening on 21 MHz (we think!) who was producing a chirp which covered from 21 to 21.450 MHz, who we believe to have been centred on 21.104 MHz because just occasionally his carrier would return there at the end of a dash, and who couldn't have worked *anyone*. A murrain on him!

Next Time

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IC290E	2m Multimode Mobile	366.00	(-)
IC2E	2m F.M. Synthesised Handheld	169.00	(-)
IC1.1/2/3	Soft Cases	3.50	(0.50)
IC1M9	Speaker/Microphone	12.00	(0.75)
ICBC30	230 V.A.C. Base. Charger and Hod	39.00	(1.50)
ICBC25	230 V.A.C. Trickle Charger	4.25	(0.75)
ICCP1	Car Charging Lead	3.20	(0.50)
ICBP2	6V Nicad Pack for IC2E	22.00	(1.00)
ICBP3	9V Nicad Pack for IC2E	17.70	(1.00)
ICBP4	Empty Case for 6 x AA Nicads	5.80	(0.75)
ICBP5	11.5V Nicad Pack for IC2E	30.50	(1.00)
ICDC1	12V Adaptor Pack for IC2E	8.40	(0.75)
ICML1	10W Booster	49.00	(1.00)

T.V. INTERFERENCE AIDS			
Ferrite Rings 1 1/2" Dia. Per Pair	0.80	(0.20)	
Toroid Filter T.V. Down Lead	2.00	(0.50)	
Low Pass Filter LP30 100W	3.95	(0.50)	
Trio Low Pass Filter LF30A 1kW	17.90	(0.75)	
Yaesu Low Pass Filter FF501DX 1kW	23.00	(0.75)	
HP4A High Pass Filter T.V. Down Lead	5.96	(-)	

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H1 - Q Balun 1:1 5kW Pip (PL259 Fitting)	9.95	(0.75)	
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Ceramic Strain Insulators	0.40	(0.10)	
Small Egg Insulators	0.40	(0.10)	
Large Egg Insulators	0.50	(0.10)	
75 OHM Twin Feeder—Light Duty—Per Metre	0.16	(0.02)	
300 OHM Twin Feeder—Per Metre	0.14	(0.02)	
URM 67 Low Loss 50 OHM Coax—Per Metre	0.60	(0.20)	
UR 76 50 OHM Coax—Per Metre	0.25	(0.05)	

MICROWAVE MODULES			
MMT144/28	2m Transverter for HF Rig	99.00	(-)
MMT432/28S	70cm Transverter for HF Rig	149.00	(-)
MMT432/144R	70cm Transverter for 2m Rig	184.00	(-)
MMT70/28	4m Transverter for HF Rig	115.00	(-)
MMT70/144	4m Transverter for 2m Rig	115.00	(-)
MMT1296/144	23cm Transverter for 2m Rig	184.00	(-)
MML144/25	2m 25W Linear Amp (3W I/P)	59.00	(-)
MML144/40	2m 40W Linear Amp (10W I/P)	77.00	(-)
MML144/100S	2m 100W Lin. Amp (10W I/P)	129.00	(-)
MML432/20	70cm 20W Lin. Amp (3W I/P)	77.00	(-)
MML432/50	70cm 50W Lin. Amp (10W I/P)	119.00	(-)
MML432/100	70cm 100W Linear Amp (10W I/P)	228.64	(-)
MM2000	RTTY to TV Converter	169.00	(-)
MM4000	RTTY Transceiver	269.00	(-)
MMC50/28	6m Converter to HF Rig	27.90	(-)
MMC70/28	4m Converter to HF Rig	27.90	(-)
MMC144/28	2m Converter to HF Rig	27.90	(-)
MMC432/28S	70cm Converter to HF Rig	34.90	(-)
MMC432/144S	70cm Converter to 2m Rig	34.90	(-)
MMC435/600	70cm ATV Converter	27.90	(-)
MMK1296/144	23cm Converter to 2m Rig	59.80	(-)
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MMD600P	600MHz Prescaler	23.00	(-)
MMDP1	Frequency Counter Probe	11.50	(-)
MMA28	10m Preamp	14.95	(-)
MMA144V	2m RF Switched Preamp	34.90	(-)
MMF144	2m Band Pass Filter	9.90	(-)
MMF432	70cm Band Pass Filter	9.90	(-)
MMS1	The Morse Talker	115.00	(-)

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MPU1	Mains Power Unit	6.90	(-)

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HK707	Up/Down Key	10.50	(0.50)
HK704	Deluxe Up/Down Key	14.50	(0.50)
EK11A	Practise Oscillator	8.75	(0.50)
EK121	Elbug	29.50	(0.50)
EK11A	Matching Side Tone Monitor	10.95	(0.50)
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Hirschman	RO250 V.H.F. Rotor	49.95	(2.00)
9502B	Colorator (Med. V.H.F.)	49.95	(2.00)
KR400RC	Kenpro (Hof) Complete with Lower Clamps	99.95	(2.50)
KR600RC	Kenpro (Med HF) Complete with Lower Clamps	139.95	(3.00)

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SHURE 444D	Dual Impedance	33.00	(1.50)
SHURE 526T	Mk II Power Microphone	46.00	(1.50)
ADONIS AM 502	Compression Mic 1 O/P	39.00	(-)
ADONIS AM 601	Comp. Mic + Meter 1 O/P	49.00	(-)
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144.4 (433.2)	b	e	e	e	e	b	c	e	e	e	e
144.800	e	e	e	e	e	c	e	e	e	e	e
144.825	e	e	e	e	e	c	e	e	e	e	e
144.850	e	e	e	e	e	c	e	e	e	e	e
145.000/ROT	e	e	e	e	e	c	e	e	e	e	e
145.025/R1T	e	e	e	e	e	c	e	e	e	e	e
145.050/R2T	e	e	e	e	e	c	e	e	e	e	e
145.075/R3T	e	e	e	e	e	c	e	e	e	e	e
145.100/R4T	e	e	e	e	e	c	e	e	e	e	e
145.125/R5T	e	e	e	e	e	c	e	e	e	e	e
145.150/R6T	e	e	e	e	e	c	e	e	e	e	e
145.175/R7T	e	e	e	e	e	c	e	e	e	e	e
145.200/R8R	e	e	e	e	e	c	e	e	e	e	e
145.300/S12	e	e	e	e	e	c	e	e	e	e	e
145.350/S14	e	e	e	e	e	c	e	e	e	e	e
145.400/S16	e	e	e	e	e	c	e	e	e	e	e
145.425/S17	e	e	e	e	e	c	e	e	e	e	e
145.450/S18	e	e	e	e	e	c	e	e	e	e	e
145.475/S19	e	e	e	e	e	c	e	e	e	e	e
145.500/S20	e	e	e	e	e	c	e	e	e	e	e
145.525/S21	e	e	e	e	e	c	e	e	e	e	e
145.550/S22	e	e	e	e	e	c	e	e	e	e	e
145.575/S23	e	e	e	e	e	c	e	e	e	e	e
145.600/R0R	e	e	e	e	e	c	e	e	e	e	e
145.625/R1R	e	e	e	e	e	c	e	e	e	e	e
145.650/R2R	e	e	e	e	e	c	e	e	e	e	e
145.675/R3R	e	e	e	e	e	c	e	e	e	e	e
145.700/R4R	e	e	e	e	e	c	e	e	e	e	e
145.725/R5R	e	e	e	e	e	c	e	e	e	e	e
145.750/R6R	e	e	e	e	e	c	e	e	e	e	e
145.775/R7R	e	e	e	e	e	c	e	e	e	e	e
145.800/R8R	e	e	e	e	e	c	e	e	e	e	e
145.950/S38	e	e	e	e	e	c	e	e	e	e	e

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RO	4.0277	8.0555	12.0833	14.9888	18.1250	44.9666
R1	4.0284	8.0569	12.0854	14.9916	18.1281	44.9750
R2	4.0291	8.0583	12.0875	14.9944	18.1312	44.9833
R3	4.0298	8.0597	12.0895	14.9972	18.1343	44.9916
R4	4.0305	8.0611	12.0916	15.0000	18.1375	45.0000
R5	4.0312	8.0625	12.0937	15.0027	18.1406	44.0083
R6	4.0319	8.0638	12.0958	15.0055	18.1437	45.0166
R7	4.0326	8.0652	12.0979	15.0083	18.1468	45.0250
S8	—	—	12.1000	14.9444	18.1500	44.8333*
S9	—	—	12.1020	14.9472	18.1531	44.8416*
S10	—	—	12.1041	14.9500	18.1562	44.8500*
S11	—	—	12.1062	14.9527	18.1593	44.8583*
S12	—	—	12.1083	14.9555	18.1625	44.8666*
S13	—	—	12.1104	14.9583	18.1656	44.8750*
S14	—	—	12.1125	14.9611	18.1687	44.8833*
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S20	4.0416	8.0833	12.1250	14.9777	18.1875	44.9333
S21	4.0423	8.0847	12.1270	14.9805	18.1906	44.9416
S22	4.0430	8.0861	12.1291	14.9833	18.1937	44.9500
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	6	10	1.50 to 1.999MHz	£4.75	£4.20	
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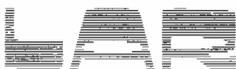
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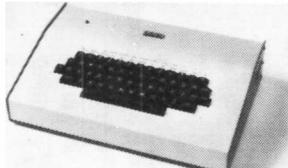
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