

The SHORT WAVE Magazine

VOL. XXXVIII

OCTOBER 1980

NUMBER 8

LOWE ELECTRONICS FOR RECEIVERS

AND SO MUCH MORE IS
HERE AT MATLOCK



TRIO R1000 The finest receiver on the market. This price includes DC kit fitted and the peace of mind that comes from buying Trio from an approved dealer.

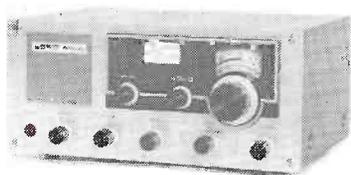
£298 inc VAT securicor carriage £4.50

2 METRE FM IS THE SR9.

2m FM Tunable 144.146 MHz
12V operation plus
11 channel crystal control

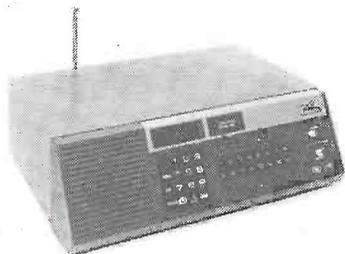


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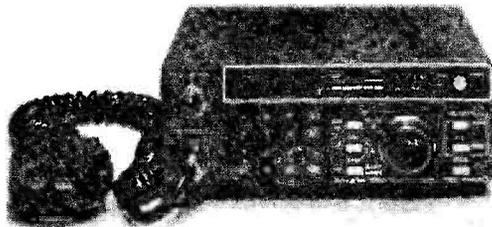
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LOWE ELECTRONICS Ltd.

 **TRIO**
TR7800

**2 METRE FM
TRANSCEIVER**

£268 inc VAT securicor carriage £4.50



The new TR7800 just has to be voted the best 2 metre FM transceiver to appear on the world scene. Following detailed market research, Trio have produced what we think is the perfect mobile/home station rig for all users, incorporating all the features which were requested by amateur radio operators worldwide.

What does it do?

Let's take the basic specification first, and say that the TR7800 is a fully synthesised 2 metre FM transceiver having a minimum output power of 25 W on transmit (typically 30-36 W on random samples), and an incredible receiver which is typically producing sensitivity measurements of 0.12 microvolts for 12 dB Sinead. This is certainly the best FM receiver of which we know. That's the basic story so let's go on to the user features.

It's clear from the photograph that you have direct keyboard entry of frequency actually from the front panel. From the keyboard, you can also select simplex and repeater shift functions for use either on UK or American repeaters. The digital readout tells you the operating frequency including any selected shift so you are completely in touch with your mode of operation.

So far so good – but what about the mysterious knob on the right hand side of the panel? Well, that selects a bank of 15 (yes, 15) memories for frequency storage and the smart part is that these are designated not 1 to 15 but 0-14. "So what?" sez you. "Aha" sez I, that means that if you programme in all repeater channels from R0 to R9 using memories 0 to 9, the memory channel display shows you the repeater channel number whilst at the same time, the digital readout shows you your transmit and receive frequencies. In addition to this, the memory channels also store the repeater shift so that it's called up automatically when you use the memory.

The remaining memories can be used to store any frequencies within the band, but a further smart part is that memories 13 and 14 can store completely separate transmit and receive frequencies for non standard shifts etc. And memory 14 is also designated the priority channel so that any frequency put into it can be constantly monitored at 5 second intervals, whatever else the transceiver may be doing. And if you have

the volume turned down, a piezo bleeper alerts you if a signal has appeared on the priority channel. You also have direct access to the channel by simply pushing the "Priority operate" button.

Final features for repeater operation include a tone burst which can be turned on or off as desired, and reverse repeater operation at the touch of a button.

Now for more facilities pertaining to scanning. In keyboard operation, you can scan the entire band in 25kHz or 5kHz intervals by simply touching the SC button. In memory mode, you can scan all fifteen memories using the same SC button. The scan system is (in my opinion) the best yet offered in that the transceiver scans until a signal is heard, stops on the frequency for about 5 seconds to allow you to check what's on, then steps on automatically to find the next busy frequency. If you want to stop the scan, simply press the PTT bar on the microphone or touch the C (cancel) button on the keyboard. By scanning this way, you eliminate the annoying locking up on busy repeater channels that so often ruins your enjoyment of an otherwise satisfactory scanning system.

In addition to scanning, the TR7800 can be stepped up and down the band in 25 KHz or 5KHz steps using the UP/DOWN buttons on the hand microphone. The microphone is supplied as a standard with the TR7800. If either button is held down, the TR7800 tunes across the band until the button is released.

The mic buttons also allow you to step up and down the memory channels.

LED indicators show Simplex, +600 or -600 operation, a busy lamp on occupied frequencies and "on air" indication. Signal strength and TX output are indicated on an LED bar display.

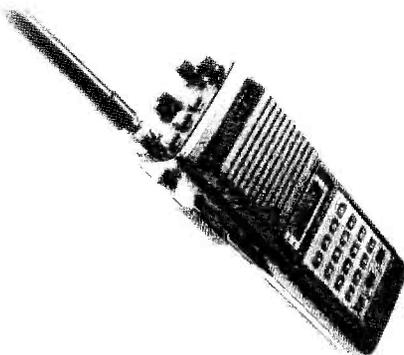
Memory contents can be retained by installing four standard AA size Nicad batteries inside the transceiver. The batteries are charged when the TR7800 is switched on, and the memories are then retained for up to five days on the batteries.

All in all, the TR7800 is an amazing transceiver and follows the Trio design pattern for the 80s. Let's face it, Trio are now showing the way to go and the others are truly a long way behind. Why not see the TR7800 soon and test the truth in what I've been saying.

 **TRIO**
TR2400

£210.45 inc VAT
securicor carriage £4.50

The TR2400 is a futuristic 2 metre FM handheld transceiver incorporating a large LCD frequency display, 400 channel operation from 144-146MHz, 10 memory channels and a host of frequency control systems (including scanning) all designed around a microcomputer. The sophisticated design makes the TR2400 the ideal handheld to meet all repeater or simplex operation for the 2 metre man.



Don't forget, we stock almost everything that the keen DXer, short wave listener or radio amateur could possibly need, including the complete range of J Beam aeriels, Microwave Modules equipment, feeder, clamps, insulators – in fact our catalogue makes good reading for 48p and includes honest advice on aerial matters. For all that's good in Amateur radio, contact Lowe Electronics at Matlock.

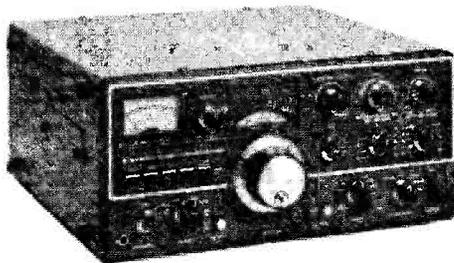
LOWE ELECTRONICS Ltd.



TRIO TS520SE

HF SSB TRANSCEIVER

£437 inc VAT
securicor carriage £4.50



The TS520SE standard specification includes CW wide/narrow switching (using the optional 500 Hz filter), semi break-in keying with sidetone, PTT or VOX operation, really effective noise blanker, switched AGC time constants, 5 function metering, switched RF attenuator, RIT, speech processing for punchy transmit audio, fixed channel facilities, 25kHz calibrator, fan cooled PA, internal loudspeaker, and of course the TS520SE will take all the wide range of current matching accessories including the DG5 true frequency digital readout, the VFO520S remote VFO unit, the SM220 station monitor scope and panoramic display and so on.

When talking to prospective purchasers of the TS520SE, the question we are most often asked is "how does it compare in price to its rivals?" and the transceiver it is most compared with is the Yaesu FT101Z series. The price for the FT101Z taken from March 1980 RadCom is £575 including VAT and you also should add PA fan at £13.80 (the fan is standard on the TS520SE) making a grand total of £588.80.

THE TS520SE costs **£437** including VAT.
Now tell me if that's not value for money.

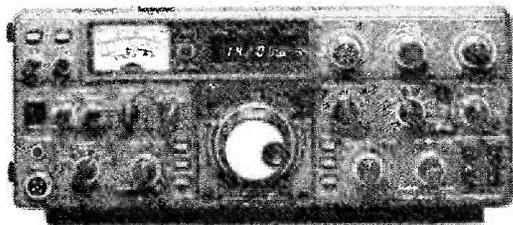
In the face of ever increasing complexity in amateur radio equipment, its comforting to know that the TS520SE is still in volume production. Radio amateurs all over the world (and dealers too) have voted the TS520SE "my favourite transceiver" because of its astounding reputation for reliability, high sensitivity receiver, and of course the unequalled Trio audio quality coming from the transmitter. The TS520SE incorporates all of the features demanded by today's amateur, and at an outstandingly low price. No wonder it's top of the list in popularity, and comparison with other transceivers will convince you that the TS520SE is the best value for money on the market today.

Of course, the bare figures cannot tell you just how nice the TS520SE feels in use, nor can they tell you the pleasure of hearing other operators saying "never heard better audio OM, what rig are you using?"



TRIO TS830S

HF SSB TRANSCEIVER AROUND £640 inc VAT carriage by securicor £4.50



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.

- ★ VBT variable bandwidth tuning
- ★ IF notch filter
- ★ IF Shift
- ★ Various filter options

- ★ Built in digital display
- ★ 6146B final with RF negative feed-back
- ★ Optional Digital VFO for increased flexibility
- ★ Innovative PLL system of frequency generation
- ★ RF speech processor
- ★ Adjustable noise blanker level
- ★ Adjustable audio tone
- ★ RF attenuator
- ★ RIT/XIT
- ★ SSB monitor circuit
- ★ Expanded frequency coverage

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PLEASE SPECIFY ANY PARTICULAR INTEREST AND WE WILL SEND FULL INFORMATION**

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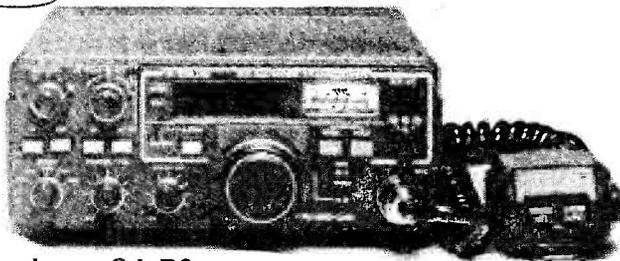


TRIO

TR9000

**2 METRE
ALL MODE
TRANSCEIVER**

£345 inc VAT securicor carriage £4.50



If you sat down at some time and designed your ideal 2 metre multimode rig, you probably laid down the specification for the new Trio TR9000. I believe that this transceiver will satisfy the needs of every radio amateur, combining as it does small size (same as the TR7600), light weight (same as the TR7600), and powerful performance.

As you can see, the TR9000 has a complete array of facilities including all mode operation, noise blanker, RIT, 5 memories, twin digital VFO's and digital frequency readout to 100Hz. Now for the smart parts.

The TR9000 is based on a 100Hz synthesiser controlled either by a photo microsensor on the main dial or by the remote up/down microphone. On FM, the operator has instant selection of either 25kHz steps (for

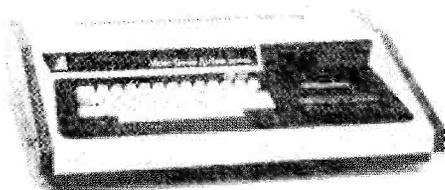
convenient mobile use), 12.5kHz steps (for future use), or 100Hz steps (for continuous tuning). On SSB and CW, the synthesiser steps are automatically switched to 100Hz and the digital display is extended to match.

A special feature is the search facility on SSB which tunes the whole band, and the scan facility on FM which scans in 25kHz or 12.5kHz steps, stopping on any received signal.

The TR9000 has so much to offer, it's bound to be yet another leader from Trio. Contact us soon for further details.

LOWE FOR COMPUTERS

video genie system



The Video Genie system is a complete 16K computer, ready to go, and ideal for all purposes.

It is programmed using the plain as English "BASIC" language, and programs are stored on ordinary cassette tapes.

For £379.50 the Video Genie offers outstanding value for money, just compare the price with equivalent cased kit computers!

Also available from Lowe Electronics is a complete range of software and computer peripherals.

- ★ 16K User RAM
- ★ 12K Microsoft BASIC
- ★ TRS-80 software compatible
- ★ Complete with internal cassette and PSU

VIDEO GENIE
£379.50 inc VAT
securicor carriage £4.50

- ★ Internal TV Modulator
- ★ Fully expandable
- ★ Powerful editor
- ★ Huge range of software available

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For personal attention on the South Coast contact John G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Ringmer 812071

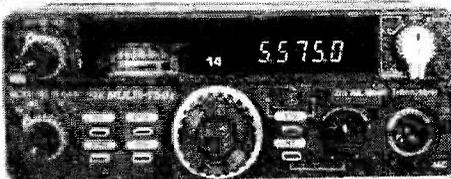
For equally helpful attention in Scotland contact Sim, GM3SAN, 19 Ellismuir Road, Baillieston, Nr. Glasgow. 041-771 0364.

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WATERS & STANTON ELECTRONICS

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FDK "700" SERIES



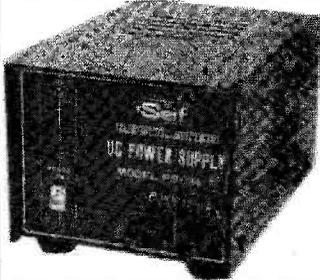
+ 70cms EXPANDER SOCKET FOR DUAL BAND OPERATION

ALL MODES AT AN "FM ONLY" PRICE! £299 inc. VAT

MULTI 750 FM-SSB-CW

10 watts or 1 watt switchable
5KHz or 100Hz tuning 144-146mHz
(144-148mHz optional) 600KHz &
1.6mHz repeater shifts.

BASE STATION POWER SOURCE



MODEL PS 134

13.5v DC 4 AMPS
230v AC FUSED
ELECTRONIC
PROTECTION FULLY
STABILISED
£22.95 inc. VAT
carriage £1.50 extra.

THIS UNIT HAS A REALLY HUSKY TRANSFORMER — THOROUGHLY RECOMMENDED

"PROFESSIONAL 008" FM POCKET MONITOR

2 metre amateur band or marine versions

8 channel scanning, individual channel lockout, AC mains battery-charger, NI-CAD battery pack, telescope whip, "Fly Lead" antenna, mobile mount bracket, manual/auto scan, metal case, squelch control.

£69 inc. VAT
FREE DELIVERY
FITTED S20 OR
CHANNEL 16

STATE WHETHER AMATEUR OR MARINE VERSION REQUIRED

This is a delightful little receiver that enables the user to continually monitor the 2 metre band when away from the base station or mobile unit. Robustly constructed in a metal case, this is certainly the most sensitive receiver for portable use we have come across. Up until now we have been very disappointed with both the construction and the performance of many pocket monitors, particularly the cheaper ones. Certainly in this day and age you get what you pay for. Therefore we are happy to tell you that if you are interested in a serious pocket monitor then we can promise you that you will not be disappointed with this one. If you should not happen to be totally satisfied with this unit and you return it to us in good order we promise to refund your money — we can't be fairer than that!



FDK 70cms HAND-HELD

£159 inc. VAT

6 channel capability, xtal automatic tone-burst, 1.6mHz frequency shift, NI-CAD battery pack, 230v AC charger, helical BNC antenna, 1 watt output, condenser microphone, external 12v DC socket, fitted Sv20 extra channels, £3 each. 12 months warranty.

MODEL PALM IV



WATERS & STANTON ELECTRONICS

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MAIL ORDER THROUGHOUT THE UK IF ITS WORTH BUYING WE STOCK IT!

All goods despatched are covered by our own insurance — no risk to the customer.

TRIO

HF	
TS820 Transceiver	£669.00
DG1 digital module	£121.90
TS520SE Transceiver	£437.00
SP520 Speaker	£17.25
YG3395C Filter	£37.95
AT200 A.T.U.	£82.80
RB20 Receiver	£690.00
TS190S Transceiver	£679.00
SP180 Speaker	£36.80
AT180 A.T.U.	£95.45
TS120S Transceiver	£432.00
TS120V Transceiver	£347.00
MB100 Mobile Mount	£17.25
YK88C Filter	£28.75
SP120 Speaker	£25.30
VFO120 VFO	£89.70
AT120 A.T.U.	£55.20
PS20 P.S.U.	£44.85
PS30 P.S.U.	£85.00
TL120 Linear	£128.80
MC50 Desk mic.	£24.00
MC35S 50k mic.	£13.80
MC30S 50ohm mic.	£13.80
LF30A L.P. Filter	£18.40

VHF/UHF	
TS770E Transceiver	£763.00
SP70 Speaker	£18.40
TR9000 Transceiver	£345.00
TR9000 Base plinth	£32.20
TR7600	SPECIAL!
RM76	SPECIAL!
TR7800 Transceiver	£268.00
TR2300 Portable	£166.00
VB2300 Amplifier	£49.00
MB2 Mobile mount	£17.25
RA1 Helical	£6.90
PS1200 P.S.U.	£29.50
TR 2400 Transceiver	£210.00
ST1 Base stand	£43.70
SC3 Carrying case	£11.50
TR3200 Transceiver	£164.00
MB1A Mobile mount	£9.20

VHF MONITORS

TM56B Amateur	£79.00
TM56B Marine	£79.00
SR9 Amateur	£46.00
SR9 Marine	£46.00
Bearcat 220 VHF/UHF	£258.00
FX213 Aircraft	£13.50
Sound VHF	£69.00
Sound Hand-held	£69.00
AP12 Aircraft	£109.00
Ingersoll MW/FM/Aircraft	£12.95

THINGS YOU SHOULD KNOW!

★ We are located in the quiet village of Hockley — fresh country air, no parking problems and four miles from the coast. We are situated between Rayleigh and Soudend and are easily reached via A127 or A130.
★ All our prices include VAT — we consider retail advertising excluding VAT is deliberately misleading. ★ All servicing is carried out on the premises and we have full on-air demonstration facilities for HF or VHF on our first floor. ★ Many products we sell are imported direct by us and we always have a range of new, exciting products on show long before they reach other dealers shelves. ★ In six years we've become the leading supplier of amateur radio equipment in the South — if you want a good deal plus friendly after sales service if something goes wrong, then call, write or telephone for latest prices and delivery information. We can supply virtually any make of equipment advertised in this magazine (except ICOM), usually from stock. Over 4,000 square feet of floor space is stocked with all the top names — YAESU, TRIO, FDK, STANDARD, DENTRON, JAYBEAM, MICROWAVE, MOSLEY, etc. Remember, if it's worth buying we stock it; so why not come and see what we don't stock as well as what we do stock!

HOW TO ORDER

All prices on this page are carriage free for orders over £20 unless otherwise indicated. For orders less than this, please add £1 for carriage and insurance. Large items are sent Securicor, smaller items by post. Any item not listed can be supplied at normal advertised prices — but if in doubt, please telephone (0702)206835. Orders may be placed by telephone on a credit card or sent by post in the form of cheque or postal order. H.P. quotations can be given by telephone or letter — and if you happen to find our telephone lines engaged, don't despair, it's probably yet another customer who has decided to buy from Waters and Stanton in the future.



BUYING AN FR7 OR FRG7000 RECEIVER

We actually guarantee you the lowest price on these two lines whilst present stocks last. If you can find a genuine current offer below our prices on new, fully guaranteed stock, send us a copy of the competitors advertisement stating page and date of publication together with your order. Providing we receive your order within one month of this journal's publication date, we'll match it.

YAESU Competitive prices

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FT-101Z Transceiver	£488.75
FTT-101ZD Transceiver	£669.25
Fan	£13.75
YE-7A Mic.	£8.80
FT-107M Transceiver	£690.00
FP-107E P.S.U.	£108.95
YM-35 Mic.	£12.85
FT-707 Transceiver	£499.00
FT-707S	£466.75
FP-707 P.S.U.	£109.25
FT7B Transceiver	SPECIAL!
FP12 P.S.U.	£78.20
FL-2100Z Linear	£362.00
FRG-7 Receiver	£189.00
FRG-7000 Receiver	£299.00

VHF/UHF	
FT-202R Hand-held	£119.00
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FT720	£149.50
FT-720v	£166.75
FT-720u	£201.25

SUNDRIES

9502 Rotator	£43.50 (2.00)
KR400 Rotator	£105.80 (2.00)
AR40 Rotator	£59.80 (1.50)
Stolle 2030 Rotator	£55.00 (1.50)
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MM202S Safety Mic.	£20.95 (0.75)
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Drake low pass filter	£18.40 (0.75)

DENTRON HF

MLA2500B 2kw linear	£699.00
Clipperton '1' 2kw linear	£458.00
GLA1000B 1kw linear	£295.00
MT3000A 3kw ATU	£278.00
HF 200A Transceiver/PSU	£395.00
Doublet Ant. 160-10m	£22.95
470ohm Feeder 100ft. reels	£11.50

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Telephone orders - Simply phone in your Barclaycard or Access number and we will despatch goods within 24 hours..

Mail orders - Send cheque or postal order for correct amount and print clearly name and address - we will do the rest!

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FDK "700" SERIES

MULTI 700EX

£ 199

It's the price
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25 watts variable
25kHz & 12½ kHz steps
144-146 mHz
Selective Scanning

READ ON IT COULD SAVE YOU MONEY

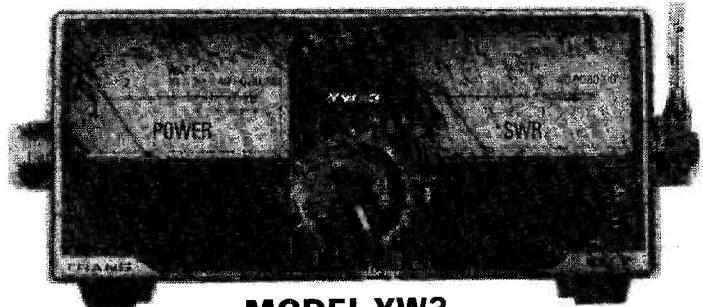
£ 199 buys a transceiver covering the whole of 2 metres 144-146mHz with a host of features that make the competition look both expensive and complicated. In the 700EX you have a pedigree stretching back through the famous FDK range made by a manufacturer specialising solely in VHF and UHF equipment. This means better value, cleaner signals and above all, the most sensitive receiver sections on the market. The famous "VARIO" power control means smooth, continuous control of power output from 1 watt to 25 watts (typically 30 watts) — full coverage in either 25kHz or 12½ kHz steps (to meet new European requirements) — full simplex and repeater operation, including instant reverse repeater switch — crystal controlled automatic tone-burst — additional 1.6 mHz shift for 70cms — diode programmable priority channels plus 2 crystal controlled channels — selective channel scanning between main dial and priority channels (most ordinary rigs lock onto the same old beacon or repeater!) — a new super tough P.A. that's guaranteed for 12 months — plug and socket board connections for easy servicing and many other features that are contained in our colour brochure — oh yes and you also get a microphone, "slide-in" mounting bracket, 12v DC lead, desk stand, fuses, mic clip and sundry hardware — it really does make other rigs seem rather expensive!

SPECIAL OFFER ! £ 11.50

inc vat p&rp 50p

SWR/POWER/FIELD STRENGTH METER
3-150 mHz 1kW max

This is a meter that every station should have. Finished in black and silver with SO239 standard connectors, this instrument will tell you the truth about your antenna system and how well it matches your transmitter and coax feeder. The direct reading power meter is calibrated in forward powers of 10, 50 and 100 watts (although powers well in excess of this can be used for SWR measurements). A separate meter indicates reflected power and SWR ratios anywhere between 3mHz and 150mHz. And for those of you with mobile or hand-helds, there is a field strength meter to indicate actual radiated RF levels. The instrument comes to you ready for operation with comprehensive operating instructions at a really competitive price.

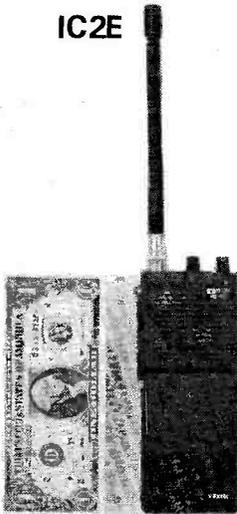


MODEL YW3

BARCLAYCARD — ACCESS — HIRE PURCHASE



IC2E



TWO METRE FM HANDY TALKIE . . . GET ONE OF THESE LITTLE GEMS IN YOUR HAND — AND YOU WON'T WANT TO PUT IT DOWN!

CHECK THE FEATURES —

FULLY SYNTHESIZED — covering 144-145.995 in 400 5KHz steps.

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.

WEIGHT — 450 Grams with supplied power pack and antenna.

DIMENSIONS — Height 116.5mm (without battery pack), width 65mm, depth 35mm.

SEND/BATTERY INDICATOR — Lights during transmit but when battery power falls below 6V it doesn't 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

HI-LOW SWITCH — reduces power output from 1.5W to 150mw reducing rapid 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 AND the famous THANET WARRANTY.

By skilful design and the use of highly advanced technology ICOM have produced this gem for

£159 incl VAT!

THIS IS THE CHOICE FOR THE MAN WHO WANTS THE MOST FROM HIS MOBILE — THE IC260E

ICOM's ALL-MODE MOBILE

The IC-260E is obviously going to be one of the best selling multimode 2M Transceivers of all time. Never before has so much been offered in such a small package.

Replacing the IC-245E, the IC-260E offers such extras as full frequency read out, upper and lower sideband, and scanning. Thus, it makes an ideal base station, when used with a DC power supply, as well as a mobile. The use of a microprocessor instead of an LSI chip has enabled Icom to offer this at a lower price than the IC-245E.

144 MHz ALL-MODE TRANSCEIVER INCORPORATING A MICRO-COMPUTER — CPU control with Icom's original programs provides various operating capabilities. No backlash dial controlled by Icom's unique photo-chopper circuit. Band edge detector and Endless System provides out-of-band protection. No variable capacitors or dial gear, giving problem-free use. The IC-260E provides FM, USB, LSB, CW coverage in the 144-146 MHz frequency range. Thus the IC-260E can be used for mobile, DX, local calls and satellite work. Easily extendable to 144-148.

MULTI PURPOSE SCANNING — Memory scan allows you to monitor three different memory channels. Program Scan provides scanning between two programmed frequencies. Adjustable scanning speed. Auto-stop stops scanning when a signal is received, in all modes.

DUAL VFO'S — Two separate VFO's can be used either independently or together for simplex operation, and any desired frequency split in duplex operation.

CONTINUOUS TUNING SYSTEM — Icom's new continuous tuning system features an LED display that follows the tuning knob movement and provides an extremely accurate readout. Frequencies are displayed in 7 LED digits representing 100MHz to 100Hz digits. When in Duplex and using the tuning-knob the two VFO's track together. Automatic recycling restarts tuning at the top of the band, i.e. 145.999.9 MHz

Phone — or put a message on the ansafone for further details

MICROWAVE MODULES

WESTERN

ANTENNA SPECIALISTS

STANDARD

J-BEAM

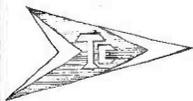
G WHIP

YAESU MUSEN

RSGB PUBLICATIONS

BEARCAT

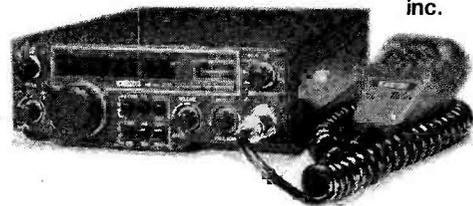
HP AND PART EXCHANGE WELCOMED



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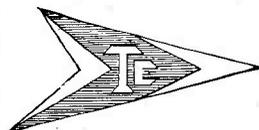
£339
inc.

'SCANNING MIC NOW AVAILABLE'

when the dial goes below 144.000.0MHz. Recycling changes 145.999 MHz to 144.000.0MHz as well. Quick tuning in 1kHz steps is available, and fine tuning in 100 Hz steps in the SSB and CW modes, and 5 kHz steps and 1 kHz steps in the FM mode, is provided for trouble-free QSO.

OUTSTANDING PERFORMANCE — The RF amplifier and first mixer circuits using MOS FET's and other circuits provide excellent Cross Modulation and Two Signal Selectivity characteristics. The IC-260E has excellent sensitivity demanded especially for mobile operation, high stability and with Crystal Filters having high shape factors, exceptional selectivity. The transmitter uses a balanced mixer in a single conversion system, a band pass filter and a high performance low pass filter. This system provides distortion free signals with a minimum spurious radiation level for an output of 10W or more.

ADDITIONAL CIRCUITS — The IC-260E has a built-in Noise Blanker, CW Break-in CW Monitor, APC and many other circuits for your convenience. The IC-260E has everything you need to really enjoy VHF operation, in an extremely compact rugged transceiver.



ICOM DOES IT ALL!



**COME ALONG TO THE LEICESTER SHOW 6th 7th 8th NOV. AND SEE
ICOM's new 8-band HF Transceiver —
the IC-720 Price less than £700 inc VAT (PSU extra)**

SPECIFICATIONS

General:

Frequency coverage:

Receive:
Transmit:

0-1.30: 0MHz
1-8.1: 999MHz
3-6.4: 099MHz
6-9.7: 499MHz
10-0.10: 499MHz
13-9.14: 499MHz
17-9.18: 499MHz
20-9.21: 499MHz
24-8.25: 000MHz
28-0.28: 999MHz
29-0.29: 999MHz

Temperature Limitation:

-10°C - +60°C

Antenna Impedance:

50Ω

Power Requirement:

Current Drain:

13-8V DC, negative ground, ±15%
Min audio output 0-9A. Max audio output
1-2A. Transmit: SSB 16A, CW, RTTY 20A
AM 14A

Dimensions:

111 (H) × 241 (W) × 311 (D) mm.

Transmitter:

Emission Mode:

Output Power:

CW (a1), RTTY (F1), SSB (USB/LSB), AM
SSB10W 100W PEP, Continuous
Operation - AM 40W; CW, RTTY reatance
Mod.

Modulation System:

SSB, AM Balanced Mod. CW, RTTY
reatance Mod.

Spurious Output:

More than 60dB below peak power output.

Harmonic Output:

More than 60dB below peak power output.

Carrier Suppression:

More than 40dB below peak power output.

Unwanted Sideband:

More than 50dB down at 100kHz AF output.

Microphone Imp:

1-KΩ, dynamic with built-in pre-amp.

Receiver:

Receiving system:

Superhetrodyne, with continuous bandwidth
control.

Receiving Mode:

A1, A3J (USB/LSB), A3, F1.

Intermediate Freq.:

1. 39-731MHz
2. 9-0115MHz
3. 10-750MHz
4. 9-0115MHz

Sensitivity:

Less than 0.25 micro-volts for 10dB S+N/N

Spurious Response:

More than 60dB

Rejection Ratio:

More than 60dB

Selectivity:

SSB, CW, RTTY more than 2-3kHz at
-6dB, Less than 42kHz at -60dB CW
Narrow (Option) More than 500Hz at -6dB,
Less than 1-5kHz at -60dB, AM, 3kHz at
-6dB, less than 18kHz at -60dB
More than 2 Watts
8A.

Audio Output:

Audio Impedance:

THANET ELECTRONICS LTD

143 RECVLVER ROAD, HERNE BAY, KENT. Tel: 02273 63859

ICOM IC251E £479 inc.

**DON'T WORRY — WE GUARANTEE
ALL SOLID STATE RIGS
INCLUDING PAs**

**THIS MUST BE ONE OF THE
FINEST 2M ALL-MODE BASE
STATIONS EVER MADE.**



MICROPROCESSOR CONTROL — CPU control with Icom's original programs provides various operating capabilities. No backlash dial controlled by Icom's unique photo-chopper circuit. Band edge detector and Endless System provides out-of-band protection. No variable capacitors or dial gear, giving problem-free use. The IC251E provides FM, USB, LSB, CW coverage in the 144-146 MHz frequency range. Thus the IC251E can be used for mobile, DX, local calls, and satellite work.

MULTI-PURPOSE SCANNING — Memory Scan allows you to monitor three different memory channels. Program Scan provides scanning between two programmed frequencies. Adjustable scanning speed. Auto-stop stops scanning when a signal is received in all modes.

DUAL VFO's — Two separate VFO's can be used either independently or together for simplex operation, and any desired frequency split in duplex operation.

CONTINUOUS TUNING SYSTEM — Icom's new continuous tuning system features a luminescent display that follows the tuning knob movement and provides an extremely accurate readout. Frequencies are displayed in 7 digits representing 100 MHz to 100 Hz digits.

Automatic re-cycling restarts the tuning at the bottom of the band when the top is reached — and vice versa. Quick tuning in 1 KHz steps is available, and fine tuning in 100 Hz steps in the SSB and CW modes, and 5 KHz steps and 1 KHz steps in the FM mode, is provided for trouble free QSO.

EASIER OPERATION AND LIGHTER WEIGHT — The most compact, lightest weight all-mode 144 MHz transceiver. First

to use a pulse power supply in communication equipment, for lighter weight. 50 mm-diameter large tuning control knob for smooth and easy tuning. Trouble-free controlling knobs for both receiving and transmitting. LED indicator for transmit and receiving modes.

MOST SUITABLE FOR BOTH FIXED AND PORTABLE STATIONS — Built in 240V AC and DC power supplies. Convenient Dial Lock switch for mobile operation. Easy carry handle. Effective Noise Blanker. IC SM5 high quality stand microphone is suitable for fixed station operation. Powerful audio output 1.5 Watts at 8 ohm, for easy listening even in noisy surroundings.

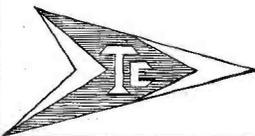
OUTSTANDING PERFORMANCE — The RF amplifier and first mixer circuits using MOS FETs and other circuits provide excellent Cross Modulation and Two-Signal selectivity characteristics. The IC251E has excellent sensitivity demanded especially for mobile operation, high stability, and with Crystal Filters having high shape factors, exceptional selectivity. The Transmitter uses a balanced mixer in a single conversion system, a band pass filter and a high performance low-pass filter. The system provides distortion-free signals with a minimum spurious radiation level.

MODES — USB, LSB, CW and FM output.

SENSITIVITY — CW and SSB — Less than 0.25 microvolts for 10 dB S+N/N. FM — More than 30 dB S+N+D/N+D at 1 microvolt or less than 0.3 microvolts for 20 dB Noise quieting.

IC-251E Typical Technical Characteristics: General. Numbers of semiconductors: Transistors 99, FETs 12, ICs 37, Diodes 132. Frequency coverage: 144-146 MHz (easily extended to 148 MHz at no extra charge). Frequency resolution: SSB 100 Hz steps FM 5 KHz steps. 1 KHz steps with TS button depressed. Frequency Control: Microcomputer based 100 Hz step Digital PLL synthesizer Independent Transmit/Receive Frequency Capability. Frequency Readout: 7 digit LED 100 Hz readout. Frequency stability: Within ± 1.5 KHz Memory channels: 3 channels, any inband frequency programmable. Usable conditions: Temperature: -10°C — -60°C (14°F — 140°F). Operational time: Continuous. Antenna impedance: 50 ohms unbalanced. Power supply requirement: 13.8V DC $\pm 15\%$ (negative ground) 3A max. or 240V AC $\pm 10\%$. Current drain (at 13.8V DC): Transmitting, SSB (PEP 10W). Approx. 2.3A, CW, FM (10W). Approx. 2.3A FM (1W). Approx. 1.0A. Receiving. At max. audio output. Approx. 0.6A. Squelched. Approx. 0.4A. Dimensions: 141mm (h) \times 241mm (W) \times 264mm (D). Weight: Approx. 5.0 Kgs. Transmitter. Output power: SSB 10W (PEP), CW 10W, FM 1 — 10W (Adjustable). Emission mode: SSB (A3J,

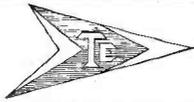
USB/LSB), CW (A1). FM (F3). Modulation system: SSB Balanced modulation. FM Variable reactance frequency modulation. Max. frequency deviation: ± 5 KHz. Spurious emission: More than 60 dB below peak power output. Carrier Suspension: More than 40 dB below peak power output. Unwanted Sideband: More than 40 dB down at 1000 Hz AF input. Microphone: 1.3K ohm dynamic microphone with built-in preamplifier and push-to-talk switch. Operating mode: Simplex. Duplex. (Any inband frequency separation programmable). Receiver. Receiving system: SSB. CW Single conversion superheterodyne. FM Double conversion superheterodyne. Receiving Mode: SSB A3J, USB/LSB, CW (A1), FM (F3). Intermediate Frequency: SSB, CW 10.7 MHz, FM 10.7 MHz, 455 KHz. Sensitivity: SSB, CW Less than 0.25 microvolts for 10 dB S+N/N. FM more than 30 dB S+D/N+D at 1 microvolt. Less than 0.3 microvolts for 20 dB Noise quieting. Squelch sensitivity (FM only): Less than 0.4 microvolts. Spurious response rejection ratio: More than 60 dB. Selectivity: SSB, CW More than ± 1.2 KHz at -6 dB point. Less than ± 2.4 KHz at -60 dB point. FM More than ± 7.5 MHz at -6 dB point. Less than ± 15 MHz at -60 dB point. Audio output power: More than 1.5W. Audio output impedance: 8 ohms.



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**YOU MUST HAVE HEARD ONE ON THE AIR BY NOW —
THE MOBILE OF CHOICE FROM THE WORLD
FAMOUS ICOM STABLE — THE IC-255E**



**25 WATTS — 5 MEMORIES — SCANNING — 600 KHz AND USER SELECTABLE
REPEATER SHIFT — FULL COVERAGE IN 5 KHz or 25 KHz STEPS**

We have had a poke around one of these little beauties and are certain that Icom, yet again, have come up with a winner. As you can see, it has the expected smart Icom appearance. Features include:—

- ★ Crystal controlled Tone Burst
- ★ Full band coverage — extendable to 148 MHz if required
- ★ Four digit LED display
- ★ 25 Watts output or 1W low power
- ★ A superb receiver using grounded gate FET front end
- ★ Scanning over a user programmable range
- ★ Memory scan
- ★ Stop on empty or busy channels
- ★ Tuning in 25KHz or 5KHz steps
- ★ 5 Memories — retained while the power is connected to the rig
- ★ Built-in 600 KHz Repeater shift
- ★ Alternative programmable shift
- ★ Reverse Repeater facilities
- ★ RIT (± 3 kHz) for those off channel stations
- ★ Scan control from the microphone (an optional mic available shortly)
- ★ Good loud audio
- ★ Optically coupled tuning between control knob and CPU
- ★ Multiway 24 pin socket on back for touchpad, computer, or external control (note the current RM3 cannot be used but a new version is to be introduced)
- ★ Rugged modular PA (guaranteed of course!)
- ★ Mobile mount which can be padlocked

“ **NOW WITH** ”
IMPROVED RECEIVER:
SCANNING MIC NOW
 ” **AVAILABLE** ”

Price
£255 inc.

At £255 including VAT these are such value for money that demand may exceed supply for a while — but they are worth waiting for! (Delivery is free of course by Registered First Class Letter Post.)



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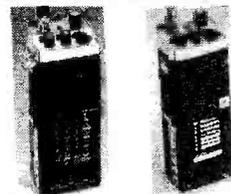
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Whether you are: just starting, taking an R.A.E. course, just licensed, or an old timer, SMC has something for you. . . . And at the **LOWEST** ever prices. Advertisd **PRICES** on this page **INCLUDE VAT** at 15%, **INCLUDE SECURICOR** speedy delivery and **INCLUDE A TWO YEAR WARRANTY** (remember as Yaesu Musen UK distributors our guarantee is **FACTORY BACKED**). We take **ACCESS AND BARCLAYCARD OVER THE PHONE**, offer attractive **HP** (including a **FREE FINANCE SCHEME** on many regular priced items) on application, and have branches and agents conveniently situated across the country plus the biggest mail order department right here in Totten.



FT202R £99
1W, 6 Channel, 2m, Handheld
FT207R £199
3W, 12½ KHz, Synthesized 2m.



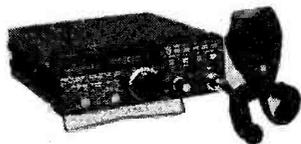
FT101ZD £569
10-160m. SSB, CW, AM, Digital. Variable IF bandwidth.



FT225RD £499
2m. SSB, CW, FM, AM Digital readout 25+ watts 230V AC + 12V DC.



FT901DM £799
10-160m. SSB, CW, AM, FM, Deluxe Digital Ultimate 'usable' HF transceiver.



FT480R £359
2m. Synthesized, 100, 25, 1KHz steps FM. 1KHz, 100, 10Hz steps SSB. 10W PEP.



FT707 £500
10-80m. 100W PEP. SSB, AM, CW, Variable IF bandwidth.



FT7B £399
10-80m. 50W PEP. SSB, AM, CW, Mobile 12V Transceiver.



FRG7 £199
0.5-30MHz General Coverage Receiver, 230V AC, 12V DC + Battery pack. AM/SSB.



FRG7000 £299
0.25-30MHz General Coverage Receiver, 230V AC + 12V option. Timer, Digital AM/SSB.



FT107M £690
160-10m + 2 Aux. SSB, CW, FSK, AM, Memory option. Deluxe all solid state transceiver.



CPU2500RS £299
Synthesized 2m Transceiver, 4 models plus stepper versions.



FT720RV £315
Synthesized 'remotable' 70cms and 2m transceiver (full range illustrated).



FT227RXS £287
Synthesized 10W, 2m transceiver fitted SMC super scanner.



South Midlands

SMC FOR ALL ANTENNA REQUIREMENTS

HF ANTENNAS			CABLES & CONNECTORS R.F.			VHF ANTENNAS		
GEM QUAD PRODUCTS			COAXIAL 50 OHM CABLE			HIDAKA VHF ANTENNA		
GQ2E	2 Ele antenna	£124.00 R £3.75	URM95	Solid centre 2.3mm	p/m £0.20	L7606	50-600MHz log	£75.95 R £1.50
GQ3E	3 Ele antenna	£187.00 R £6.45	UR43	Solid centre 5.0mm	p/m £0.20	JAYBEAM 4 METRE		
GQ4E	4 Ele antenna	£248.00 R £7.05	UR76	Stranded core 5.0mm	p/m £0.22	4Y/4M	Yagi, 4 element	£14.95 SR £1.50
GQCK1	Con kit 1 ele	£63.00 R £2.90	RG58U	Stranded core 5.0mm	p/m £0.48	PMH2/4M	Harness, 2 way	£10.60 SP £1.25
GQCK2	Con kit 2 ele	£125.00 R £4.20	RG213	Low loss 10.2mm	p/m £0.48	JAYBEAM 2 METRE		
GOSPIDER	Centre piece	£26.25 SP £1.25	UR67	Low loss 10.2mm	p/m £0.52	HO/2M	Halo, head only	£3.70 SP £0.55
GOSPIDER	Spreader arm	£9.85 R £1.50	COAXIAL 75 OHM CABLE			HM/2M	Halo, with mast	£4.40 SP £0.65
HY GAIN HF ANTENNA			307EP	Economy type	p/m £0.16	UGP/2M	Ground plane	£8.15 SP £1.50
12AVQ	Vertical 10-20m	£37.50 SR £1.50	UR70	Stranded light 5.7mm	p/m £0.24	C5/2M	Colinear vert.	£34.80 SR £1.50
14AVQ/WB	Vertical 10-40m	£52.50 SR £1.90	UR39	Medium duty 7.8mm	p/m £0.36	L1/12M	Colinear	£19.60 SR £1.50
18AV17/WB	Vertical 10-80m	£76.00 SR £1.50	YR57	Low loss 10.2mm	p/m £0.57	5Y/2M	Yagi, 5 element	£18.90 SR £1.50
14RMQ	Roof mount kit	£19.50 SR £1.50	BALANCED TWIN CABLE			8Y/2M	Yagi, 8 element	£11.50 SR £1.50
18V	Vertical 10-80m	£27.80 SR £1.50	302	75 Ohm Light duty	p/m £0.14	10Y/2M	Long Yagi 10ele	£24.70 SR £1.50
18H1	"HY Tower"	£225.00 R £10.90	305	300 Ohm Ribbon	p/m £0.15	14Y/2M	Long Yagi 14ele	£31.30 SR £1.50
103BA	3 Ele Yagi 10m	£51.00 SR £1.50	2X21	240 Ohm Dual foam	p/m £0.11	D5/2M	Yagi, 5 over 5	£15.90 SR £1.50
105BA	5 Ele Yagi 10m	£92.00 R £2.75	BNC COAXIAL PLUG 50 OHM			D8/2M	Yagi, 8 over 8	£21.60 SR £1.50
153BA	3 Ele Yagi 15m	£62.75 R £2.05	UG88	Standard type 5.6mm	£0.64	PBM10/2M	10 Ele parabeam	£29.20 SR £1.50
155BA	5 Ele Yagi 15m	£117.50 R £4.15	UG959	Large Type 11.2mm	£2.60	PBM11/4/2M	14 Ele parabeam	£35.50 SR £1.50
203BA	3 Ele Yagi 20m	£117.50 R £3.45	BNC COAXIAL SOCKET 50 OHM			Q4/2M	Quad, 4 element	£18.70 SR £1.50
204BA	4 Ele Yagi 20m	£155.00 R £5.10	UG90	Standard, 4 hole type	£0.66	Q8/2M	Quad, 6 element	£24.80 SR £1.50
205BA	5 Ele Yagi 20m	£208.00 R £6.50	UG1094	Nut fixing type	£0.62	8Y/2M	Yagi, 8 ele cross	£18.00 SR £1.50
402BA	2 Ele Yagi 40m	£155.00 R £4.55	UG89	Free cable end 5.6mm	£0.82	10X/2M	Yagi, 10ele cross	£29.80 SR £1.50
DB10/15A	3 Ele 10-15m	£115.00 R £3.40	BNC COAXIAL COUPLER 50 OHM			PMH2/C	Harness, cir.	£6.90 SP £0.45
TH3JNR	3 Ele 10-20m	£113.50 SR £2.15	UG914	Back to back female	£0.93	PMH2/2M	Harness, 2 way	£7.80 SP £0.75
TH2MK3	2 Ele 10-20m	£108.75 R £2.25	UG491	Back to back male	£0.93	PMH2/2M	Harness, 2 way	£8.00 SP £1.00
TH3MK3	3 Ele 10-20m	£157.00 R £4.05	UG274	"T" 2 female 1 male	£1.44	PMH4/2M	Harness, 4 way	£18.70 SP £1.50
THSDXX	"Thunderbird"	£178.30 R £4.70	UG306	Elbow male - female	£1.62	JAYBEAM 70CM		
THSDXX	"Thunderbird"	£205.00 R £5.90	BNC CABLES 50 OHM			X8/2M/12/70	8 Ele 2, 12, 70	£33.50 SR £1.50
HYQUAD	2 Ele Quad	£169.00 R £4.25	BNC18BNC	1.5' RG58 BNC ends	£2.22	C8/70	Colinear, vert.	£39.50 SR £1.50
BN66	Balun ferrite 1:1	£13.50 SP £1.00	BNC38BNC	3.0' RG58 BNC ends	£2.90	D8/70	Yagi, 8 over 8	£17.80 SR £1.50
LA1	Lightning arrest	£39.50 SP £0.65	BNC36CRC	3.0' RG58 BNC/clips	£2.17	PBM18/70	18 Ele para	£21.50 SR £1.50
JAYBEAM HF ANTENNA			PL259	Standard type 11.2mm	£0.69	MBM48/70	Multi, 48 Ele	£24.50 SR £1.50
VR3	Vert 10-20m	£34.00 R £1.50	PL259P	Push on type 11.2mm	£0.48	MBM88/70	Multi, 88 Ele	£32.60 SR £1.50
TB3	3 Ele 10-20m	£135.00 R £3.75	UG175	Reducer 5.0mm	£0.12	8X/70	Yagi, 10 Ele X	£27.00 SR £1.50
MINIBEAM ANTENNA			UG176	Reducer 5.6mm	£0.12	12X/70	Yagi, 12 Ele X	£33.50 SR £1.50
C4	Vert miniature	£42.15 SR £1.50	PL259R	Reduced type 5.0mm	£0.58	PMH4/70	Harness 2 way	£6.75 SR £0.65
HQ1	"Mini" quad	£83.85 SR £2.90	PL259A	De-luxa type 11.2mm	£0.98	PMH4/70	Harness 4 way	£14.30 SP £1.25
MOSLEY HF ANTENNA			PL259B	De-luxa type 5.0mm	£0.98	JAYBEAM 1236MHz		
TA32JRE	2 Ele beam	£78.00 R £2.25	PL259S	"Solderless" 11.2mm	£0.55	D15/23	Yagi, 15 over 15	£26.90 SR £1.50
TA33JRE	3 Ele beam	£116.00 R £2.40	PL259SL	"Solderless" 5.0mm	£0.55	SMC VHF ANTENNA		
TA33JRHP	3 Ele c/w balun	£132.00 R £2.60	PL259E	Angle type 5.0mm	£0.83	GP2J	VHF Ground plane	£4.35 SP £1.00
Mustang 2	2 Ele beam	£117.00 R £2.40	PL259M	Metric type standard	£0.65	SMC-HS VHF ANTENNA		
Mustang 3	3 Ele beam	£146.00 R £2.60	PL259M	Metric type standard	£0.65	SMCSDX1	90-480MHz	£36.00 SR £1.50
RD5	Dipole ham	£36.00 SP £1.25	PL259M	Panel mount 4 hole	£0.93	SMCSDX2	90-480MHz	£41.70 SR £1.50
SWL7	Dipole B.C.	£36.00 SP £1.25	UHF COAXIAL SOCKET			SMCVHFL	65.520Hz Rx	£14.65 SR £1.50
SMC TRAPPED DIPOLE			SO233F	Standard 4 hole fix	£0.42	SMCGPV144C	Colinear multi %	£21.70 SR £1.50
SMCTD/S	Standard 14swg	£26.50 SP £1.50	SO233F	Standard 4 hole fix	£0.42	SMCGPW	Colinear multi %	£21.70 SR £1.50
SMCTD/HP	Hi power 14swg	£29.50 SP £1.50	SO239T	2 Hole fitting type	£0.42	BANTEX MOBILE ANTENNA		
SMCTD/P	Portable ant	£32.50 SR £1.50	SO239NI	Nut fix inside type	£0.51	425S	Ele stainless 42"	£1.75 SP £0.75
SMC-HS ANTENNA			SO239E	Nut fix outside type	£0.51	40GF	Ele glassfibre 40"	£3.65 SP £0.95
SMCHFSV	Vertical 10-80m	£35.00 SR £1.50	SO239E	Free angle type 5.0mm	£0.88	20S	Ele stainless 20"	£1.40 SP £0.65
SMCHFBR	Radial kit loaded	£25.65 SR £1.50	UHF COAXIAL ADAPTORS			19GF	Ele glassfibre 19"	£2.75 SP £0.65
G WHIP HF MOBILE			PL258	Back to back female	£0.79	B5	Ele 1/2 glass 2m	£7.65 SP £0.95
OW BASE	Base Standard	£3.90 SP £0.55	PL274	Back to back chassis	£0.93	BGASS	Ele 1/2 stain 2m	£7.00 SP £0.95
Tribander	Antenna 10.2m	£21.50 SP £0.75	PL258M	Back to back male	£1.20	BAGAGF	Ele 1/2 glass 2m	£8.25 SP £0.95
LF40-160	Loading coil each	£5.70 SP £0.45	M359	Elbow male - female	£0.93	BSU	Ele 1/2 stain 70cm	£2.15 SP £0.65
LFWHIP	Telescope whip	£2.90 SP £0.45	M358	"T" 2 female 1 male	£1.20	UDL	Ele coln. 70cm	£6.85 SP £0.75
Multimobile	Antenna 10.2m	£25.00 SP £1.00	M358AF	"T" 3 female	£1.48	UDL	Ele coln. 70cm	£13.65 SP £0.75
MM40-160	Loading coil each	£5.70 SP £0.45	M458	"X" 3 female 1 male	£1.85	BM	Base standard	£2.15 SP £0.35
MMWHIP	Telescope whip	£2.90 SP £0.45	UG255	UHF socket - BNC plug	£1.53	BC	Base trunk lip	£7.00 SP £0.55
Flexwhip	Antenna 10m	£15.00 SP £0.75	SO4FF	UHF socket - F plug	£0.60	BMM	Base Magnetic	£12.35 SP £1.00
FF15-180	Loading coil each	£5.70 SP £0.45	SO25	UHF socket 2.5mm jack	£0.69	SMC-HS MOBILE ANTENNA		
HY GAIN MOBILE ACES			SO35	UHF socket 3.5mm jack	£0.69	SMC3H/PL	Helical 2m PL259	£3.00 SP £0.35
415	Bumper strap	£10.80 SP £1.50	UHF CABLES			SMC2H/BNC	Helical 2m BNC	£3.85 SP £0.35
499	Body mount	£10.80 SP £1.00	PL36PL	3.0' RG58 PL259 ends	£1.61	SMC4	Ele 70MHz 1/2	£7.80 SP £1.25
511	Spring H.D.	£8.50 SP £1.25	N COAXIAL PLUG			SMC2NE	Ele 144MHz 1/2	£7.50 SP £1.25
417	Spring medium	£8.20 SP £1.00	UG536	Small type 5.6mm	£2.35	SMC78F	Ele 144MHz 1/2	£10.00 SP £1.25
SMC - HS MOBILE			UG21	Standard type 11.2mm	£1.15	SMC78B	Ele 2m 1/2 "Ball"	£11.00 SP £1.25
SMC15SE	Ele 15m 1.72m	£11.00 S £1.25	N COAXIAL 50 OHM			SMC2EB	Ele 70cm col.	£10.00 SP £1.25
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SMC10E	Ele 10m 1.72m	£11.00 S £1.25	UG1052	Free cable end 5.6mm	£2.49	MX9 13U/M	Dust cover	£0.40 SP £0.35
SMCSOCA	Cable assembly	£3.00 SP £0.55	UG23	Free cable end 11mm	£1.48	SMCGCD	Gutter clip	£5.00 SP £0.55
SMCGCD	Gutter clip	£3.00 SP £0.55						
MX913/M	Dust cover	£0.40 SP £0.35						

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NB: PRICES AND CARRIAGE COSTS DO NOT INCLUDE VAT (15%)

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GM8GEC	Jack	Edinburgh	(031665)	2420
G13WVW	Mervyn	Tandragee	(0762)	840656
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9508H.D. version of 9502A £57.00



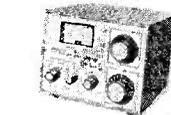
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 160W out for 15W maximum drive. 145MHz.
 12V dc (circa 18A). RF or manual switching.
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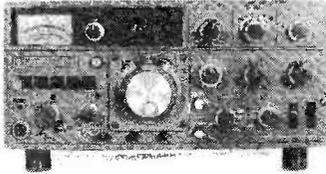
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R820 RECEIVER

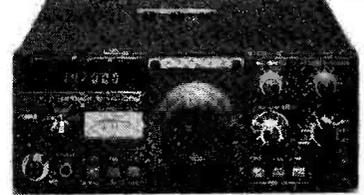
THE ULTIMATE IN RECEIVERS

Frequency coverage 160-10m plus SW Broadcast Bands. All modes CW-USB-LSB-RTTY. Digital Readout. Noise Blanker. Fully variable. I.F. Bandwidth, plus Bandpass tuning, plus rejection notch filter. **£690.00**

TR9000



The TR9000 is a compact lightweight 2 mtr FM/USB/LSB/CW Transceiver with an outstanding array of functions. FM1 for 25 KHz steps (for mobile use) FM2 for precise 100Hz steps (for base station use). Microcomputer control giving many advanced features. Built in 5 channel memory. New type microphone with UP/DOWN switching. Built in high performance. N. Blanker. Side tone for CW. ALL THIS PLUS MUCH MORE FOR **£345.00** inc. VAT.



TRIO TS120 TRANSCEIVER

ALL SOLID STATE HF BAND TRANSCEIVER

Freq. 3.5-30MHz Amateur Bands and WWV. I.F. Shift System, Noise Blanker, Vox, Single conversion system using PLL circuit. Digital display dial.

TS 120V 10watts PEP **£347.30**
 TS 120S 200watts PEP **£432.40**



TR2300

TR2300 2m Synthesised Portable Transceiver. We have lost count of the number of this model we have sold over the last 12 months. Hikers, campers, climbers, you can hear them all over the country and reliability which is the essence of TRIO equipment. **£166.75**

TRIO

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TS520SE HF Transceiver	£437.00
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DM800 G.D.O./Wavemeter	£51.75

Crystals and accessories in stock

NEW TRIO TS 830S HF TRANSCEIVER
 AVAILABLE SHORTLY



TR7800

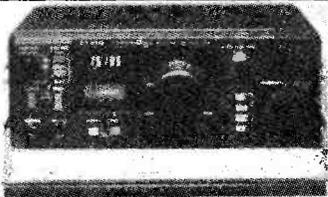
Continuing TRIO's policy of presenting the Radio Amateur with the finest equipment available, we are pleased to announce the NEW TR7800 2m FM Mobile Transceiver. 15 memory channels - Priority channels with simplex ± 600 KHz or non-standard operation - "Priority alert" beeps when signal on M14 priority channel. Frequency coverage 144.00, 145.955 in switchable 5 KHz or 25 KHz steps. Front keyboard for selecting frequencies, programming memories and controlling scan function. ALL THIS and MORE for **£268.50**.

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H.S. HFS Vertical 10-80m	£48.50
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5Y/2M 5 element yagi	£10.24
8Y/2M 8 Element yagi	£13.23
10Y/2M 10 Element	£28.41
PBM/14/2m. 14 element Parabeam	£40.38
5XY/2m. 5 element crossed yagi	£20.70
8XY/2m. 8 element crossed yagi	£25.88
10XY/2m. 10 element crossed yagi	£34.27
Q4/2m. 4 element Quad	£21.51
Q6/2m. element Quad	£28.52
D5/2m. 5 over 5 slot fed yagi	£18.29
D8/2m. 8 over 8 slot fed yagi	£24.84
UGP/2m. ground plane	£9.37
MBM48/70cms. Multibeam	£28.18
MBM88/70cms. Multibeam	£37.49
TAS 1/2m. Whip mobile	£15.30
C5/m. Colinear	£40.02
C8/70cm. Colinear	£45.43
D15/1296 23cm. Antenna	£30.94
Carriage on Antennas	£3.00



TRIO R1000

R1000 Receiver **£298.00**
 The latest general coverage from Trio. Frequency coverage 200 KHz to 30 MHz in 30 bands. Using an advanced PLL system. Full digital readout. Three filters 12 KHz for AM - 6KHz narrow AM and 2.7 KHz SSB. Also incorporates a noise blanker. Operation is from 100-240 V AC or 12 V DC.



TS 180S

TS 180s. HF Transceiver. An all solid state Transceiver with Digital Frequency Control. A rig that has the facilities that DXer, Contest operator or any Amateur would desire for maximum flexibility on the 160 through 10 metre bands. Up to 200 watts PEP input. No tune final amplifier. **£679.65**
 With digital readout.

RECEIVERS AND TRANSCEIVERS

(inc. VAT and Postage)	
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AMR217B Scanner Receiver. AC or DC operation	£113.50
R512 Aircraft Band Scanning Receiver	£135.00
Regency Digital Flight Scan Synthesised Aircraft Band Receiver	£215.00
Phillips FM321 70cms FM Transceiver	£264.00
Yaesu FRG7 Receiver	£199.00
FDK TM563 Scanning 2m Receiver	£109.00
'SkyACE' Hand held Aircraft Band Receiver	£49.50
Bearcat 220 Scanning Receiver	£258.75
AR22 2m Hand Hold Receiver	£83.00

SECONDHAND EQUIPMENT

Due to delay in publishing secondhand lists please send SAE for our up to date lists. We have a very quick turn over in secondhand equipment, especially in receivers. If you require a specific model please let us know and we will inform you as soon as we have one available. Our secondhand equipment carries a three month guarantee. We would be pleased to sell your equipment on a commission basis, which saves you time and money advertising.

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DR7500R	£107.98	UR67	80p
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Sky King SU200	£40.40		12p metre
Sky King SU400	£75.00		75 ohm low loss
DR7600X	£135.00		24p

SRX-30
Solid State Receiver 550kHz-30MHz... **£158.00**

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Bantex G. fibre 5/8th whip	£9.10

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4 way Antenna Switch 50 ohm 200 watt PEP	£10.60
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DL50 50 watt 50ohm Dummy Load	£7.50
DL-1000 1kW Dummy Load 50 ohm	£37.95
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Oscerblock SWR200B Twin Meter	£40.19
HyMound HK708	£10.50
Katsumi EK150 Electronic Keyer	£79.00
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Full Range of Insulators - plus Valves - Etc.	
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HQ1 Mini Beam	£96.00
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Diawa 144 Mhz and 70 cms Antennas in stock

F.D.K.	
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Multi-700EX Transceiver	£199.00

R517 Hand Held Tunable 118.144MHz plus Crystal Control on three Fixed Frequencies. **UNDER £50inc. VAT**




£258.75

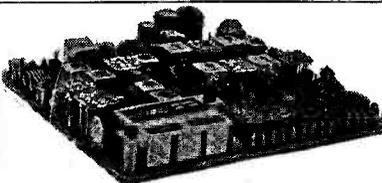
BEARCAT 220 FB
Specifications.
Frequency range:
66 - 88 MHz
118 - 136 MHz
144 - 148 MHz
148 - 174 MHz
420 - 450 MHz
460 - 470 MHz
470 - 512 MHz

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C8800 2M FM Mobile Transceiver	£252.00
G-WHIP	
Tribander Helical 10-15-20m	£24.72
LF Coils for Tribander	£6.55
LF Telescopic Whip Section	£3.35
Basemount standard type	£4.48
Multimobile 7B, 10-15-20m	£28.75
MM Coils	£6.55
MM Telescopic whip section	£3.33
Flexiwhip basic 10 metres section	£17.25
Basemount standard	£6.32
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Coils for Flexiwhip	£0.75
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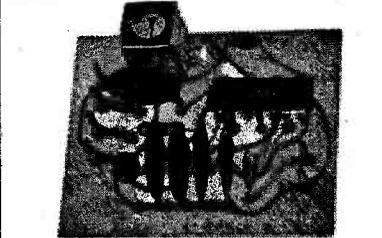
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TR7 Digital Transceiver	£1035.00
PS7 Power supply	£207.00
RV7 Remote VFO	£136.00
MS7 Speaker	£29.90
R7 Digital Receiver	£989.00
Filters for TR7	£39.10
FA7 Fan for TR7	£20.70
MM7 ATU/RF Meter 250 Watts	£124.20
MM2700 ATU 2 KW	£207.00
DL300 Dummy Load 300watts	£20.70
DL1000 Dummy Load 1KW	£37.95
TV3300 Low Pass Filter	£18.40
AK75, Doublet Antenna 132' top with 470 ohm Feeder	£23.00

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MML144/40 40 watt Linear Amplifier	£69.00
MMA144V 2m RF Switched preamplifier	£29.90
MML432/20 Lin Amp and Pre-amp	£69.00
MMT144/28 2m Transverter	£99.00
MMT432/28S 70cm Transverter	£136.85
MMT432/144R 70cm Transverter	£173.65
MMT70/144 4m Transverter	£115.00
MML144/25 2m 25 watt Linear	£48.30
MML144/100 2m 100 watt Linear	£142.60
MMC70/28 4m Converter	£24.90
MMC144/28LO 2m Converter	£26.90
MMC432/28S 70cm Converter	£29.90
MM1296/144 23cm Converter	£32.20
MMD050/500 500MHz freq. coner	£69.00

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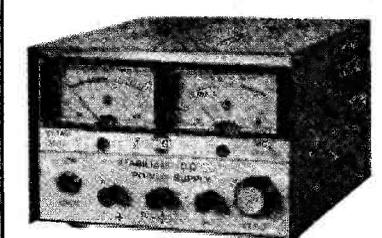


455 kHz FM DISCRIMINATOR AMPLIFIER. Limiting threshold 100uV. Amplitude modulation rejection 40dB. Audio output voltage at 1 kHz 20-300mV frequency deviation ± 3kHz. **Price £5.00**

SECONDHAND EQUIPMENT
We have a very rapid change over of secondhand equipment, especially in receivers. Our lists are updated each day, please send SAE for latest or telephone. Here are a few of the items from our range. All prices include VAT.

Racal RA1218 Receiver	£1,500.00
Trio RB20 Receiver	£525.00
Drake R4C + CW Filter	£400.00
Drake TR4C HF Transceiver MS4S Speaker/power supply	£395.00
Eddystone EC958/9 Solid State Digital readout Receiver AM/FM/CW/SSB 10kHz to 30MHz	£1,200.00
Icom IC701 HF Solid State Transceiver	£560.00
Swan 10CMX Transceiver + AC PSU	£450.00
Drake TR4CW Transceiver No 4 Speaker PSU	£465.00
Collins 75S3A Amateur Band Receiver	£275.00

SOLID STATE STABILISED POWER SUPPLIES	
Maximum ratings quoted. Prices include postage.	
Model 122 12.6V 2.5A	£15.55
Model 125 10-15V 6 amp	£28.00
Model 156S 4-15V 6 amp Twin Meter	£40.00
Model 1210S 4-20V 10 amp Twin Meter	£85.00
Model 1210/1 10amp 13v	£68.00
Model 1220/1 13.5V 20 amp	£90.00
Model 1220/2 13.5V 12 amp	£80.00



Mod. 1210 S

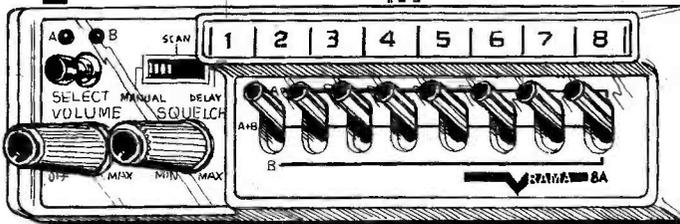
STEPHENS-JAMES LTD.

47 WARRINGTON ROAD, LEIGH, LANCs. WN7 3EA
Telephone (0942) 676790

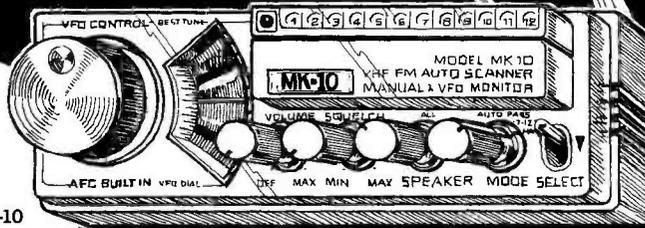
LEICESTER EXHIBITION - November 6-7-8th.



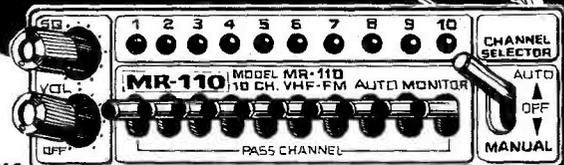
AMATEUR RADIO EXCHANGE



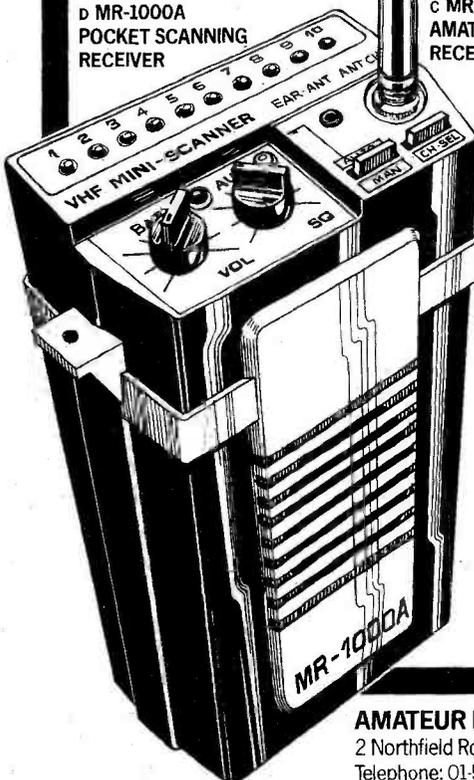
**A RAMA-8A
AIR-BAND
SCANNER**



**B MK-10
AMATEUR-BAND
RECEIVER**



**C MR-110
AMATEUR-BAND
RECEIVER**



**D MR-1000A
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A really competitive range of scanning receivers, all offering top-grade technical specifications and unbelievable value for money. Come and try them in the shop, or phone your orders and enquiries (24-hour answer service when we're closed).

A RAMA-8A 16-channel capability crystal-controlled air-band scanning receiver, covering 108–136 MHz. Choose 8 or 16-channel scanning, or manual operation. Sensitivity $1\mu\text{v}$ (10 db S/N). 12v or mains. **BASIC PRICE £79.**

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D MR-1000A The finest-value pocket receiver ever offered. VHF scanner, 10 channels, and allowing scan or manual tuning across selected crystal-controlled channels. Complete with Nicads and charger. **BASIC PRICE ONLY £39.**

**CRYSTALS: £2 PER CHANNEL FOR ALL MODELS.
ALL PRICES ARE POST-FREE AND INCLUDE VAT.**

AMATEUR RADIO EXCHANGE,
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Telephone: 01-579 5311.

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Keysers EK 150 (semi/fully auto with monitor) 240/12v	£74.00	(—)
Power Supplies PM 103 3-12v ½ A	£14.00	(£0.75)
Power Supplies SP 134 13.8v 4A	£22.95	(£1.00)
Power Supplies PH 5000 13.8v 5A cont (7A max)	£46.00	(£1.50)
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The SHORT WAVE Magazine

EDITORIAL

Green Paper

The Government's Green Paper, "Open Channel", quite cogently sets out the reasons for selecting 928 MHz as an appropriate frequency, given the range they consider to be suitable for this facility. However, while it makes great efforts to avoid tangling with TV by its choice, no mention is made that images of the receiver may well fall into the area occupied by civil and military SSR (and *vice-versa* for that matter).

A highly disturbing point that emerges from this document is the implicit assumption that the Home Office will be quite unable to control Open Channel — a result, presumably, of their observation of CB overseas, where without exception administrative control has been completely lost.

Putting OC at 928 MHz should at least protect amateur radio from being blamed for all the TVI which would result from OC on 27 MHz, but if the Home Office cannot control things who is going to initiate prosecutions arising from the *continued illegal use of the thousands of sets on 27 MHz?* Who on earth is going to defend us from being blamed for the TVI they cause? One of the most frustrating and upsetting aspects of this whole affair is the widespread and increasing confusion in the public mind over the difference between Amateur Radio and CB: rapidly, the two are being lumped together as "those people who muck about with radios causing all this trouble".

On this last point, it is absolutely vital that everyone connected with, and involved in, amateur radio should wherever and whenever possible, starting now, spell out the differences between the two leaving no room for misunderstanding: to next door neighbours, pals in the pub, members of the local R/C club, colleagues at work, your MP, the local police, by letters to the local and national press — the list is unending. Unless this is done, then when the situation becomes even smellier than it is already, we shall have lost a great deal of hard-to-regain public tolerance which could have widespread repercussions.

A wider view could be more generous (the implication here of 'live and let live' is intentional), but from the purely amateur radio standpoint, CB (OC) is nothing short of a bastard concept and in the end we can look only to ourselves (meaning essentially the RSGB of course) to protect our proper interests. But here we are reminded of the 'position of integrity' mentioned in this piece in the August issue.

The point really is that in theory, in the perfect world, Amateur Radio and CB could co-exist quite happily together; what we fear is that the practice (the real world) will be something totally different.

MCC

The thirty-fourth "Magazine Club Contest" will be fought out over the week-end November 15-16. Rules and details appear in *Clubs Roundup* in this issue. Better start the preparations now!

Letters to the Editor

In response to many requests, a regular monthly letters page — "A Word in Edgeways" — will begin with next February's issue. Letters may be on any topic related to amateur radio, and can express any view or criticism; we shall publish as many as space allows. By the way, naturally we include ourselves as a possible 'topic', though letters intended for publication in this new feature which bear on the *Magazine* will not be answered personally, but, where appropriate, in print. Deadline for letters to arrive will be four weeks prior to publication date; this means that for the February issue the deadline is January 2nd (we'll give you the odd reminder of this date in the next couple of issues). Address all your letters for this page to "A Word in Edgeways", Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ. So reach for your pen and let your feelings go!

Talking of change, no doubt many readers will have noticed that several recent issues have been thicker than usual; pressures to expand mean that by this time next year *Short Wave Magazine* is likely to be a considerably larger publication.

Leicester

We shall be there again, looking forward to meeting friends old and new. Held as usual at the Granby Halls, Leicester, the dates to note in your diary are 6th, 7th and 8th November. Hoping to see *you* at the premier exhibition of the year.

Articles

The era of the microprocessor is well and truly with us, and we should particularly, though by no means exclusively, like to consider for publication your offerings on this topic. Any takers? Don't forget, any article published is eligible for the annual *Magazine* prize.

WORLD-WIDE COMMUNICATION

VHF BANDS

NORMAN FITCH, G3FPK

Repeater Topics

TO avoid co-channel interference from GB3LW in central London, the UHF relay, GB3BK, in Upper Basildon has changed from channel RB6 to RB11 (434.875 MHz input, 433.275 MHz output).

Following the comments in the June feature on the gross abuse of the London VHF repeaters, correspondence with the RSGB and Home Office reveals that while both bodies deplore the present state of affairs, neither is prepared to close them down thus denying their availability to those licensed amateurs who may wish to use them.

At the moment, the current Wireless Telegraphy Act is to blame for the apparent inaction in stopping unlicensed operators from using the relays. It seems that to obtain a conviction, a pirate must be actually caught in the act of transmitting and, even when so apprehended, the Post Office personnel do not have the power to impound the equipment being used. Therefore, this important piece of evidence cannot be produced later in court since, in most cases, the pirate would have sold it in the meantime.

Your scribe understands that the necessary amendments to the W.T.A. have been drafted and have been with the Home Office for some time. They will tidy up the loose ends and grey areas of the present Act in such aspects as possessing transmitting gear without having the licence to operate it. If this were implemented, the pirate situation could be transformed from the current mess whereby authorities are virtually powerless to deal with the problem.

However, it appears that these essential amendments have been pigeon-holed somewhere in the higher echelons of the Home Office and, unless somebody kicks up a fuss and starts asking some awkward questions, there the matter could rest. There must be

thousands of radio amateurs who are justifiably incensed by the present anarchy on the 2m. band in particular. Therefore, it is up to those who feel strongly that something must be done, and soon, to restore some semblance of order, to use the Parliamentary process to get some action. This means writing to your Member of Parliament, briefly outlining the problem, mentioning that you understand the necessary revisions to the W.T.A. have been drafted but that someone in the Home Office is sitting on the thing. A request for your M.P. to make inquiries of the Secretary of State at the H.O. would result in at least his initiating some action. If enough people take the trouble to start asking questions, it could well result in someone being told to extract his digit!

The Radio Regulatory Department of the Home Office has confirmed that the following three call signs heard regularly on the 2m. repeaters, on FM simplex frequencies, and sometimes on SSB are not currently issued; these are:—G8RGE, whose name is Carol; G8HWC, Steve, and G8HLL, Bill. A Post Office contact has estimated that there are possibly one hundred pirates operating illegally, the majority being known. As soon as the amendments to the W.T. Act are ratified, they can be dealt with.

Satellite News

AMSAT has altered the mode schedule for *Oscar 8* which is now:—Sat. and Sun., Mode "J"; Mon. and Thurs., Mode "A" and Tues. and Fri., Modes "A" and "J". 0.7 is quite often not in the scheduled mode. As it is not possible to correct this situation, the only advice is to check both modes and use whichever one it happens to be in.

The first satellite *Worked All Continents* has been completed by W0CA who had contacts with CN8, G, KH6, HC, UA0 and W. The European Space Agency has confirmed that the *Phase 3 B* AMSAT satellite can be accommodated on an *ARIANE* launch scheduled for Mid-February, 1982. It seems that AMSAT can get the *A-0-9* replacement ready by that date.

Meteor Scatter

There can be no disputing that MS is a growth mode on VHF. Although high *e.r.p.* helps, many readers are having considerable success with 100 watts of RF to single *Yagi* aerials. Representative of these is Ken Willis, G8VR, (Kent)

who uses a QQV06-40 output valve with 600 volts on the anodes and a 10-ele. *Yagi*. Ken continues to make progress with MSCW operation and says he finds it the most exciting form of *ham radio* he has encountered in his 43 years on the air, even including the 432 MHz *E-M-E* work with which he is involved. During and after the *Perseids* he had several good contacts, notably with SR6ASD (HL); SP4ERZ (KN); OE5KE (HI); HG6KNB (JI); EA3AIR (BB); SM5DRV (HR); SM3AZV (IX); SM7GWU (HS); SM5CHK (HS) and 13TJQ (GF). This has raised his countries worked total to 22. Ken writes that Martin Adams, G4IYA, (Kent) is another MS enthusiast and that he, too, has notched up 22 countries in a relatively short time on 2m., partly thanks to this mode.

John Hunter, G3IMV, (Bucks.) was very active on MS in August. On the 3rd, he worked YU1ADN (KD) and on the 8th E12VAH (UN). The next day, SP2DFW (JM) was netted and the best day in the *Perseids* was the 11th when he worked SP4ERZ (KN); YU2CCB (IF); OK2SGY/P (IJ); OH5LK (NU) and UA3LBO (QO). On the 12th UQ2NX (MR) was added and John got a 30 secs. burst from him. Random SSB brought in F1JG (CD); SM5FRH (HT) and HG6KVB (KH).

Ian Lucking, G8RNM, (London) was a member of the "UN" team that journeyed to northwest Ireland for some concentrated MS work. Most of the gear was provided by ON5FF and ON6UG. They had intended to operate from UO80 but found that the only way up would have been by helicopter. Accordingly, they settled for UN10c which was accessible by van. Ian was impressed with the very well organised stations of Marc and Freddie. They had two sets of purpose made masts with rotators. For 70cm., they had a 4 × 21-ele. *Yagi* array and a 16-ele. *Yagi* for 2m. on each mast.

The weather was quite appalling but the gear all worked perfectly apart from a voltage regulator failure in the generator which resulted in a 50 Hz supply voltage of 300! By reducing the speed, they got the voltage down to 240 but at around 40 Hz, so that the transformers got rather hot. No less than 110 MS' QSOs were completed, 33 in the contest. They had one QSO on 70cm. MS with SK6AB for the first EI/SM QSO on this band. This was completed in spite of the fact that the 0.7 dB. *N.F. GasFet* had been destroyed by

the inadvertent application of many watts of RF. There has been nothing but praise for this very successful expedition. It is satisfying when everything comes up to expectations in contrast to some others which have gone off like a damp squib.

Edmund Ramm, DK3UZ (EN20c) thought this year's *Perseids* the best yet in which he has operated. He worked on the random SSB frequency, had lots of fun, and was hoarse for days afterwards. Eddi's list comprises; EI2VAH, YU1NOP (KE); OH7UE (OW); I4BXN; F1JG; F1DPU; EA3ADW (BB); G3ZYY (XK); F1EUK (XH); F1FJM (AH); I5MZY (FD); I1BEP (DE); EA3LL (AB); G14GID (WO) and OK3AU (KI).

José M^a Gené Llagostera, EA3LL, (AB56h) is now up to 185 squares on 2m. many via MS, using SSB. On Aug. 1, he completed with G4DEZ and, during the *Perseids*, G18JPG, GM5CJF and GW8MJD. José also made the first Spain to Norway QSOs on 2m. during this shower with LA6HL, followed by LA2PT, a QRB of 2,155 km. Skeds with G8OPR and G8IHT were incomplete. He is still looking for GD and GJ and would welcome SSBMS proposals from either of those countries.

Bill Hodgson, G3BW, (Cumbria) lists some nice stations worked during the *Perseids* over Aug. 11/12. *Viz*; OK1BMW/P; OH3YW (MU); SP2DFW (JM); I3LGP (GF); SM7GWU; SP4ERZ; DF2HC (FN); HG1KYY (1H); SM5CMQ (HS); SM5CHK; EA3AIR. On the 13th, Y22UL (HL), while the next day, OE5KE replied to a CQ call. The 17th saw a QSO with I1BEP (DE) with SM3AZV worked the following day. Bill did not think conditions any better than in previous years but points out that MS working certainly encourages one to extract the last fraction of a dB. from the station. He appears to have mixed feelings about holding a contest during a major shower but does, nevertheless, congratulate the organizers in their attempt to encourage MS activity. He thinks the rule about exchanging the first two letters of one's QTH locator is excellent.

Mike Lee, G3VYF, (Essex) works most of his MS on CW. His August tally reads: 6th SM5DRV (HR); 7th SM3FGL (IV); 9th SM0FFS (JT); 10th YU1ADN (KD) and SP2DFW; 11th SP2DX (JO); UR2RQT (MS) and EA3AIR; 12th SM4ANQ (HU); UK2BAB (MO) with whom "47"

THREE BAND ANNUAL VHF TABLE
January to December 1980

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G4CMV	50	6	71	19	53	12	211
G4HNS	41	5	59	12	43	9	169
GD2HDZ	45	6	58	13	38	7	167
G8OPR	—	—	65	23	51	8	147
G8GXE	—	—	63	17	51	9	140
G3BW	—	—	70	25	37	7	139
GJ4ICD	—	—	61	25	42	10	138
G3PBV	15	4	56	13	41	9	138
G4BYP	36	5	49	11	23	4	128
G8VLQ	—	—	66	16	34	8	124
G8IHT	—	—	61	11	41	9	122
G8FMK	—	—	60	12	40	7	119
G3FJ	39	6	44	10	16	3	118
G8MFJ	—	—	62	16	30	7	115
G8HHI	—	—	55	11	40	9	115
G8TFI	—	—	54	16	25	7	102
G4DEZ	—	—	69	29	—	—	98
G3FPK	—	—	68	20	—	—	88
G4IGO	—	—	59	28	—	—	87
GBKAX	—	—	38	10	31	8	87
G3CO	22	3	36	11	9	4	85
G8KGF	—	—	48	14	17	6	85
G4ERX	15	2	30	10	18	8	83
G8VR	5	1	53	20	—	—	79
G4FKI	36	5	19	5	6	3	74
G8RWG	—	—	58	14	—	—	72
G3KPU	—	—	33	5	28	6	72
CW3CBY	18	5	27	8	8	4	70
G4ARI	12	2	44	7	—	—	65
G3EKP	22	5	18	6	8	5	64
G8TIN	—	—	51	12	—	—	63
G4HGT	—	—	56	7	—	—	63
G8VJJ	—	—	50	11	—	—	61
G8JJR	—	—	28	7	19	1	55
GM8TSI	—	—	42	9	1	2	54
G8RZA	—	—	41	10	—	—	51
G8VVF	—	—	42	6	—	—	48
G4BWG	—	—	20	11	9	6	46
GW3MHW	40	5	—	—	—	—	45
G8JGK	—	—	34	9	—	—	43
GM8MNG	—	—	33	5	—	—	38

reports were exchanged with a 44 secs. burst; SP4ERZ, and OK3KCM (JI) on random SSB; 13th HG4KXE (JE) and OZ4EM (HP). Mike did not quite complete with UQ2NX and OH5LK on CW.

Ken Osborne, G4IGO, (Bristol) only completed one *Perseids* sked with SM0FSK/3 (GY). However, on random SSB, he worked many of the 28 stations from 11 countries heard including; on the 11th OE30BC (II) and OE1JKL in the same burst as the finish of the OE contact; on the 12th DF3RU (FJ); SM5CHK; YU1NPW (KE); Y22ME (HM); OE5JFL (GI); EA3ADW; HG1YA (IH); YU2RGO (HF); F1JG; I4BXN (FE); YU2CMS (IG); OE3OBC again. Best DX heard was LZ1AB (LC). Ken has received s.w.l. reports of a dubious nature from QO and PT squares for a contact with DM2DQO on 13-8-79 reported in this column and in *DUBUS*.

George Gullis, G8MFJ, (Wilts.) has his *Trio* TS-120V, transverter and *Nag*

amplifier going well now. Three of his five MS skeds so far have come off; SM5CHK on Aug. 11th and I3FGX (FF) and DF2HC on the 12th. Dave Cox, G8OPR, (Hants.) took a couple of days off for the *Perseids*. On Aug. 7, OK1DIG (HK) was worked in 50 mins. and on the 9th OZ1OF (EQ) while the 10th brought SM7AED (GQ). During the period 11-13, Dave's skeds came off with: IV3HWT (GF); SM4GGC (GT); OK3TJK (II); OZ1EKI (EP); I6WJB (HC) and YU3ES (GF). Random SSB operation brought in DF3RU, I4BXN, OE3OBC, F1JG with YU2RGO (HF) the best QSO completed in one burst.

Bob Lane, G8VLQ, (S. Yorks.) had a go on the 13th and completed with OK1KKH in 26 mins. Skeds with SM3DCX and YU3CAB/3 did not come off. From Co. Antrim, Darrell Mawhinney, G18JPG, managed 8 new squares and 3 new countries in the *Perseids*. His SSB successes were: DC7HM (GM); OE5KE; PE1BTX/LX (CJ); DF3RU; PA2GER (CL); I4BXN; SM5DRV; DC7MH (GM); SM0DJW

(IS); DF6OB (FM); OK1DIG and EA3LL.

From Jersey, Geoff Brown, GJ4ICD, clocked up 21,000 points in the MS contest. He found two new squares on the 11th in YU3ULM (GF) and HG5KDQ (KH) with HG1YA (IH) the next day. Mick Allmark writes that he, Kevin Jackson, with G3ZXZ and G8MJD operated from XN49f for the shower and worked DJ5MS and OK1DIG on the 10th through skeds, and PE1AMX and OE6LOG/6 on random SSB mode. On the 11th they were in XM17c and worked HG1YA with "38" reports each way on 144.200 MHz. Many others were heard. The weather was very bad the next day with a Force 8 gale blowing so the 4 x 9-ele. *Yagis* were replaced by a 16-ele. beam with which G3ZXZ contacted F1EXG. The Wx. was better on the 13th and SSB skeds with OK1DIG and EA3LL were successful. SM4COK was also worked on CW without a keyer!

Four Metres

Dave Sellars, G3PBV, (Devon) managed another 7 counties including Jersey for a new 1980 country during the contest on Aug. 17. Alan Scott, G4BYP, (Cheshire) collected Surrey, Essex and Kent during August — G3WBN, G4FKI and G3RQZ respectively. He found conditions poor for the contest with "... only average participation, not too encouraging for those who may be dithering on the brink of equipping for this band."

Clive Morton, G4CMV, (W. Yorks.) agrees on the contest conditions although the GMs were strong off the back of his beam, specially resurrected for the occasion. 14 new 1980 counties resulted from this effort. Dave Thorpe, G4FKI, (Essex) is looking for EI and GI skeds for 4m. and his best DX in August was GM3XBY/P. Gary Allitt, G4HNS, was going well in said contest and had worked 15 new countries when a TVI complaint necessitated QRT in the afternoon. He worked 52 stations. G8VR is now on 4m. with 5 counties worked but Ken did not divulge anything about the gear.

From the Isle of Man, Arthur Breese, GD2HDZ, made 45 QSOs in the contest including GJ3YHU/A for a long haul in the prevailing conditions. John Baker, GW3MHW, (Dyfed) is a champion of the band which he reckons is the nearest thing to the way *ham radio* used to be; no QRM, politeness and

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3POI	—	—	294	294
I4EAT	—	25	238	263
G3VYF	—	74	183	257
DK3UZ	—	—	241	241
GJ4ICD	—	66	174	240
G3IMV	—	—	230	230
G3JXN	39	81	107	227
G4CMV	13	57	152	222
G8HVV	12	73	130	215
G8GML	11	74	122	207
EA3LL	—	15	185	200
9H1CD	—	13	178	191
G4ERG	—	16	174	190
G3CHN	—	—	190	190
G8LEF	22	62	101	185
G3COJ	24	66	93	183
G3SEK	—	—	182	182
GJ8KNV	2	54	119	175
9H1BT	—	11	163	174
G3BW	3	26	140	169
G3FPK	—	—	167	167
GM4COK	—	12	154	166
G8ATK	5	52	107	164
GM4CXP	—	25	136	161
G4BWG	—	32	125	157
G3KEQ	—	—	157	157
G4IJE	—	—	157	157
G4IGO	—	—	150	150
G2AXI	2	54	93	149
G8HHI	1	40	107	148
G8LHT	7	39	98	144
G30HC	4	33	104	141
G8OPR	1	36	102	139
G3PBV	6	42	91	139
G4AWU	—	22	110	132
GD2HDZ	12	41	76	129
G4DEZ	—	—	128	128
G4HYD	—	40	83	123
G8GXE	6	40	73	119
G8LGL	—	17	101	118
G8MFI	—	22	96	118
G3SPJ	10	36	71	117
G3KPU	—	25	91	116
G8KGF	1	20	95	115
G4ERN	1	41	72	114
G8IFT	14	30	68	112
G8IXG	—	—	111	111
G8TFI	—	32	77	109
G8KAX	2	40	66	108
G4FBK	—	5	100	105
GJ3RAX	1	27	74	102
GM8NCM	—	12	84	96
G8FMK	12	48	35	95
G4AEZ	5	29	61	95
G3FJI	—	27	68	95
G8KPL	—	7	87	94
G18EWM	—	25	67	92
G8LFJ	—	1	91	91
G6UW	—	1	89	90
G8VLQ	—	29	60	89
G4GEE	—	28	60	88
G8JJR	—	9	78	87
G8JAG	—	7	79	86
G4GHA	—	—	79	79
G8KSP	—	2	76	78
G8VR	—	—	76	76
G8RMA	—	5	57	62
G4GXT	—	1	56	57
G4GSA	—	6	51	57
G8TGM	—	—	54	54
G8JGK	—	—	52	52
G4HFO	—	15	36	51
G8PRG	—	12	39	51
G8RWG	—	—	50	50
G8VFW	—	—	22	22

Starting Date January 1, 1975. No satellite or repeater QSOs.

plenty of space. He reports keen interest in the 0830 local time net on 3718 kHz where 4m. folk congregate daily. John now has his 6-ele. beam at 45ft. on a tower made from scaffold tubes and clamps and threatens to stack another 6-ele. beam above it soon. Since

increasing the height, he has worked G3FDW (Notts.) twice on SSB, also G8VN in Derbys. He reports many strong signals during the contest with no poor ones. Due to the welcome increase in activity, his nightly sked with G2AOK has been moved from 70.205 to 70.225 MHz to avoid QRM. A mains transformer has blown up in John's Tx at his Powys QTH so he is not QRV from there at present. He mentions that Peter Mathews, G3BPM, (Middx.) has recently returned to 4m. and comes in well to Dyfed in spite of his mere 20ft. *a.s.l.* site. Finally, GM3MHW welcomes *s.w.l.* reports from distant listeners.

Two metres

As usual, this is the band where it has all been happening. There have been several periods of excellent tropo. and the odd *Aurora*. Writing from Kaltkirchen on Sept. 3, DK3UZ starts, "What an opening it was!" referring to the very extensive tropo. event that started on Sept. 2. Eddi's list includes Fs in AG, BI, CH, YH, YI locators with F1EWG (ZD48j) the best DX. He got over to G3ZYY (XK49d) but says that the hordes of Scandinavians were not DX for him. From Reus (AB56b), EA3LL, writing on Aug. 26, reports consistently fine tropo. propagation to the east with Italians workable between 800 and 1300 kms. on a daily basis. The best DX stations are from Malta, with Paul Galea, 9H1BT, the outstanding one, even on 500 *milliwatts!* By contrast, the northerly direction has been poor with only one G heard in July and August.

José details this year's *E's* from AB, the first session of which was a bit later than expected, on June 1. The best period was July 11-13 over which three days he had 80, 45 and 50 QSOs respectively. Gs worked on the 11th were G8OBS, G8MJD, GW3MFY, G3PPT, GW8ELR and G3LSD. The best DX on the 13th was LZ2FA (ND40g). Further *E's* occurred on July 20, then on the 31st when 35 stations in I, LZ, YO and YU were contacted, the last opening being on Aug. 9 — OE6FGG in HH, at 1819. José's biggest disappointment was only working the few Gs on July 11th, when EA6FB in Ibiza had 30 QSOs. He heard nothing from EI2VGN on the 13th when he was coming into Valencia (ZZ49) for 30 mins. Next year, he will try elevating his aerials. From Brussels, Jean-Louis Delpont sent a listener report covering

some E's happenings from June 10th, through July 13th. These include:— LZ2FA at 1706 on June 10th; 9HIBT at 1843 and 1904 on June 30th; EA6AU (BZ55a) at 1748 on July 11th plus ZB2VHF (XW64g) up to 1851; CT1AIF (VB) at 1839 on July 13th and EA7CR (WX66h) at 1912 the same day. Jean-Louis uses an FRG-7000 Rx from *Yaesu* with converter and the aerial is a crossed Yagi of 12 dB. gain.

John Heys, G3BDQ, (E. Sussex) did well in the Sept. 2nd tropo. opening between 1913 and 2050. His catches include OK1KKH/P (HJ06c) on CW and the rare Bornholm Is. in the shape of OZ1BJF (HP75h). He contacted lots of East Germans in FK and HN squares, plus OZs and SMs in GP, etc. Afterwards, he learned that stations in Southampton and Poole heard him working all this DX which was undetectable along the south coast further west. On the 3rd, John worked more Germans in EK, FJ and FK, Y24XN (GK) and was called by OK1MBS (HK48a) on SSB at 1838. Best DX on the 4th was to FJ square and at 2013 on the 6th John worked EA2HO (ZD63a) on the key. On the 7th HB9MUK/P (DH50e) was QSO-ed.

G3BW caught the *Ar* on Aug. 16 which brought in the usual LA, SM and northern GMs. Additionally, it provided Bill with three new squares:—

OH2BBF (LT15b); LA2D (DU50g) and LA8OW (EU31g). Jack Mitchell, G3KEQ, (S. Croydon) was in on this event from 1615-1800 and got three SMs in GT, HR and HS, LA7KK (FU) and GM4FZH (YS). The event confirmed G3PBV's poor take-off to the north, the only stations heard from Newton Abbot being GM3OUR/P working lots of SMs, and GM4IAO. However, Dave did take advantage of the various tropo openings in August and heard beacon FX5THF (AC08d) several times. He says it seems to have settled on 144.146 MHz now and does not shift 3 kHz HF when it keys. Stations in AC, CD and ZD squares have been worked, plus EA1ED (VD) over a 150ft. hill only 200 yards away. On Aug. 25, HB9MFL/P was contacted at 1814. Contact of the month was G8AXZ/P (ZP) for the first ever Northumberland QSO. On Aug. 9, Dave had a short E's burst from IS0RHF at 1805. In the Sept. 2 fun, between 1700 and 1900, 12 Germans, 3 Swiss and 8 French stations were contacted including into EM, FH and FM squares.

G3VYF was on for the Sept. 2 event and worked 12AV (EF46j) in Milan for a new square, along with 8 HB9s. G4CMV's letter starts with the Aug. 2 tropo. across the North Sea when DL0IH (DO) in Heligoland was a welcome new one. Clive's best DX was OZ1FKZ/A. Nothing spectacular emerged in the QRP contest on Aug. 3 and G4CRC/P in Cornwall and GM8MJV/P in the Borders were each good signals. Aug. 9/10 saw good propagation to France, the best DX being F1EWG (ZD) with EA1CV heard at S7. The Aug. 16 *Ar* produced one QSO with SM4GGC (GT80c) and a 53a report from 15 watts of CW. The 2m. amplifier is now complete so expect a big signal from Queensbury henceforth.

John Cleaton, G4GHA, (Dorset) has mended his amplifier and has 50 watts available again. He heard many EAs on the evening of Aug. 9 with EA3AQT and 3BBW (ZB) the best. The next day, F1EKU/P (XH) gave a new square. The big lift on Sept. 2 produced F9NL (AD); F6FRR (ZF); F9ON/P (AD) and F6ELI (ZE). In the Sept. 6/7 contest John remarks on the serial numbers of over 1,000 being exchanged by leading stations. Bob Mackean, G4HAO, (Liverpool) reports after a long absence due to A-level studies. He should be in Edinburgh by now. The E's season was a disappointment for him but as some compensation, G15MPS in Armagh and

G18TVK in Tyrone were worked on tropo. around noon on Aug. 24. Bob understands that 2m. activity in Fermanagh is virtually nil. His new *FDK* Multi-750E is performing well and the Rx side has excellent dynamic range and high sensitivity. John Wilkinson, G4HGT, another Liverpool reader, is back in the chase again following the revitalizing of the amplifier with a new valve on Aug. 23. DX worked since includes GM3OUR/P, G15MPS and G4FCC (Northumberland).

G4IGO worked IW0UAM/P — IS0 — in EA16b in a one minute opening on Aug. 3. Tropo. on the 9th produced EA3AQT (ZB1ld) along with EA1s 'CV and 'ED and a few southern Fs. Ken now has a *Trio* TS-700S with which he seems well satisfied. Mike Hearsey, G8ATK (Surrey) worked HB0LL (EH68j) in Liechtenstein during the Sept. 2 opening. Anyone who has been to the Principality may wonder how it is possible to get a VHF signal from there to the U.K. 2m. is full of surprises.

Tony Collett, G8GXE, has been very active again and was on for only the last 45 mins. of the QRP contest, his half-watt raising GW4ERP/P and GW4GZL/P. On the 9th EA3BBW (ZB) was worked and the QSL has arrived. On the 10th F1EKU/P (XH); C31VF (AC29f) were both very nice new ones. The evening of the 25th brought in HB9MFL/P (DH) and EI2DW, both new ones this year. Tony is very pleased with his *muTek* "front end" board which he reckons has greatly improved his receiving capabilities.

John Lemay, G8KAX, (Essex) with Phil Children, G8MDY, and Bob Harrison, G8HGN, operated as GW8MDY/P from the summit of Cader Idris in North Wales in the QRP contest. At 2,920ft. *a.s.l.* they operated by candlelight from the mountain rescue hut, cold, but dry and had some 90 QSOs. Visibility was at least 20ft. at times and the temperature a bracing 50°F! Fellow Essex amateur Jon Stow, G8LFI, worked the rare YG square on Aug. 9 — F6GRC/P — but could not raise F1EPB (BD42j) the next morning. However, C31VF did answer Jon's first call at 1000. On the 25th HB9MFL/P was worked at 1757.

G8MFJ's letter lists some good tropo. DX in August, such as F1FRW/P (AC08d); EA3AQT, F6GRC/P and F1EKU/P on the 9th and F1EWG(ZD) and F6EVT/P (AC07f) on the 20th. Dave Cox, G8OPR, (Hants.) lists some nice tropo. and E's for July including an FM QSO with G8MRB a few miles

TWENTY-THREE CENTIMETRE
ALL-TIME TABLE

Station	Counties	Countries	Total
G3JXN	40	9	49
G3DAH	37	9	46
G6NB	28	7	35
G3NHE	24	5	29
GD2HDZ	21	7	28
G8IFT	23	5	28
G3COJ	19	8	27
G8FMK	24	3	27
G4ALN	20	5	25
G3JVL	21	4	25
G4CMV	19	4	23
G3OBD	20	3	23
G8LEF	16	6	22
G8ARM	20	2	22
G8GML	17	4	21
G8EOP	11	5	16
G5DF	12	2	14
G8AOD	11	2	13
G8GXE	11	1	12
G8LHT	7	3	10
G8AII	7	2	9
G4DKX	7	2	9
G3OHC	8	1	9
G3BW	3	5	8
G8ABH	7	1	8
G8FJG	7	1	8
G8GNZ	4	2	6
G2AXI	5	1	6
G3PBV	5	1	6
G8KAX	4	1	5
G8OPR	3	1	4

Based on current counties/regions.

away, through repeater FZ4THF in ZC07a! On Aug. 22nd he worked F6EVT/P (AC); F1BYM (ZE); F5HB (ZF); F1BUT (AD); EA1CR (XD) and F6FHP/P (AE) who was running one kilowatt to a pair of 16-ele. *Yagis*. G8TIN (Oxen.) now has an *Icom* IC 251E which he christened by working EA3AQT. Roger reckons he will buy a *Nag* amplifier one day.

Welcome to Neil Clarke, G8VVF, from Knottingley, W. Yorks., who enters our tables. His gear comprises an *IC-202* and 30 watts amp. feeding a 12-ele. *ZL-Special* at 32ft. G8VR is not wholly hooked on MS and did manage some good tropo. contacts in August including EI3ABB/M, GM3XNE and folk in Tyne and Wear, Durham and Cumbria. On a short holiday in Scotland, he unpacked his *TS-700* in a hotel room in Moffat (YP) and worked G6WR in Whitehaven and GM3WOJ in Dumfries. The Sept. 2 event brought Ken QSOs with SM7CMV (GP); SM7WT (GP); OZ1EHW (FO) and Y22QG (FM) and a few Germans in EL and EM.

GD2HDZ worked SM5DRV in the *Ar* on Aug. 16 but had to abandon the chase when visitors arrived. GJ4ICD's list includes some choice stuff worked in the Spanish contest on Aug. 2/3 such as EA1CR/P (XC01d) and EDIECO (WD22a). Other stations were worked in BB, BC, VD, YC and YD in this event. Geoff worked EA3BBW (ZB) on the 5th and in the lift of the 10th, F1BHO/P (DD15c). A local worked on Aug. 3 was GU8GTD/P on Herm Is. which does not count as a separate county, though. In the Sept. 2 affair, he stayed up through the night and made 475 QSOs on 2m. and 70cm. with 8 new squares on 2m. Best DX on 2m. was an SM in JT square.

Richard Hope, GW8TVX, (W. Glam.) is back on the band after a change of QTH, with an *Icom* IC-211E and a 9-ele. *Tonna Yagi* at 4m. He has a *Lunar* 80w. amplifier which needed a power supply at the time of writing, which was just too late for the previous month's deadline. An anonymous note, mailed in Glasgow, arrived at the office informing that GM8WEF (Wick), GM4FZH (Halkirk) and GM8UQM (Thurso) are regularly QRV on 2m. monitoring ch. S20. They have SSB too. GM4EFR, GM8ULP and GM8VKT are FM-equipped and more activity is expected soon following a successful

RAE course at Thurso Technical College last season.

Seventy Centimetres

On Aug. 25, G3PBV worked HB9MFL/P but Dave reckons either propagation was not very good to the south, or the local hill to the south is too great an obstacle on this band. On Sept. 2, F9NL (AD) and F1BUU (ZE) were worked in the period 1300-1330, and PA0FRE (CL) at 1630. From 1915, DK5AI (FL); DL7QY (FJ); DK1KN (DK); DK0NA (FK) and a couple of Dutch stations were contacted. G4BYP wonders where all the SSB activity is on the band and says, "Difficult to believe that the G8-plus-threes were once confined to this band."

G4CMV found strong radar QRM to the east on Aug. 2 from 1830 and worked DL0IH (DO) and OZ1FKZ/A, the event fading out by 0100 on the 3rd. On the 25th, G4HNS had QSOs with two Bucks. stations at last, G4BIO and G4IGK, and with G8LZM (Cleveland.) Gary is still looking for Cheshire, Herts., Lancs., and Wilts., though G8GXE's preamp. died at the end of July due to lightning. By Aug. 24, Tony seems to have put it right as he worked G8CVO in Manchester and the next day, G80SW (Durham) and G4HNS (Notts.) On the 30th, G8TFI/P in the Isle of Wight was another new one. Tony seems to get stronger signals from that direction on 70cm. than he does on 2m.

G8VLQ is on the band and has worked G3PBV (YK32b) and GM3YGF/P (ZR41c) on Aug. 25. The Sept. 2/3 lift saw GJ4ICD burning the midnight oil and grabbing 7 new squares in the process. OZ and LX were worked while Phil Johnson, GJ8KNV, worked into SM with 10 watts.

Twenty-three Centimetres

G3BW says he will now be concentrating on the band. The 15-over-15 aerial is up at 55ft. fed with *Andrews* cable and a 2C39 amplifier to follow the *Microwave Modules* transverter is ready for testing. Bill received a quote from *Tranco* in the

U.S.A. for a decent relay. Would you believe £137? Your scribe contacted the participants in the 23cm. all-time table who have not reported in for a long time. Phil Dutfield, G30BD, (Dorset) hopes to be QRV in the autumn *Cumulatives* on 23 and 70cm. John Pinchbeck, G5DF, (N. Yorks.) who used to live in Reading, writes that he has had to discontinue 23cm. activity since there is nobody to work or beacons to hear from Preston-under-Scar in the Wensleydale area. However, he is active on 4m., 2m., and 70cm.

During the Sept. 2 lift, G3PBV had his first QSO outside England with Claus Neie, DL7QY, in FJ square, a QRB of 996 kms. PA0EZ was also heard and GB3AND and GB3BPO were audible, but not all that strong. G3DAH (Kent) was weak and did not hear Dave. G4CMV worked PA0FRE (CL); PE1CNP (CN); DF3XU (FN) and G4BYV (Norfolk) on Aug. 2. On the 26th when strong UHF TV signals were coming from DL and PA, Clive made 11 QSOs with PA, DL and various G counties between 1855 and 0920 the next morning. Beacons PA0QHN (CM) and DB0VC (FO) were heard in this event.

G8GXE finally made it at the sixth attempt with G3AUS on Aug. 19. On the 24th, G8CVO (Manchester) had dropped from S7 to just detectable when Tony tried to raise him, after listening to his attempted QSOs with G30SS and G3TDG. Murphy again! A late piece of news is that, in the Sept. 2 affair, G3AUS (Devon) worked DJ30S (EJ24).

Deadlines

Another packed month and some items have had to be held over. All your contributions for the November piece by October 8 and for the next issue, by Nov. 5. Everything to: "VHF Bands," SHORT WAVE MAGAZINE, 34 HIGH STREET, WELWYN, HERTS., AL6 9EQ. 73-*de* G3FPK.

THE RABBIT PATCH, PART IV

THE SECOND OF FOUR PARTS DESCRIBING THE CONSTRUCTION OF A MULTI-TEST UNIT

BY "BUCK"

General: What theoretical considerations there are concerning the other Sections can most conveniently be dealt with when looking at the constructional details for individual circuits. Which leaves us free to turn our attention to the power supplies required.

Power Supplies

The voltage inputs and approximate current consumptions for the various sections of the Unit are:—

	Volts	Average Current (mA.)
(a) Ohms Range	1.5	0.1
(b) FET Tester	9.0	10
(c) Capacitor Tester	9.0	5
(d) Transistor Tester		
(i) Type Test	9.0	10
(ii) Leakage/Gain Test	3.0	Low 10 High 50

The necessary motivating forces can be provided by several methods. One approach would be to arrange six dry cells of 1.5v. each in series and to tap off the desired voltages. (If this solution is chosen the depth of the casing should be increased to at least 101 mm. to allow sufficient clearance between the wiring and the cells.) In the prototype a 12 volt supply (car battery) was used with voltage dropping resistors in circuit to give the voltages required; Zener diodes could have been used in place of resistors — but at greater cost.

To establish the value of resistor required to drop a voltage to some lower figure the value of the voltage to be dropped (V_d) must be divided by the current flowing in the circuit, (I).

Thus:—

$$R_d = \frac{V_d}{I} \dots \dots (3)$$

Applying this formula enabled the following arrangements to be made which work well in the present Unit, the 12 volt supply being dropped to:—

- (a) 1.5 volts by means of a 105,000 ohm resistor in the supply line.
 - (b) 9 volts by means of a 300 ohm resistor in the supply line.
- These two resistors are located in the casing of the Unit (see Fig. 2). To obtain the 3 volt supply required by the Leakage/Gain part of the Capacitor Tester, the 9 volt supply is further dropped to 3 volts by a 600 ohm resistor included on the sub-chassis (see Figs. 23 and 24).

Case Construction

When the overall size has been finally determined the case can be made from hardboard and 9 mm timber as for previous

items of test equipment. The marking-out and drilling of the front panel should be entirely completed before any components are mounted. A safe approach to the order in which the building should be undertaken would be:—

1. Make and shape case.
2. Mark out and drill front panel.
3. Mount switches, terminals and potentiometer.
4. Mount meters and light emitting diodes, (LEDS).
5. Fix sub-chassis sections and wire-up Sections 'A', 'B', 'C' and 'D', one at a time, and in that order.
6. Test each Section as it is installed, and adjust performance levels to satisfaction before starting on the next.
7. Make and fix legends to front panel and give protective coats of varnish.

Before Stage 5 above is begun, however, the builder must decide upon the precise voltage and current ranges to be covered by the meters.

Determining Meter Ranges

First considerations must be to the values of DC current and voltage to be measured as determined by the outputs of each Section of the Test Unit. Second considerations should be given to general requirements of measurements to be undertaken on external circuits. Third considerations need to be given to preserving the flexibility of use of the three meters. Lastly, consideration must be given to the distribution of the desired ranges between the three meters.

Typical current and voltage outputs from each Section are:—

(a) *FET Testing:* Three measurements need to be made simultaneously:—

- (i) Gate Volts (V_g) 0 to 1v.
- (ii) Gate/Source Volts (V_{gs}) minus 1v. to plus 1v.
- (iii) Drain Current (I_d) 0 to 10 or 20 mA.

(b) *Capacitor and Continuity Tester:* Nil, the output being aurally determined.

(c) *Transistor and Diode Tester:* Depending upon the type of transistor being tested, Low Power or High Power, typical maximum currents will be of the order of:—

- (i) Low Power: 0 to 10 or 20 mA.
- (ii) High Power: 0 to 50 or 100 mA.

For general measuring on external circuits voltages of 0 to 20 volts would seem to be the limit, whilst current values could be up to 250 mA. or so, but might be higher in a few cases.

To preserve flexibility of usage, the three meters should have one range of unmodified f.s.d; this would allow external multipliers or shunts to be included in circuit for those once-in-a-blue-moon occasions — like measuring the potential of storm clouds.

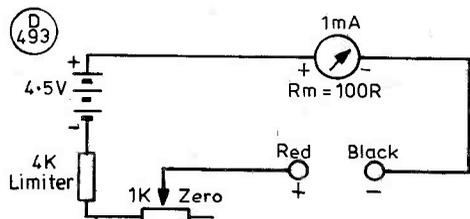


Fig. 7 USING A METER TO MEASURE RESISTANCE

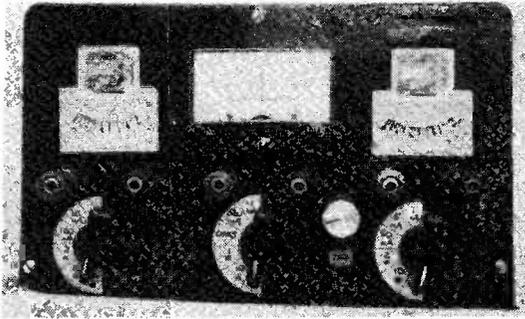


Fig. 8 Close-up of front panel showing meter section.

The distribution of the ranges between the meters is largely determined by circumstances. Thus, the minus 1v. to plus 1v. measurement must obviously go to the 100-0-100 microammeter. The Ohms Range must go to the same meter because this has a nicely calibrated scale which allows resistance readings to be charted conveniently without having to draw in a special ohms scale. For the rest, convenience of providing multiplier and shunt values, and avoiding any danger of 'locking-up' a particular range on one meter which might involve awkward changes between meters whilst measuring, have a place in fixing which-goes-where. The arrangement given below met all the prototype requirements, but can easily be modified:—

	Meter 1 (0-1 mA.)	Meter 2 (100-0-100 μ A.)	Meter 3 (0-1 mA.)
Range 1	100v.	20v.	100v.
Range 2	10v.	10v.	10v.
Range 3	2v.	1v.	2v.
Range 4	100 mA.	Ohms	50 mA.
Range 5	10 mA.	500 mA.	5 mA.
Range 6	1 mA.	0.1 mA.	1 mA.

With the ranges established the values of the shunts and multipliers can be worked out using Formula 1 and Formula 2. At least, they can be worked out once we know the internal resistance of the meter: *Q.E.D.* Mark the R_m on the back of the them, some do not; but whether marked or not they should be measured anyway. For two good reasons: (a) to check that the stated figure is correct, and (b) to satisfy ourselves that our methods are correct by comparing our results with the figure given on the meter.

Determining R_m : Finding the value of the meter resistance is a straightforward business, though it is more complicated in the description than in the event. A Resistance Box will be needed, together with a variable resistance of about 100,000 ohms, and a voltage supply of 1.5v., 3v., or 4.5v. or whatever, but with the lower voltage being the better choice. The meter itself will also be needed, of course.

The first requirement is to determine the true f.s.d. and half-f.s.d. points on the meter scale. If the meter is already scaled then the marked f.s.d. point will have to be accepted, but the half-f.s.d. point should be measured because the scale itself may not be linear; if it is, so much the better. When there is no scale, or when a new scale is to be drawn in, the f.s.d. point must be measured and marked also. For f.s.d. a milliammeter is going to need 1,000 ohms in series with every volt applied to the circuit. A 100 microammeter is going to need 10,000 ohms per volt in circuit to achieve a similar f.s.d.

For Scaled Meters: Connect the dry cell positive to the positive terminal of the meter; the dry cell negative to one terminal of the Resistance Box. Set the Resistance Box to about 100,000 ohms: now connect the other terminal of the Box to the negative terminal of the meter. Slowly reduce the resistance value until the meter needle coincides with the f.s.d. point on the meter scale — note the resistance value at which this occurs (say, 4,500 ohms); now increase the resistance to exactly double (say, 9,000 ohms), and the new position of the needle will be the true half-f.s.d. point. Mark this point on the scale. Disconnect the Resistance Box, leaving the dry cell positive connected to the meter.

Now connect the dry cell negative to the left-hand lug of the potentiometer (viewed from the front); turn the resistance knob fully anti-clockwise (still viewed from the front), to bring the whole of the resistance into circuit; connect the centre tag of the potentiometer to the negative terminal of the meter; slowly reduce the resistance by turning the control clockwise until the meter needle coincides with the f.s.d. Leaving the meter reading at f.s.d., take the Resistance Box and set it to about 1,000 ohms; connect the Box in parallel across the circuit by joining one terminal to meter positive, and the other terminal to meter negative. Vary the Resistance Box value until the meter needle coincides with the true half-f.s.d. point. Note the value at which this occurs for this will be the internal resistance of the meter: *Q.E.D.* Mark the R_m on the back of the meter for future reference.

For unscaled or re-scaled Meters: Without a marked f.s.d. point to guide us, the resistance value required to bring about maximum deflection on the meter must be calculated. The required resistance will be obtained by dividing the applied voltage (say, 1.5v.), by the current required (say, 1 mA. *i.e.* 0.001 amperes); thus, $\frac{1.5v.}{0.001 A.} = 1,500$ ohms.

Setting this value on the Resistance Box and connecting up the circuit as previously described will give the f.s.d. point to be marked on the new scale. (There will generally be some extra movement of the needle possible past this point which should be left as a safety measure.) With the f.s.d. marked the sequence of events follows precisely the pattern given for Scaled Meters.

Determining Shunt and Multiplier Values

Now the shunts and multipliers *can* be worked out and listed. Meter No. 2 has been taken as an example of this process, there being no difference in principle for the other meters — only the values changing.

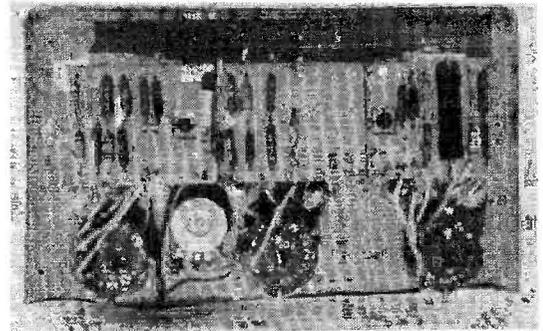


Fig. 9 Close-up of meter section wing.

Voltage range: Required:— 20/10/1 volt ranges.

- R_v = Value of multiplier (ohms)
- R_m = 400 ohms (by measurement)
- E = Full Scale Volts required
- I = 0.1 mA. (100 microamperes)

From Formula 1: $R_v = \frac{(E \times 10^3)}{I} R_m$

- (a) For 20v. range = $\frac{(20 \times 1000)}{0.1} - 400$
= 199,600 ohms
- (b) For 10v. range = $\frac{(10 \times 1000)}{0.1} - 400$
= 99,600 ohms
- (c) For 1v. range = $\frac{(1 \times 1000)}{0.1} - 400$
= 9,600 ohms

Current Range: Required:— 500 mA. and 0.1 mA. ranges.

- R_s = Value of shunt (ohms)
- R_m = 400 ohms (by measurement)
- N = Number of times by which f.s.d. is to be multiplied.

From Formula 2: $R_s = \frac{R_m}{N - 1}$

- (a) For 500 mA. range = $\frac{400}{5000 - 1}$
= 0.08 ohms
- (b) For 0.1 mA. range = Nil

Ohms Range: To measure resistance a current flowing through the meter is reduced by connecting the unknown resistance (R_x) in series. For a given voltage supply a limiting resistance must be connected in series with the meter to produce f.s.d. when the terminals are shorted together. When R_x is equal in value to the limiting resistance the total current flowing through the meter will be halved. The meter will thus read at half, or mid-scale in terms of ohms registered.

Since meter scales tend to be non-linear at either end of their register, the mid-scale-ohms value has an important bearing on the usable range of ohms that can be read over the scale as a whole. For any given meter, the higher the voltage applied to the circuit the higher the limiting resistor value; the higher the mid-scale reading will be; and the higher will be the readable scale values. In the present case there is a 105,000 voltage dropping resistor in series with the limiting resistor of 10,000 ohms and the 5,000 ohms potentiometer, making a total of 120,000 ohms. Hence the mid-scale reading is 120,000 (120 Kohms) and the readable range is from 3 Kohms up to 1 Megohm, with 2 and 3 Megohms just separable at the maximum end. If a 1.5 volt cell were to be switched into circuit in place of the dropped voltage and applied to the 10k and 5k resistors, the mid-scale reading would become 15K and the overall range accordingly divided by 10 approximately.

No provision has been made to carry out this particular range switching, though it could easily be done if needed. For present usage the existing range serves its purpose. Any values outside the range can, if necessary, be brought within the readable scale by the Resistance Box being used in series or parallel as the case may be. For more precise measurements the Ohms section of the yet-to-be-built sensitive instrument previously mentioned will have the facility to read from 0 to about 500,000 ohms over several ranges to give accurate readings. Once the builder has selected the ranges he requires and determined the resistance/voltage values accordingly, a

table can be drawn up for each meter showing the relevant information.

Construction

When the terminal posts, meters and variable resistor have been mounted, a sub-chassis measuring about 165 x 45 x 3 mm. should be fixed on stand-off supports to clear the back of the components. The stand-off pillars will be about 40 mm. high, and can be made from sawn-off lengths of *Biro* pen barrel, having 4 or 6 BA bolts passed through them; or, lengths of 3/8" dowel fixed by means of round headed woodscrews. The wiring should follow the details given in Figs. 10 (a) and 10 (b). More than one resistor can be grouped by the builder to achieve the desired value, the only limitation being that they should all have a power rating of a half-watt or better.

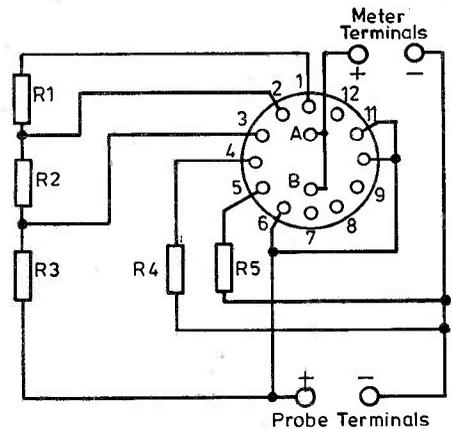


Fig. 10 a. Wiring details of Switch for Meters numbers 1 and 3

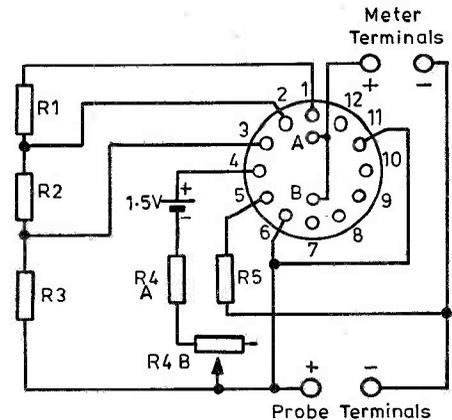


Fig. 10 b Wiring details of Switch for Meter number 2

Fig. 10

D 494

Fig. 10(a) all resistors are mounted on sub-chassis.
Fig. 10(b) all resistors except R4-B are mounted on sub-chassis.

The shunt resistor can be fixed between two panel pins if it is a short length of wire (1/2", or so); or, if using anything similar to the 18" of enamelled copper wire use a 1/2-watt resistor of 1,000 ohms (or higher) as a former. The ends of the shunt can be wrapped around the leads of the resistor without upsetting the shunt values disastrously. (Work out the total effective resistance (R_T) of a 0.8 ohm shunt (R_s) in parallel with a 1,000 ohm former (R_f), using the formula $R_T = \frac{R_s \times R_f}{R_s + R_f}$, and you'll see what I mean.)

Operation

Using the meters presents no problems. Two leads are connected to the meter terminals, a suitable voltage or current range selected, and the flying ends of the leads applied to the circuit under test. Current measurements have to be taken with the meter in series with the circuit. In some cases this would mean unsoldering the circuit at some point to allow the meter to be inserted. Rather than go to this trouble even when it is

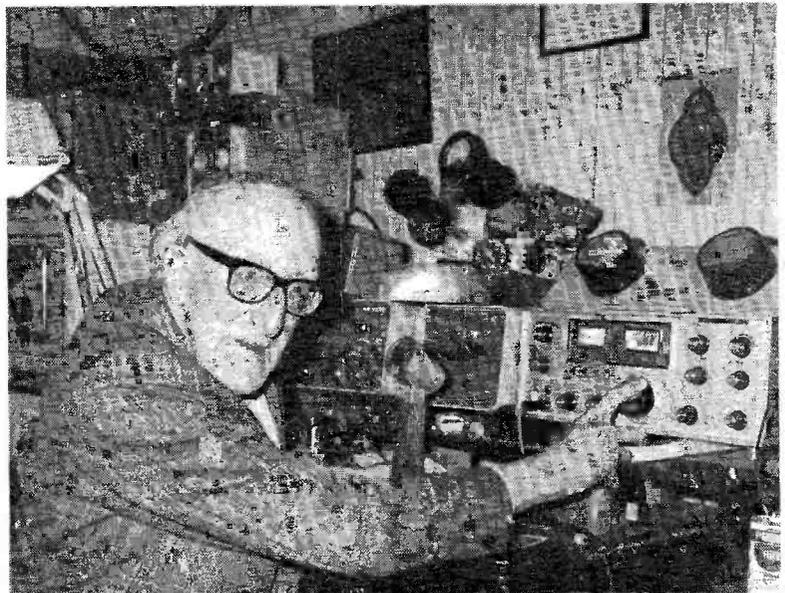
possible (and there are many occasions when it isn't), the generally accepted approach is to rely upon voltage measurements, using Ohm's Law if some indication of current flow is necessary.

To measure resistance the Range Switch is set to "Ohms"; the two ends of the leads touched together (shorted) and the Zero Control adjusted to give f.s.d.; separating the flying leads will cause the meter needle to drop back to zero. If an unknown value of resistance is now put between the flying leads the needle will indicate something between zero and f.s.d. if the resistor value falls within the readable range of the meter. To interpret the meaning of the position of the needle requires the range to be calibrated and for the relevant ohm values to be drawn onto the scale to permit direct reading; or extracted for use in table or graph form. Whichever method is chosen, using the Resistance Box makes calibration a speedy and accurate process.

to be continued

An 87th birthday photograph of Ken Alford, G2DX. Ken, who can be heard every morning on 80 metres, was first licensed in July, 1912, with the call TXK, receiving his present call in 1919. In 1922, G2DX made his first supersonic heterodyne receiver — a ten valver; also in 1922 he first worked the United States, by a QSO with 1PL. Australia came in 1924, when he worked ACVQ on 20 metres. Congratulations, and Many Happy Returns to one of the pioneers of amateur radio!

Photo by G4AJD.



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CLUBS ROUNDUP

BY "Club Secretary"

34th MCC

THIS is the time of year when once again we announce the "Magazine Club Contest", or MCC as it is so well known, to be played off over the week-end November 15-16. This year the Top Band possibilities could make it really novel and interesting, with so many new countries about. While you are getting the club organisation for MCC nailed together, if you work any overseas stations, let *them* know what it's all about and that they are eligible to enter as well. MCC has for long been a training-ground for clubs' new contest operators, and that is why the rules are as they are. And it is, we think, true to say that in MCC the contest ops. make it into one of the most enjoyable of all, and a worthwhile activity for any club to participate in. However, on the Saturday, this is an event which should show up skill in the CW art, rather than *just* being a CW contest. Also, please make up your logs into a fair copy — it's bad enough wading through your own tea-stains, beer-marks, blots, etc., so just imagine what it must be like to cope with a whole pile of logs in the same state: have a heart for the scrutineers!

The rules appear in this issue, and entries must be postmarked not later than 21 days after the contest ends; the results will appear in the February 1981 issue. So . . . DON'T FORGET MCC!

Nationals

Here we start with the **G-QRP Club**, which is the one for the ever-increasing band of enthusiasts for the low-power game, whether they be SWL or licensed; details from the Hon. Sec. — see Panel.

All but the rawest newcomers to the hobby will know of **R.A.I.B.C.** catering as it does for the handicapped and blind in our hobby. It does really deserve your support, and if you know of anyone who should be a full member, you will be doing them a service by putting them in touch with the Hon. Sec., no matter how early it is in their amateur or SWL career, or whether they are equipped or not: one of the clubs objectives is to equip those who need such aid.

A.R.M.S. looks after the mobile interest; the current issue of their club magazine is of interest for a "matchbox" circuit for tuning mobile aerials — the result of some attention by the German police force to the question of amateur radio aerials on the one hand, and DL6UH's attempts to get a better VSWR indication on the other.

The **Ex-G Club** is for those who were born in U.K. but have made their home abroad — for details, contact the Hon. Sec. at the address in the Panel.

WACRAL is a group of amateurs and SWLs, world-wide, united by their common faith in Christianity, with on-the-air nets, and regular newsletters. Details from the Hon. Sec. — see Panel for his address.

"CQ-TV" is the magazine of the **BATC** crowd, and the latest issue to hand includes a vision mixer and an article on the microprocessor and its application to SS/TV. A pleasant change to see the home computer type of box used for something other than games!

Last among the nationals we have **R.N.A.R.S.** for those who have served in the Royal Navy, but associate membership available to members of the Merchant Navy or foreign navies. Details from the Hon. Sec. — see Panel.

Up North

Dumfries and Galloway are to be found on the first and third Mondays of each month in the Cargenholm Hotel, New Abbey Road, Dumfries; the first is generally a social occasion, and the third a more formal session with a talk, films or whatever.

The happy chaps at **York** are still foregathering on Fridays, with the exception of the third one in each month. They welcome (and get lots of) visitors, not to mention prospective new members. Hq is at the United Services Club, 61 Micklegate, York.

Northern Heights seem still to be at the Bradshaw Tavern, every Wednesday evening — details from the Hon. Sec. at the address in the Panel.

Now to **Tyneside**; they would like to remind us all that they have Hq at the Community Centre, Vine Street, Wallsend, where they are to be found on Monday evenings.

Deadlines for "Clubs" for the next three months —

(November issue — September 26th)

December issue — October 31st

January issue — November 28th

February issue — December 31st

Please be sure to note these dates!

Westerlies

This covers quite a spread of territory, starting with **Yeovil**, who are located in Building 101, Houndstone Camp, Yeovil. There is a talk or films, or such, each week save for the last, which is a natter session. Thus, each Thursday the club is open, with a library facility, not to mention the club station.

Problems at **South Dorset** who were, at the time they wrote, looking for a new place to foregather — so the latest gen can be gotten (as our American friends have it) from the Hon. Sec. — see Panel.

Next we visit **Loughor**, at their home with the Loughor Boating Club, where they are to be found fortnightly on Mondays, unless this should fall on a Bank Holiday, when they shift to Tuesday. Details on how to get there can be obtained either by phoning the Hon. Sec. (see Panel) or talk-in by way of the members, either /M on the way or /P on site.

Swansea get together fortnightly on Thursdays, the venue being the Technicians Common Room, on the second floor of College House, University of Swansea.

There seems to be a very strong feminine element at **Plymouth**, with Secretary, Treasurer, and one of the newsletter editors all YLs. They are all to be found, plus the OMs of course, at Tamar Secondary School, Paradise Road, Stoke, Plymouth, on alternate Monday evenings.

October 2 is the date for **Cornish** this time, and the topic Model Control, as usual at the SWEB Clubroom, Pool; Camborne; and when you've found them, expect a closely

packed room — they average over 60 turn-out each month!

Over the water now, to **I.R.T.S.**, where Karen, E12DW, has a newsletter editorial, her theme being the CB business and the QRM being blamed onto the licensed amateur rather than the illegal CB-er. If you want to know about the EI doings, particularly Region 1, or indeed if you want to know a bit about what goes on in GI, the Hon. Sec. of IRTS is probably as good a place as any to start — his address is in the Panel.

Now for a different lot of water, travelling from EI to GJ and the **Jersey** club. It would appear that the GJ8's are becoming a rare breed — good for those who have passed the Morse, and congratulations. The lads get together on October 8 at the Communicare Centre, Quennevais. Another club, incidentally, where YLs are among the membership.

We are indeed sorry to hear that the **Exeter** Hon. Sec. is temporarily out of action, resulting in a new address and name appearing in the Panel. We hope to be hearing that Jack is up and about soon. The group are in session on the second Monday in each month, at the Community Centre, St. Davids Hall, Exeter. On Tuesdays they have a 'network' using 144.0 and 145.0 MHz, on which the latest data on the programme is notified — they have it buttoned-up for the next year on paper, but this allows for any hang-ups. October 13 is down for the AGM.

Finally, **Axe Vale** who have managed to find new QTH, at the George Hotel, Axminster. Details from the Hon. Sec. — see Panel.

Midlands

Our first stop is at **Mexborough** where they have Hq at Dolcliff Hall, Dolcliff Road, Mexborough, with the early starting time of 7.00 p.m. every Friday. More details on the current programme are available from the Hon. Sec. — see Panel.

It's every Thursday *except* the second one in each month at Shevington Conservative Club, for the **Douglas Valley** crowd, who possibly were better known as "Wigan" in the past. The first meeting in each month is the one they try to fill with a talk or other such activity, the third meeting of the month they discuss the club business, and the other is given over to a ragchew.

Now down to **Midland** where there is an AGM on October 21 at Ashton University, although soon they hope to move into new Hq.

Great Yarmouth have a place at 67 Southtown Road, on the last Thursday in each month, and details are available from the Hon. Sec.

On to the Merseyside area now where we have **Ormskirk** at the 'Over-60's Hut' in Liverpool Road, opposite Christ Church, every Tuesday evening from 8.30. More details from the Hon. Sec.

Liverpool have the AGM on October 7, there being in addition a session every Tuesday evening at the Conservative Room, Church Road, Wavertree.

Sefton are a fortnightly group, based on the Liverpool Prison Officers' Club, the booking being for Wednesdays. All the other information is available from the Hon. Sec. at the address in the Panel.

On now to **Derby**, where the regular weekly Wednesday evenings in the top floor at 119 Green Lane continue to be popular. However, at this moment we don't know what they have set up for October — but it'll be worth going to, of that we are sure. Incidentally, note should be taken of the change of phone number for the Hon. Sec.

34TH TOP BAND MCC — 1980 RULES

1. *Place, Date and Time:* Top Band, 1700-2100 GMT, November 15th and 16th.
2. *Mode:* CW only on Saturday evening, Phone only on Sunday evening. A valid entry will show contacts on both evenings. (But see Rule 8)
3. *Scoring:* Three points for a contact with a club, one for a contact with a non-club station. Multiplier of one for each county, administrative area, and country worked. Score for each evening: QSO points times multiplier (CW total score to be multiplied by 1.5). Total score, sum of the Saturday score and the Sunday score found as above. A station may only be worked once on each evening; a given county etc. may be claimed for multiplier once on each evening.
4. *Geographical:* Entries from Scotland, Ireland, Isle of Man, Devon, Cornwall, Channel Isles or outside the British Isles may multiply the score obtained under Rule 3 by 1.5.
5. *Callsign:* The club callsign, or that of a member, in which case the same call is preferable on both evenings. If a different call is used on either evening it shall be clearly noted in the entry.
6. *Contest Exchange:* Call "CQ MCC". Exchange RS(T) plus a serial number which may start at any number and rise sequentially with each QSO. Club stations shall so indicate (CLB acceptable on CW) and all stations shall give their county/admin. area in a suitable abbreviation. In the case of a foreign station QTH will be acceptable.
7. *Disqualification:* Will be at the discretion of the Contest Committee, for bad operating practices, poor signals, or excessive duplicate contacts. The Contest Committee decision will be final and no correspondence can be entered into.
8. *Entries:* To be *postmarked not later than 21 days after the contest conclusion*. Logs will include the usual signed declaration. An entry may be from any part of the world having Top Band facilities; UK entries should note this and operate accordingly. Should a club be unable to operate both sessions, a log will be accepted as a check-log, and be appreciated; should there be enough such, they will be listed with claimed scores.
9. All entries to Contest Committee, **SHORT WAVE MAGAZINE, 34 HIGH STREET, WELWYN, HERTS. AL6 9EQ.** N.B. Check logs from any other station will also be appreciated by the Contest Committee. We would also be very pleased to receive photographs and comments on the station with the logs, for possible publication. The results will appear in the February 1981 issue.

At **Stourbridge** they seem to alternate construction with a main meeting at which there is a talk of something of interest, the venue being Longlands School, Brook Street, Stourbridge. Thus Construction is on October 6, and the main meeting on October 20.

Bury have a place at the Mosses Youth and Community Centre, Cecil Street; October 14 is down for the construction competition and main meeting, but the room is booked and occupied every Tuesday when there are a wide range of regular activities (which we understand have brought back some old members and attracted some new — which says a lot for the way things are being run). If you want to know more, why don't you contact the Hon. Sec. — see Panel — for the very latest word?

It looks like the first Monday in each month for **Worcester**, and on October 6, G3TQZ will bring along some test gear, and check out some rigs, thereby demonstrating how the test gear should be used.

At **Dudley**, October 7 is provisionally the date for the AGM, and on 14th G3DQG will be talking about aerial design, while October 28 sees G4BSO giving his talk on planning permission.

Mondays for **Kidderminster** members means a trip to the Bellmans Cross Inn at Shatterford, which is a couple of miles out on the Bridgnorth Road; shattered or not, they follow up on Tuesdays with the "proper" meeting at Aggborough Community Centre, Hoo Road, Kidderminster, this being followed by a quick whip over to the Land Oak pub to finish off. October 14 is down for a film by the Gwent TV group on amateur TV, and they hope to back it with a speaker from nearer home. October 28 would be the other formal evening, and is open as at the time of their August data sheet.

On to **Cheltenham** and the Old Bakery, Chester Walk, Clarence Street. October 2 sees the visit of the new RSGB RR, G4FRG, and on November 14 they have a Natter evening.

The chaps at **Wirral** foregather at the Sportscentre, Grange Road West, Birkenhead, on the first and third Wednesdays of each month. October 1 is down for a Sale of Surplus Equipment, and on October 15, there is the AGM.

Now **Hereford**, where the dates are October 3, topic not settled at the time of their *Newsletter*, and October 17 for an informal at the club room; Hq is at the County Control, Civil Defence Hq, Gaol Street, Hereford.

New Club

This one is the **Rolls Royce** group, based on the R-R Sports and Social Club in Barnoldswick, where they have their own shack and a comfortable lounge which will hold 70 people for their visiting speakers. They have their own call and appropriately enough it is G3RR. They await the permission for a 60-foot tower on which to put the aerials, and there will be a mobile rally for 1981. For more details, contact the Hon. Sec. at the address in the Panel.

Southerly

The kick-off here is with the **East London RSGB** gang, who will be getting together on Sunday, October 19 at 3 p.m. The venue as ever will be Wanstead House, 21 The Green, Wanstead, London E.11. The speaker will be G4HUE, who will be talking about the oscilloscope and its uses. As the programme notes say, a 'scope is a must in the shack.

Another new one is in the pile, the name being **Waterside** and the catchment area Hythe, Fawley, and New Forest — the trip to Southampton was getting a bit too much at current petrol prices! So, they have set up shop at Blackfield Community Centre, on the fourth Tuesday in each month. October 29 is set apart for the man from the GPO to talk about Radio Frequency Interference, which it is hoped will prevent irate neighbours at the door during "Match of the Day".

Next we pick up the **BAD Newsletter** — BAD standing not for what you thought but for **Brighton** and District! October 8 is down for a talk by the Channel Contest Group, and October 22 is set aside for the Engineer-in-Charge at Radio Brighton to tell all about his station. We had a bit of a struggle to find out the venue: alternate Wednesdays at 47 Cromwell Road, Hove.

Cambridge are based in the Visual Aids Room, Coleridge Community College, Radegund Road, where they are to be found every Friday evening — they generally have something of interest going on, but we must refer you for the details to the



Nothing like bringing up the children in the correct way! Needing a headset a size or two smaller is Stephen, 2½ months, the junior op. of Roger and Mary Luke, GW3XJC and GW8VQY. Home QTH is near Bridgend, and the main rig is an FT-101B.

Hon. Sec. (see Panel) as our copy of the programme only goes to the end of September.

For **Bishops Stortford** the place to head for is at the top of Wind Hill, where the British Legion Club is their Hq. The date is the third Monday in each month, and there is almost always a speaker or some films or other activity.

At **Reigate** the Hq is in Redhill! It is in fact the Constitutional and Conservative Centre, Warwick Road, where the booking is of the 'upstairs meeting room' on the third Tuesday of each month. This gives us October 21, and at the time they wrote they had not finalised the details — doubtless by now the Hon. Sec. will have it all buttoned up, so if you must know, contact him at the address shown in the Panel.

East Anglia is our next, right up to **Ipswich**, where the Hq is nominally at Handford House, Ranelagh Road, on the corner joining to the A12; but there are so many alternatives that we strongly recommend a check with the Hon. Sec. as to where they will be before you set off! His address of course is in the Panel. October 8 looks to be at Handford House, and is certainly down for the final planning for J-O-T-A.

'Quiznite' it is on October 10 for **Guildford**, who are based with the Guildford Society of Model Engineers. We understand the Quizmasters will be G8JMP and G8PHG.

At **Crystal Palace** the troops meet at Emmanuel Church Hall, Barry Road, London SE.22, on the third Saturday of each month; they also have an informal at the home of a

Names and Addresses of Club Secretaries reporting in this issue:

B.A.T.C.: M. Cox, G8HUA, 13 Dane Close, Broughton, Brigg, South Humberside.
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London SE23 3BN. (01-699 6940)
 DUDLEY: N. Rock, G3RLY, 28 Conway Avenue, Kingswinford. (Kingswinford 77167)
 EAST LONDON RSGB: R. Holmes, G3PKQ, 92 Dunedin Road, Leyton, London E10 5NJ. (01-558 2928)
 IRTS (Region 1): G. Gervin, E18C, 185 Elton Court, Leixlip, Co. Kildare.
 ISLE OF WIGHT: T. Fallick, G4FY1, "Harmony", Main Road, Chillerton, Newport, I.O.W. (Chillerton 328)
 JERSEY (C.I.): S. Smith, GJ8EZA, 19 Parade Road, St. Helier, Jersey, Channel Isles. (Jersey 23249)
 MEXBOROUGH: I. Abel, G3ZHI, 9 Grove Terrace, Maltby, Rotherham, Yorks. (0709 814911)

ROLLS ROYCE BARNOLDSWICK: L. Metcalf, G4IEX, 1 Park Avenue, Salterforth, by Colne, Lancs. (Barnoldswick 813433)
 ROYAL NAVY: M. Puttick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants. PO8 8SQ. (Waterloo 55880)
 TYNESIDE: J. Dingwall, G4ILW, 10 Loweswater Road, Gateshead, Tyne & Wear NE9 6TN.
 VERULAM: A. Clarke, G8MAE, 24 Kilm Ground, Hemel Hempstead, Herts. HP3 8EZ. (Hemel Hempstead 64751)
 WATERSIDE: C. Sanders, G4KCM, 35 Forest Edge Estate, Fawley, Southampton, Hants. SO4 1FN. (Fawley 893200)
 WIRRAL: G. O'Keefe-Wilson, G8VPF, 20 South Drive, Upton, Wirral. (051-677 1531)
 YARMOUTH: A. D. Besford, G3NHU, 49 Blake Road, Gt. Yarmouth, Norfolk NR30 4LT.

See September issue 'Panel' for names and addresses not appearing here.

member on the first Tuesday in the month. At the time of writing, we don't know the October activity, but we guess there'll be something set up by now.

Our next port of call is **Crawley**, where the venue is the United Reformed Church Hall, Ifield. October 22 is an "Aerials and ATUs" meeting with Dr. M. Underhill, G3LHZ, doing the explanations. Meantime, we'd like an update on the Hon. Sec. for the records, please!

Over the water again, to the **Isle of Wight**, where the Hon. Sec. advises he is now on the 'phone — see Panel. They are still booking Unity Hall, Wootton Bridge, I.O.W. for their gatherings, on Friday evenings at 8 p.m. As a guide, if you can see the Sloop Inn, you are very close to base!

Acton, Brentford & Chiswick will be foregathering at Chiswick Town Hall, High Road, Chiswick, on October 21, and for that evening they will all be swapping experiences from the holiday season, doubtless with the /P and /M activities much in mind.

At **West Kent** they have broken out into a newsletter, or at least let us look at one — they've been hiding it from us for ten years or more! October 7 should be an interesting evening, as G3R00 is going to talk about ways and means of getting going

on the new bands without buying a new rig. This is at the Adult Education Centre, Monson Road, Tunbridge Wells.

At **Edgware** they have a place at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, where they may be found on the second and fourth Thursdays of each month; November 13 should be interesting — they hope to have G3BNL talking about Microwaves.

On to **Surrey** where they have the first and third Wednesdays booked each month at *T.S. Terra Nova*, 34 The Waldrons, South Croydon. On October 1 they have a Surplus Equipment Sale, and on the 15th it is a bit different, namely a Surplus Book Sale.

It's the second Thursday of each month at **Southgate** with a Film Evening set up for October; the Hq is at the Scout Hut, Wilson Street, Winchmore Hill Green, London N.21.

Verulam have their main meeting at the Charles Morris Memorial Hall, Tyttenhanger Green, Tyttenhanger, near St. Albans. There is also an informal on the second Thursday — for more details of the goings-on, we must refer you to the Hon. Sec., see Panel.

Somebody has been doing some arm-twisting at **Bournemouth**, as we are advised that the Hon. Sec. after the AGM will be G8GTB! October 3 is the AGM at which this miracle is going to occur, and we'll be interested to hear if anybody notes any injuries to the candidate. Seriously, a volunteer is worth ten pressed men, and the chance to work alongside the present incumbent for a few weeks is very helpful. The venue, by the way, is as always the Dolphin Hotel, Holdenhurst Road, on the first and third Fridays.

Although the 'official' meeting for **Barking** is each Thursday, the Hq is also open to members on Mondays, Wednesdays and Fridays. October 23 is set aside for a talk on Repeaters from the UK FM Group.

White Horse Vale covers the areas around Swindon, Newbury, Oxford and Wallingford, and a club has recently been formed to fill the gap. Meetings are at the White Hart Inn, Harwell on the first Monday of each month; the meeting proper starts at 8 p.m. upstairs, but the group can be found down below in the lounge from around 7.30 p.m.

It is nice to hear that a club is expanding, which is what is happening to **Chiltern**; perhaps the extra space made available by the move to Hq at the John Hawkins Furniture Factory, Victoria Road, High Wycombe, has some bearing on the situation as they were, we gather, a bit cramped before. For October, there is a visit to the local MPT complex arranged, so perhaps we should suggest a contact with the Hon. Sec.



A recent addition to the list of DXCC-ers was Richard Walker, G3XYJ, of Verulam ARC (second from left). With him are Brian Pickford G4DUS (chairman), Frank Clayton-Smith G3JKS, Les Carpenter G4CNH and Stan Pond G4EBD.

At St. Neots there is a club active, based on the Ernulf Community Association, Barford Road, Eynesbury, St. Neots. More details from the Hon. Sec.

The weekly meetings of the Cheshunt on Wednesdays alternate natter evenings with more formal things; for October they have natters on 1st, 15th, and 29th, all with a bit of Morse practice thrown in, while on October 8 there is a Junk Sale, and a talk on QRP given by G4FAI on October 22.

QRT

We've covered the mail for this time; for the next issue available, look in the 'box' in the body of the piece, where deadline dates for three months are laid out. Meantime, start planning your MCC efforts, please, and let's have a good entry to back-up the fair play which is such a tradition with this contest.

For your club details, please let us have 'em here on or before the due date; the address is "Club Secretary", SHORT WAVE MAGAZINE, 34 HIGH STREET, WELWYN, HERTS. AL6 9EQ.

G3FGY MEMORIAL

On a late-May evening this year, the Derby and District Amateur Radio Club met at the club Hq, with many visitors and friends, to unveil the memorial to their late colleague and stalwart member, Tom Darn, G3FGY. To most radio amateurs in this country, his name and call will be remembered for the sterling work he carried out organising the A.R.R.A. exhibitions in Leicester, until his sudden early death just prior to the 1978 exhibition. For the club, memories were more personal, of a friend who gave unstintingly of his time to the business of putting more into his hobby than he took out. Speeches stressed the point that as long as clubs have such people as Tom in their membership, then they will not only be successful but happy as well.

The memorial takes the form of a fine quartz standard clock which dominates one end of the room, alongside the space allocated for the shack equipment.



Three of those present at the unveiling of the memorial to G3FGY were, left to right, Tom Douglas G3BA, Fred Ward G2CVV and Jack Anthony G3KQF.

EQUIPMENT REVIEW

DATONG MODEL FL2 AUDIO FILTER

WHEN the review specimen of the Datong Model FL2 multi-mode audio filter arrived, the writer was well aware that his professional involvement with receiver design had biased him very definitely in favour of getting as much of the selectivity into the front-end as possible. The FL2 is designed to provide filtration suitable for SSB, AM, SS/TV, CW, and RTTY, and has a notch facility, something rare in modern receivers but much missed in knockabout use both on the CW and Phone bands.

Anything that comes from the David Tong drawing-board is going to be technically a Rolls-Royce job — such is the reputation he has built up over the years. Also, anything with such a wide range of capabilities as the FL2 is not going to be "learned" and driven to the best of its abilities without quite a bit of intensive use being put in on the air. Thus it was decided that the writer would try it first, and follow up by asking G3MWF and G4ITL for their views. G3MWF is a mainly CW man, G4ITL to date 100% Phone (shame!), with the writer looking at both ends of the band. Between the three of us we have a KW-2000B, a TS-520 with SSB filter only, and a TS-520 equipped with both CW and SSB filters.

Now, just about anyone who has ever used even the old surplus FL-8 on a Field Day knows that the purely LC filters used on CW would ring like blazes and could often make the cure worse than the disease! Modern active filter technology has brought down the required 'Q' and put up the number of stages practicable, so that one need not necessarily have to live with "ringing" and its associated difficult copy. On the other side, the old single-pole crystal filter could be "tweaked" by way of a "phasing" control to give either symmetry in the response (i.e. a sharp nose response), or be made to a degree asymmetrical, or it could be used as a notch filter in an otherwise broad response. There has been the odd receiver made with both high selectivity and a notch usable simultaneously (the KW-77 springs to mind) but this is not a facility which has been in evidence of recent years.

On the other side of the picture, few people would think seriously about the possibilities of audio filtering in the case of an SSB-oriented modern transceiver as an aid to improved SSB reception. The argument would be that there is already as much selectivity as the situation could stand, and a near-ideal IF shape factor.

G4ITL in his search for the SSB DX found that, not surprisingly, the notch facility was mighty handy; he also found that under conditions of adjacent channel QRM and "monkey chatter" he could narrow the audio bandwidth steadily down until he got the best compromise between loss of readability due to the QRM and loss of intelligibility by lopping off too much of the audio (to the degree that he is quite firm that an FL2 will appear in his station as a permanent item in the near future). He also accepts that the CW performance can be a help, and will make use of it just as soon as the station modifications as to layout are completed.



G3MWF did not have so long with the filter, and he concentrated on CW. He has copied CW with an SSB bandwidth transceiver for at least five years, but also has previously used an old-fashioned L-C filter and found that not very pleasant, the ringing often being due to the QRM rather than the signal one is trying for. He found that the FL2 needed to be used with some caution; tuning the receiver while the FL2 was in circuit gave the result that one could pass clean over a signal without noticing it — or, in other words, the tuning gearing was not able to cope (although found quite OK for normal use on Phone or CW). His transceiver also is not quite so stable as the ones used by G4ITL and the writer.

Your reviewer tried it first, and came back to have another bite in the light of the reactions already given. There is also an MFJ CW filter in the shack and the use of the two could be compared, in that mode at least. One gained an impression that on a noisy band — Eighty for example — the MFJ filter had greater response to the noise; in other words the s/n ratio of the Datong FL2 was better. This was not altogether surprising in that the MFJ filter used four low-Q sections at its maximum while the Datong has no less than twelve. It was also found by experiment that a signal all but inaudible with the receiver set to the CW IF filter could be made into 100% copy, albeit with some discomfort, and setting the IF passband to the broad (SSB) width still enabled adequate copy. (For those who wonder, the writer's TS-520 has the 'FIX' switch rewired so that with the function switch set to CW one can choose between the SSB and the CW filter in the IF.)

Having had the good fortune to own a KW-77, one has to admit it would be very nice to have the sharp CW response of the FL2 *plus* the notch facility; but this is a minor criticism of the Datong device. After all the CW filter in the IF of the TS-520 is pretty narrow in itself, and the notch can do some very neat work without the aid of the sharp CW audio filtration! An interesting point here is that in order to accurately tune the notch the FL2 has a position "SSB plus Peak" which is primarily intended to peak the whistle, then by pressing the button turning the peak into a notch and dishing the heterodyne. Both G4ITL and the writer found that the SSB-plus-Peak had its benefits at times when receiving SSB, in

improving the copy — picking up the most important frequencies in a given voice, perhaps? We don't know quite how it happens, but it's there!

The equipment requires a power supply; also it has no gain control, but one uses the receiver's own AF Gain control. If the unit is wired between headphone output of the TS-520 (input to FL2) the output can be wired to a speaker, there being an AF amplifier chip built-in; plugging the headphones in cuts this speaker output off.

We were rather cruel and made use of one of the little PSU's that are meant for replacing batteries in transistor portables: with the speaker volume run up, the little PSU got quite warm. But, after all, with full output from the audio IC Datong quote a current of 350 mA, and the little PSU is claimed to be 9 volts at a maximum of 200 mA!

On the debit side, one of the reviewers felt the clicks as switches were moved around to be a mite high; he was using the speaker. The other two did not regard these clicks as being annoying. The writer feels that the instruction sheet with the device is not really enough to do justice to this fine instrument, being the same piece of paper as used for publicity. It shows graphs as evidence of the performance, gives brief technical specs., and provides a very brief "driving lesson" associated with the graphs. We would like to see the driving lesson expanded considerably, as we feel sure from the three differing reactions that there is much potential for getting rid of QRM here which is not going to be realised by the "appliance operator".

One final point; we did not use the Datong FL2 on RTTY, but practical curves were plotted establishing that the shapes Datong consider to be useful for RTTY are in fact obtainable.

Conclusions

Two of us have put an FL2 into the amateur radio budget for this year; the third one is teetering on the edge, recalling the need for a new car! It does all its maker's say it does, and it is up to the high standard of design and construction always put out by the Datong company. It needs skill in use, particularly on CW, as it can sharpen up the response to the point where *very* careful tuning is required.

FREQUENCY SYNTHESIS FOR THE RADIO AMATEUR

Paul M. Jessop, G8KGV

IN the past, amateur transmitters came in two varieties: crystal controlled and VFO controlled. The former were more common at VHF and the latter at HF. Now, however, more and more commercial and amateur designs feature "frequency synthesis". In this article, it is hoped to explain simply how this works, the justifications for its use and the advantages that it brings.

Traditional Methods

First we will look at the two "traditional" systems and examine their relative pros and cons. Clearly, a crystal controlled transmitter is very stable: its frequency varies very little with time or temperature. Similarly, a crystal controlled receiver will remain tuned to a stable signal. However, a transmitter or receiver controlled by a VFO is not so well placed in this respect. Because it is tuned by mechanical components, the frequency will vary with temperature or physical shock. Other effects may cause the frequency to vary also with supply voltage. This will mean that, in the case of a receiver, the signal will go out of tune, and in the case of a transmitter the transmitted signal will drift up or down the band (and in the worst case, may move outside the amateur allocation altogether). These effects however can be, if not eliminated, then considerably reduced by temperature compensation and sound mechanical construction, and it is this possibility which has made the VFO so popular and practical. The VFO naturally has the advantage that once it is built, it can quickly be tuned to any frequency within its range. On the other hand, a crystal controlled device must be equipped with a separate crystal unit for each frequency which it is desired to use.

The object of a frequency synthesiser is to combine the good points of each type of frequency control element: the tunability of a VFO and the stability of a crystal controlled oscillator.

Direct Combination

The simplest way to achieve a form of frequency synthesis is by mixing a series of crystal banks together. A first bank of ten crystals spaced at 100 kHz intervals, mixed with a second

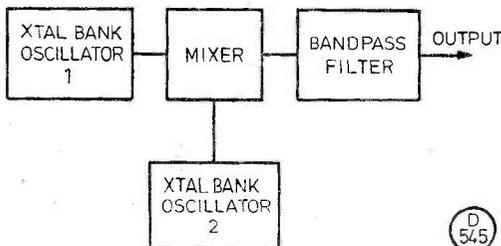


Fig.1 Simple system to produce 100 stepped output frequencies by direct combination

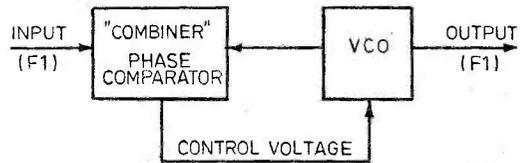


Fig.2 The simplest type of PLL

spaced at 10 kHz and a third at 1 kHz, will produce an output with a range of 1 MHz and spaced at 1 kHz steps. However this is not all that it will produce: a good mixer produces two output components at the sum and difference frequencies of the inputs. Only one of these will be wanted and the other will leak through the post-mixer filter to enter the following mixer and create more unwanted frequencies. In reality the situation is much worse since any real mixer, with inputs f_1 and f_2 , produces a whole series of outputs of the form $mf_1 \pm nf_2$, where m and n are whole numbers. It can be seen that for any practical system, the amount of high quality filtering which will be needed will be enormous, and the end result may then not be very good. In addition, the system proposed above would use 30 crystals which are expensive and bulky for use in compact equipment.

It may be taken that for any large number of frequencies, direct combination is, for the amateur at least, a non-starter.

Phase Locked Loop

It is necessary at this stage to introduce the "Phase Locked Loop". This is an essentially simple system which requires some very complicated maths to predict its behaviour or design its components. It is however quite possible to gain an idea of how the Phase Locked Loop (PLL) helps in frequency synthesis with a knowledge of only RAE standard maths.

The simplest type of PLL is shown in Fig. 2. A Voltage Controlled Oscillator (VCO) is an oscillator whose frequency can be varied by altering a DC voltage applied to its input. Such a VCO, operating at the same frequency as the input is combined in some way with the input and this produces a voltage which is fed back to the VCO. In simplest terms, the system adjusts itself until the VCO is on *exactly* the same frequency as the input. Not at first sight the most useful device since the input and the output appear to be the same! It may be taken that this form is useful for other applications, but for our purposes the most important thing is that we can fool the circuit. This remark is not meant facetiously since, as will be seen, the VCO need not really operate on the same frequency as the input as long as the frequencies presented to the combining block are the same (or nominally so: the loop will itself correct small errors).

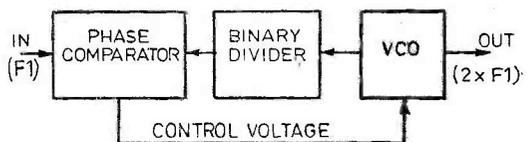


Fig.3 A PLL Frequency Doubler

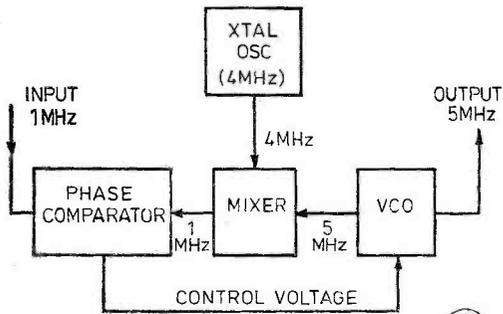


Fig.4 A PLL Frequency Mixer

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In Fig. 2, the VCO is running at twice the input frequency but it is fed through a binary divider back to the combiner. As far as the PLL is concerned, the VCO looks as if it is running at half its real frequency and it adjusts itself until half the VCO frequency is equal to the input. Thus we have a frequency doubler.

filtered out. This is taken to a phase detector and it appears to the loop as if the VCO were operating around 1 MHz. The other input of the phase detector is fed with a stable 1 MHz signal and the VCO is adjusted by the loop until its output is on exactly 1 MHz plus 4 MHz, or 5 MHz.

We can apply this technique to our 144 MHz synthesiser; Fig. 5 shows the general circuit. The VCO output at about 144 MHz is mixed with 130 MHz to produce a frequency in the range 14 to 16 MHz. This is divided by a ratio in the range 560 to 640 to give 25 kHz which is fed to the phase detector. It is quite possible to construct this divider, and using normal TTL logic it becomes practical for the amateur to build.

If $12\frac{1}{2}$ kHz channel spacing were required, this would simply be a matter of using a $12\frac{1}{2}$ kHz reference frequency and using division ratios twice as large (1120 to 1280), thus giving twice as many channels in the same frequency range.

Using techniques such as these, it is now possible to produce frequencies spaced at 100 Hz for SSB use and, of course, just as stable as the crystal reference frequency (*i.e.* very good indeed). For the FM example above it would be adequate to set up the wanted frequency or channel on switches, but for SSB this is not practical in amateur circumstances where fixed frequencies are not normally used. The most convenient

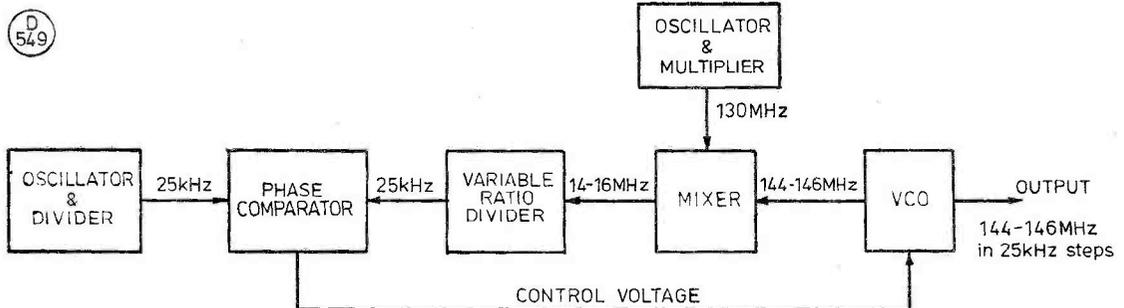


Fig. 5 A Frequency Synthesiser producing outputs in the 2 metre band spaced at 25kHz intervals.

Of course, the binary divider need not just divide by two: it could divide by any number and the VCO will run at that multiple of the input. In this circuit we have the rudiments of a frequency synthesiser. The elements we need are: (1) a VCO operating at the wanted output frequency, (2) a digital divider which will divide by different ratios at will, (3) a stable reference source and (4) a combining block, known by the somewhat daunting name of a "phase comparator".

Suppose we want to generate, between 144 and 146 MHz, the 25 kHz spaced channels for FM operation. These are all harmonics of 25 kHz so we take 25 kHz as our reference frequency. For the output range quoted above, the orders of the harmonics are in the range 5760 to 5840. The variable ratio divider must therefore be capable of dividing by any number in this range.

Here we hit our first snag: whilst it is possible to construct a variable ratio divider to operate at 144 MHz, it is not convenient with normal amateur devices and practices. This leads us to another trick which we can play on the PLL. We can put any mixing process (with reasonable filtering) *inside* the loop and not generate output *spurious*.

Consider Fig. 4. The VCO output at about 5 MHz is mixed with that from a 4 MHz oscillator and the output at 1 MHz is

control for this is a continuous tuning dial, as used with a VFO. If this were to be provided by a switch, the result would be very complex and not very comfortable to use. In these circumstances it has become normal to use an "optically coupled" control.

If a striped disc is placed in a light beam, when the disc is rotated the beam will be interrupted and if it is allowed to fall

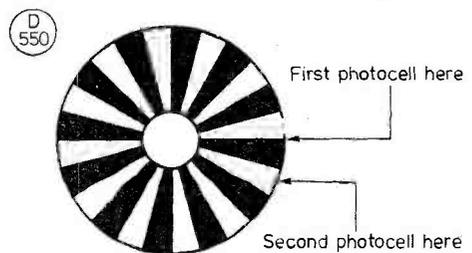


Fig. 6 A Striped Disc for producing up/down pulses to control a frequency synthesiser

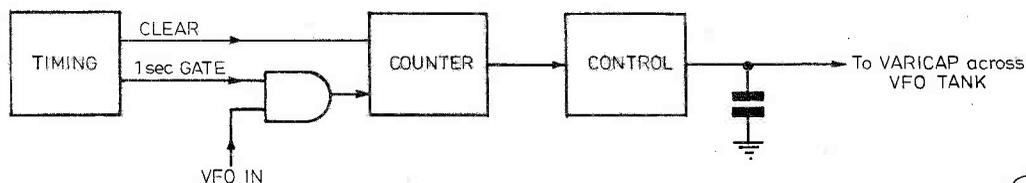
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Fig.7 A Huff and Puff Frequency Stabiliser

on a photo-sensitive device, pulses will be produced. This is not yet directly usable as a tuning control since it cannot discriminate between rotation in opposite directions. To do this, we make the disc interrupt two light beams spaced around the disc by an odd number of half-stripe widths (Fig. 6). Now rotation in one direction will produce pulses in one beam before the other, and in the reverse direction the order will be reversed. These pulses can be decoded into "up" and "down" pulses to control a counter which can contain the information to be fed to the variable ratio counter to generate the wanted frequency, and to a display so that the operator knows where he is.

Loose Lock

Whilst the methods outlined above are ideal for commercial, mass-produced equipment, the ordinary amateur is likely to have difficulty in designing and constructing such complex circuitry, and may already possess a good piece of equipment which he would like to have the frequency stability of a frequency synthesiser. For such an amateur, all is not lost for there is another technique, which has become known as "Huff and Puff", which can be used to give a reasonable existing VFO the stability of a crystal oscillator.

The circuitry is very similar to a digital frequency meter; indeed it might make economic sense to construct the two units together since so much of the circuit is common to both functions. In a digital frequency meter (DFM) with a gate time of one second, each cycle of the input signal which occurs within the space of one second is counted and displayed. This number is equal to the frequency (in Hertz) of the input signal.

If the frequency being measured is that of a normal (free running) VFO then, as the VFO drifts, the display will change. The principle behind "Huff and Puff" is to examine the last digit of the display and if it changes, to move the oscillator slightly in the other direction to compensate. Hence the name: if the VFO drifts down, it will be "huffed" up and if it drifts up, it will be "puffed" down. Between any two gate periods, any reasonable VFO will only drift a small amount so it is only the last digit which need be examined; in the case of a specially built unit, this means that the rest of the dividers and displays found in a DFM need not be built. Now a variable capacitance diode across the VFO tank circuit will give a degree of voltage control and this tuning voltage is derived from the voltage across a capacitor. Every time a count of 0, 1, 2, 3 or 4 is recorded, a small amount of charge is, say, put on the capacitor so as to reduce the frequency and bring the count towards zero. Similarly, if a count of 5, 6, 7, 8 or 9 is recorded, the voltage on the capacitor is changed in the opposite direction so as to increase the frequency towards a count of ten, or since only the last digit is being considered, zero.

A more "de-luxe" version will vary the amount of correction applied with the deviation from the desired zero count, allowing a faster drift rate to be compensated. In any case, the output will tend to lock to a set of frequencies spaced 10 Hz apart, but the VFO can be tuned like any normal one; this is rather better than the new generation of commercial equipment which uses 100 Hz steps, and its cost is much smaller. It must however be emphasised that the technique will only improve an already good oscillator. If the drift rate is too high, the "Huff and Puff" unit will have to continuously apply correction in one direction, and the capacitor on which the control voltage is stored will rise or fall to the potential of one of the supply voltages. It cannot vary beyond this and the correction will not be applied, and the unit will try to lock to another 10 Hz point and the VFO will jump in frequency. In the worst case, the VFO drift might be more than 10 Hz per sample period. There is now no hope of achieving any kind of stabilization for even a short period and the unit will have no effect. Frequency changes caused by mechanical shock which move the oscillator by more than 10 Hz will not be corrected so there is still a requirement for good mechanical construction.

Where a DFM is not being built, there is no requirement for the gate period to be exactly one second: any period of that order will suffice so long as it is stable. The locked frequencies will not then be spaced by exactly 10³ Hz, but this will not normally be important.

Conclusion

This, then, is the state of the art for the amateur. However, despite the increasing use of synthesisers in commercial equipment, it is the author's firm belief that there will still be room for the good old VFO and crystal oscillators in home-brewed equipment for a good many years to come.

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BOOK REVIEW

"AMATEUR RADIO QUESTIONS AND ANSWERS" and

"A GUIDE TO AMATEUR RADIO", 18th EDITION

YEARS ago, when the reviewer started his amateur radio career, many people discovered amateur radio transmissions accidentally when tuning across the short wave bands on their domestic receivers. Then, AM was the universal telephony mode. It is unlikely this would be the case today since, on the HF bands, SSB virtually reigns supreme. Moreover, amateur radio now encompasses so many facets, from rag-chewing with local stations on 2m. FM to SS/TV on the HF bands, that it is doubtful whether an inquiring newcomer to the hobby could get an overall picture from any individual radio amateur he might meet. Consequently any reference books attempting to convey what the hobby is all about are most welcome. Two such have come in for review.

The first is *Amateur Radio Questions and Answers* by Fred Judd, G2BCX, who has sought to deal with our hobby in six chapters. The first is an introduction in which he covers the origins of AR and how it has developed over the years, answering questions about how to get a licence, what we talk about and the cost of assembling a station. Chapter 2 deals with the British RAE and the current amateur radio licences, while the next, "Amateur Radio Technology," covers the basics such as Ohm's Law, what capacitors are for, and so on.

Chapter 4 is a brief one devoted to "Equipment for an Amateur Radio Station," followed by one on "Aerials," including propagation. The final section deals with "Operating Procedure, Signals and Codes" with examples of a typical CW QSO using many of the accepted abbreviations. Also included is advice on which bands to use. The book includes a short bibliography, a list of amateur radio equipment suppliers and an index.

Inevitably in a first edition there are some errors. On page 8, it is stated that the maximum permissible power *output* in the U.K. is 150 watts, whereas it should read maximum DC *input*. On page 6, the fee for the Morse test is quoted as £2 although this is corrected to £6 on page 21. The table of multipliers on page 37 includes the term "Milo" abbreviated to "k" and representing 10^3 and on page 67, the length of a quarter wave aerial for the 3.5-3.8 MHz band is quoted as being, "about 10m. long." This is truly a little pocket book of 110 pages in 165 by 110mm. format.

The second book is the eighteenth edition of Pat Hawker's, G3VA, *A Guide to Amateur Radio*, which was first published

in 1933. It is a very comprehensive and well edited book of twelve chapters, two appendices and an index. Although only six pages long, the first chapter, "This is Amateur Radio," contains an amazing amount of information answering 22 of the most-asked questions about the hobby. The following one, "Getting Started," deals with *s.w.l.* reporting, the characteristics of the various bands and includes a general discussion of station equipment and layout.

Chapters 3 and 4 are the real meat of the manual, dealing respectively with "Communication Receivers" and "Transmitters." As well as covering the essential theory, some up-to-date designs for receivers and transmitters are featured with excellent circuit diagrams and layout drawings. A full size *p.c.b.* layout for a 2m. FM Rx is given. A simple braid-breaker UHF high pass TVI filter is illustrated made from double clad *p.c.b.* material, and the essential and desirable items of test gear to comply with licence requirements are covered.

The fifth chapter, "The Antenna," is mostly devoted to wire types for the HF bands including the popular *G5RV* and *W3DZZ* multiband designs. It contains a section on "S.W.R. facts and fallacies," which is a real gem and recommended reading for anyone who thinks he knows all about this subject.

The next chapter is a brief one on "Amateur Radio Equipment," illustrating with photographs many of the immediate post WW2 to present day gear. It includes comprehensive lists, with brief descriptions, of many receivers, transmitters and transceivers from 19 international manufacturers, plus assorted military gear.

Chapter 7 is devoted to "Workshop Practice" and, in its well illustrated eight pages, covers very thoroughly the tools and materials used for "chassis-bashing" and finishing. The following section is concerned with "The Licence Examination" and includes the syllabus of the RAE.

The ninth chapter, "Operating an Amateur Radio Station", includes the usual explanation of the RST reporting system, typical CW abbreviations, a selection of the "Q-Code" signals, band plans and prefix lists. The next two parts are devoted to the *R.S.G.B.* and what it does, and to international amateur radio organizations. The last part is entitled, "Fundamentals of Electronics," and is just that. It deals briefly with Ohm's Law, capacitance, inductance, impedance, etc. It would have seemed more logical to place this chapter before the one on receivers.

The first appendix contains some sample RAE questions and the second one lists safety pointers. The index occupies two full pages and is quite comprehensive. *A Guide to Amateur Radio* has 140 pages in 245 by 182mm. format and can be highly recommended both as an introductory book for newcomers to the hobby, and as a reference manual for those already in the game.

Both books are available from the Publications Dept. of *Short Wave Magazine*. Mr. Judd's book costs £2.05 and Mr. Hawker's one, £2.95, including postage and packing.

N.A.S.F.

Next month: a detailed review of the new Yaesu FT-707 'Wayfarer' 100-watt transceiver. Make sure of your copy of "Short Wave Magazine" now!

PASSIVE GRID 4CX250B's ON TWO METRES

MODIFICATION TO A WELL-KNOWN DESIGN

R. I. THOMAS, GW4BCD

THERE must be many amateurs who, like the author, have built the classic GW3ZTH/GW8EHK double-4CX250B two-metre linear amplifier first described in the *Magazine* for July 1973. This is a first class design and in most cases works extremely well.

The author had one or two problems with his particular version, however. Firstly it would not remain completely stable, no matter how carefully the neutralizing procedure was carried out: it was always possible to get the amplifier to oscillate at some settings of the anode/grid tuning capacitors. (Before you ask — yes, I did use the correct EIMAC VHF base!) There must be many of these amplifiers that are completely stable, but the fact remains that the one built by the author was not. It was possible to use it, however, provided one slightly detuned either the anode or grid circuit; this is an incorrect method of using a linear amplifier, of course, and should be avoided.

The second problem was that the amount of drive from the author's transverter (about 35 watts from a QQVO6-40A) was far too much for the 4CX250B's, and unless one was very careful it was quite easy to get 15mA of grid current from the 4CX250B's. This is definitely to be avoided! (GW4BCF has remarked to the author that this is only allowed during two metre contests).

Not wishing to disturb the transverter, and in any case wanting to retain the tuned circuits associated with the '6-40A in

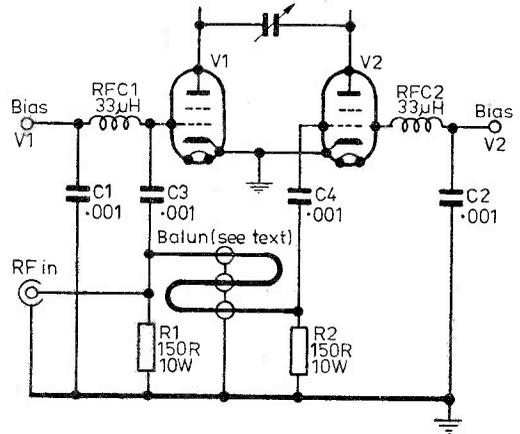


Fig. 2 THE MODIFIED 4CX250B LINEAR AMPLIFIER. With this input circuit the amplifier is unconditionally stable though with a reduction in gain. D 568

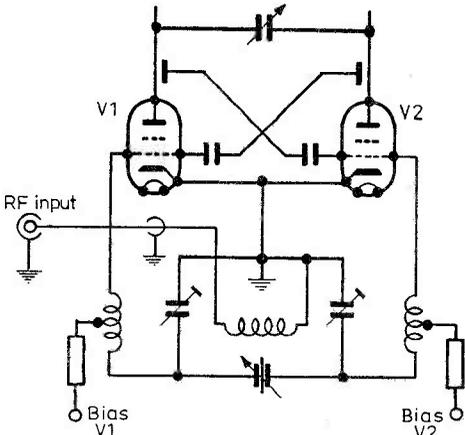
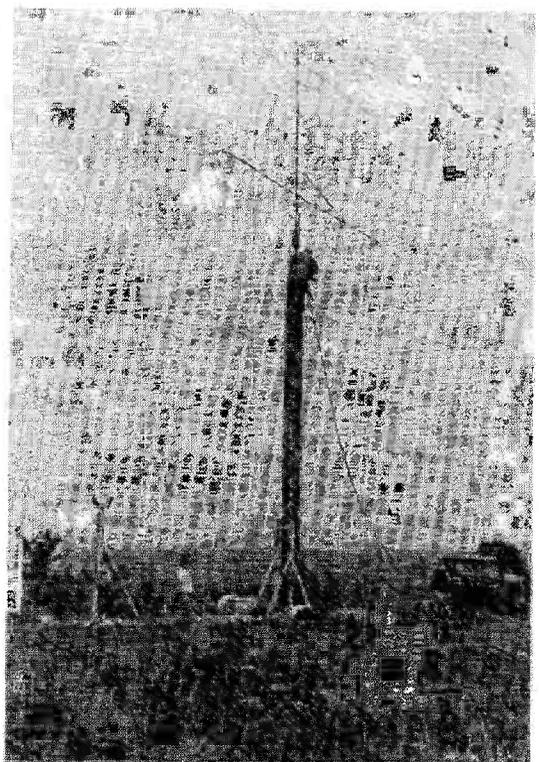


Fig 1 THE UNMODIFIED 4CX250B 2 METRE LINEAR AMPLIFIER D 567



This just has to be VHF NFD 1980! Tony Heasman, G8GJO, of the So-Com contest group, about to attach a 2-ele 4m. antenna to the tower before being raised to 90 feet. The 2m. antenna is two phased 19-ele 'Boomers'. Calls used by the group were G3VCP/P on 4m., G4BWG/P on 2m., and G3FZL/P on 70cm. and 23cm.

Photo by G4DCV.

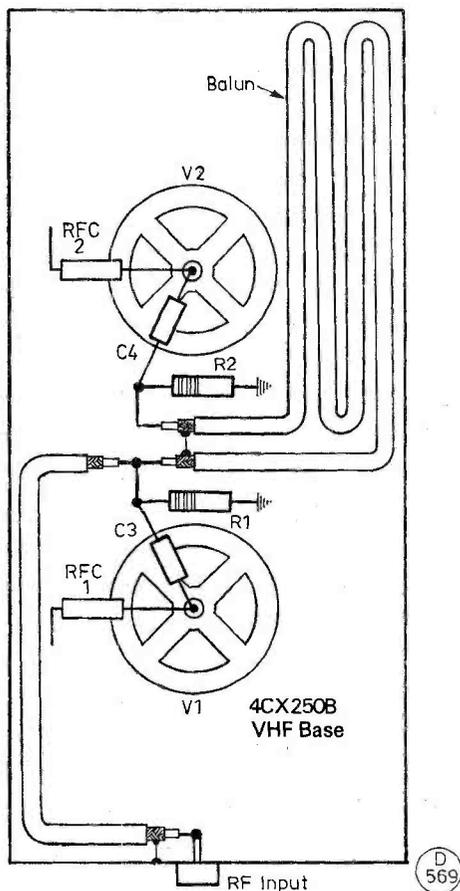


Fig.3 LAYOUT OF PASSIVE GRID INPUT CIRCUIT

the transverter, a simple power control device was made up consisting of a potentiometer in the screen supply of the '6-40A. Now a QQVO6-40A running at two watts output is not the most efficient of devices, so a more elegant solution was sought. A passive grid double-4CX250B amplifier was already in use by the author at HF, and it appeared that this method of driving the valves at VHF would solve both problems. The difficulty was, of course, that at HF the '250's could be operated in parallel with no problem, but on two metres they had to be driven push-pull. No circuits for this type of operation had been seen by the author, but the problem was mentioned at the local club where Gary, GW4HNT, came up with the answer, shown in Fig. 2. As can be seen the valves are driven in the standard passive grid fashion, but *via* a balun made up of a length of coaxial cable. This circuit was installed in the amplifier and found to work first time.

Around 30 watts of drive are needed to draw 100 microamps of grid current from the '250Bs, power output then being about 420 watts — this at 2kV anode potential. With the typical 10 watts given by an 'oriental black box', power output is about 190 watts, giving a gain of around 13 dB. Fig. 1 shows the original grid circuit which, together with all the neutralizing components, was removed, the hole being filled by a nut and bolt. With the passive grid circuit the amplifier is unconditionally stable — no amount of mistuning can induce it to oscillate. Power gain is considerably reduced of course, but this modification certainly solved a problem in the author's case. The actual length of coaxial cable used in the balun is derived from the formula: 39 inches (*i.e.* a half-wave at two metres) times the velocity factor of the cable used. In the author's case this worked out at 25.7 inches; this does not appear to be very critical, however. Note that this length of cable is the actual length between R1 and R2, referring to Fig. 2. Layout of the passive grid version used by the author is shown in Fig. 3, and it should be noted that everything should be kept as symmetrical as possible.

Thanks go to Gary, GW4HNT, for suggesting the circuit — the only problem now being how to get lots of grid current for those VHF contests. . . .

The neat station of Richard Hook, G8LVB. Richard started on the air in 1976 with Pye FM-10B Cambridge, which is still going strong; these days he uses an FT-221R, Venus SSTV and a Trio 2200GX, which are fed into an 8-over-8 slot and a ground plane at 70m. a.s.l. For mobile, his rig is a Standard C8600 into a 5/8-wave Bantex. QTH is near Alder-shot.



COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

BACK to the typewriter again, and the last few days give the impression that the Clerk of the Weather has become disorientated — almost the first warm and sunny days since last summer, at a time when we are beginning to think of winter and evening classes! The result of this, and a few night-rainfalls has been a shocking disregard for DX in the fight to even keep the grass low enough for access to the house!

The Bands

In summary one feels, a bit like the curate's egg, mainly due to summertime conditions and rain static problems; and rain in summer does seem to bring out the TV timebases in force as well! But, for all that, something of interest for everyone.

Perhaps the most interesting thing is that at least one country is known to have given a firm date of January 1, 1982 for the opening of the 10 MHz band to its amateurs. Let us all hope that that turns out to be the start date worldwide — it's a very long time since we were able to be in at the christening of a new band, the last one being 21 MHz when your scribe was an SWL and most people had home-brew rigs — persuading the 7/14 MHz doubler to triple to 21 MHz led to one or two problems. But the sudden start of operations worldwide at 0001z on the appointed day was a listening session never to be forgotten.

Top Band

Grandad's band *some* say, but working DX on it is something comparable with E-M-E when you start thinking of the hundred countries as a mark to be aimed at. W1BB, Stew Perry, who has been leading the DX activities on Top Band since 1932, with his famous *Bulletin* is well past that mark now, and so are quite a few others too; yet I recall the mere idea of DXCC on Top Band as a joke when first licensed — as likely as hen's teeth!

As far as your scribe goes, the home-brew Top Band rig slowly progresses: transistor Colpitts oscillator, into jFET source follower, into BFY51 driver and, at the moment, a 2N3553 in the PA giving out some 400-500 milliwatts of

RF into a 51-ohm resistor, key-down, for hours on end. The next stage is a mixer and crystal oscillator to bring received signals onto one of the ranges of the TS-520, using a tiny 5.315 MHz crystal from the junk-box to make a jFET oscillator, and another jFET as mixer, feeding Top Band on to the 7 MHz band of the TS-520. The VFO-BA live on one bit of p.c.b., the driver and PA on another, and the receive converter on a third.

G2HKU (Sheppey) seems to have been in the wars, and spent a little time in the hospital. Nevertheless he still managed to find time to QSO PA0PN on SSB, plus CW QSOs with OZ5RM, OY7ML, DL1VJ, and UB5NAR.

Twenty

Here we have a right turn-up for the book: a report from our *VHF Bands* contributor, G3FPK, trying out an FT-707, FV-707DM and FP-707 combo — on the HF bands for the first time in eleven years. As for the aerials, Norman has his crossed dipoles in the loft cut to 29.45 MHz which he normally uses for the *Oscar* downlink signals (the SWR must be a bit high at the CW end of Ten!), while for 14 and 21 MHz a trap groundplane has been contrived from half the driven element of the old TA-33Jr, with a set of radials for each band and a five-turn loading coil to persuade the whole thing to resonate in the bands. SSB exchanges were made with CS1BI (Berlengas Is., just off CT1 — QSL to CT1XK) while a little bash on the key turned up HZ1HZ, VP9CB, KV4AA, HSSAID, (QSL via AG6D), HC2XA and CM6TM, not to mention the usual W, JA and Russian swarms. It seems G3FPK retains the knack of CW and DX.

G3NOF (Yeovil) was beginning to note the change of conditions with season already; Don doesn't stay on the band a lot at these times of high sunspot activity and when he does get on, it is the morning opening he is interested in from 0600z when on some days it has been good to W6/7, and others to VK/ZL and the Pacific. SSB QSOs were made with HC1FF, VKs, including VK7KH/M, ZK1AC and ZK2EA.

G3CED/G3VFA (Broadstairs) also found himself in the bandage factory with something he didn't have, namely a suspected heart attack; but he did come out with phlebitis, something he hadn't got when he went in. Since this all happened in the programme of tests he was running on a new all-band ATU and radial system, much of his operating was QRO. One question we must ask George is how come an "all-band" series of tests without Top Band? Shame! However, to revert to the derring-do on Twenty, CW made a lunch-time 2-watt QSO to HA7KLC, using the new bits plus Joystick and eight feet of feeder all indoors, YU2QO with 50 watts for a 599 incoming report, F2MA with 2 watts again, another YU and an HA likewise, all in mid-morning. Around 1830 one evening 50 watts netted two UA6s and a UB5; another day came UA3TPQ running, surprisingly, a TS-515. A tea-time session with 25 watts netted CT10I and YU7BDA/7, and a couple of days later CT10I and YU2CFX were noted one after another, the month finishing up on twenty with DJ4LOP, UA6PAP, and a long ragchew with YU2REO.

Tit-Bits

The whole question of "lists" as a way of operating from a DX station is a thorny one; the writer has never reckoned a QSO made *via* a list worth the bother of adding to his list of countries worked. G3FPK notes an FW8 who will no-way make a casual contact — *everything* has to be done through the list-taker; while *TDXB* (Issue 53) notes correspondence from AD1S who, it seems is list-taker for such as ZK1CE, KC6DC, H44SH, plus mentions of KC6DE and KC6CG shortly — AD1S is also the QSL manager for these. One supposes the points each way are that: for DX, not so much operator skill is required, and he can "work" the chap he can't hear by relaying through the list-taker, against which he also takes far longer to make each QSO (so he can keep the log and drink his coffee in between foul-ups). Finally, QRM — it reduces the racket round the DX station, but transfers it to the list-taker, and in either case it won't stop the breakers and the lids. About the only time we can

imagine any real use for a list operation is where a DX end is starting completely "cold" in amateur radio and likely to be frightened out of his wits by a good old-fashioned pile-up.

Now to Portugal, where it would seem they have things rather like our counties. Thus, they can think up an award, "DCP", for working such. There are four grades, namely HF fixed, HF mobile, VHF fixed and VHF mobile. The award is in seven grades, for working between 75 (Grade 1) and 274 (Grade 7) counties. The first award at Grade 1 is made in a special book, to be obtainable from their national society, ARP, and costing one US dollar; they recommend you buy two, so you can keep a station record. After Grade 1, you go upwards on special log sheets also to be obtained from ARP. Applications and all correspondence to Associação de Radiomadores Portugueses, PO Box 2145-4021, Porto Codex, Portugal. So much for DCP. Another Portuguese award, "DRVP", (a balloon with a little less lead in its make-up) involves working three stations in each of the 23 counties of the Port Wine Region; these are the twenty counties recognised as being in the Port Wine region, plus the county of Mirandela where there are only three farms allowed to produce port wine, and the counties of Via Nova da Gaia and Porto where the stuff is bottled and shipped. All QSOs to be after April 1, 1980, either CW, SSB or Mixed; application to ARP is on their special form, signed up as genuine by a couple of amateurs, and accompanied by \$2.5 US, or the equivalent. The *nice* bit about the DRVP is that the award is printed on a special label of a full-sized Port Wine bottle, as offered by C. da Silva (Vinhos), SARL, of Vila Nova da Gaia who are one of the leading companies. Nets are on Fridays, 2100 to 2300z with WB2SJK, WB9RCY (Dorothy) and CTIDF as the net control stations on 14.345 MHz. Our thanks to G4ISK who passed on all the above.

Looking forwards a little we note that the 600DX, stirring-up the ether in mid-August, is going to return in October for three months; on the other hand it is also reported that the Okino Torishima effort for October is cancelled. At the beginning of this month there were reports of GM3MOP/P on St. Kilda — the services maintain a small tracking station on this "uninhabited" island, some sixty miles west of Harris. Another

snippet is that 600DX, already mentioned, has ideas about 9U5; he confirms 9U5AC is genuine, but allowed only three QSOs per week!

Early November is the hoped-for date set for an expedition to Fernando de Noronha, by KB4IT and PY40D. One gathers they have been working on the permission for well over a year but the licences will be for PY0ZDX and PY00D. And, talking of PY0, the operation to St. Peter and St. Paul Rocks by two other PYs has been cancelled "due to poor conditions".

By the time you get to read this, the Bajo Nueva and Serrana Bank expedition will have come and gone, some 17 operators having been involved. The Indian Ocean expedition will also probably have gone by the time you read this; they started with Mauritius and Rodriguez, which they wrapped-up on August 27, and it was not known for sure what the next stop would be — the local problems over licences seem to be of the nature that can't be solved by post.

CR9B will, it is hoped be on from October 23-30, but we have no firm data, save that he proposes to use the gear left in store by the CR9A expedition. The operator for this one is KP4KK/DU2, Bill Hatcher.

Eighty

Here as elsewhere, we have little to report; as usual at this time of year 'summer doldrums' of several kinds rather take their toll of contributors! G2NJ (Peterborough) heard two G9 callsigns on Phone down at 3520 KHz. One was very powerful and apparently a base station while the other was a mobile of some sort, discussing the terrain, the signal strengths and so forth, with callsigns given methodically at the end of each over. Such have been heard down in the South of England, too — manufacturers of the gear testing, doubtless. On the /P front, G2NJ found G3EEL/P from Shanklin twice, GW4GUW/P running 2 watts QRP from the Conway Valley area, at Llanrwst, and GW4FOF/P who was on from a caravan site in mid-Wales, using a couple of convenient trees for his aerial. However, local QRM from electrical appliances had been a nuisance for most of the day and so Nick had to grab his chance in between the noises. Nonetheless there was G3IOI in Wickford with a home-brew two-watts and direct conversion receiver to give Nick a 589 signal, G4HNI in Lan-

cashire, and G4GIQ in Northwich. After those, a switch to Forty seemed to be indicated.

G3CED/G3VFA has always been somewhat of an LF-band addict, and his CW worked G4GIK, DL3CM, PA3AQF, DF1DN, ON7QD, OR5CV, G3LPN, G3IRW, G6AB, G3GZG, Y63WI, G3UJH, mostly low power, all in "firm's time" and all on the Joystick with eight feet of feeder, into development ATU and shortened radial system — and, firm's time or not, we notice G3CED doesn't mind a ragchew for up to an hour — not many CW operators can do that!

'CDXN' deadlines for the next three months—

November issue — October 2nd
December issue — November 6th
January issue — December 4th

Please be sure to note these dates.

Forty

G2HKU stuck to the key, and found himself UA0AGB, PY7BF, PY6AAC, UK9OCI and PY7AOW with the big rig, plus a YL, and, using QRP from the Argonaut, DJ9SB.

G3CED/G3VFA was on the band with his prototype aerial-thing all indoors — we suspect that this is as much as anything so he can fiddle with it without going to the bother of trying to drop the mast single-handed; if it is, then we don't blame him as mast erection is ever a chore. His first session was mainly G and GW, but ended with DL0HLB/DJ5OE, a commemorative of 750 years of Hohenlimburg asking for two QSLs. Then came G2CNN and GM3XO, followed the next afternoon by a session which began with a longish spell of ragchew with GB2RN aboard *HMS Belfast*, followed by a lost ON4 and a brace of Germans. Several days followed with the rig sitting on the band, and being fired up to talk to (on the key, of course) DF3VK, G3HIS, PA0ATG, UK2BBL, GM3MXN with QRP; and OR5AG with the reverse of the normal situation, the OR being QRP and George QRO. Most of Europe in the following weeks in between session on 21 and 28 MHz, with GM3OXX, the arch-apostle of QRP as possibly the most interesting, and another one which carries the note "all solid copy but must QRT — my dog is lost"!



"... the rig here is a-a-ah-ah-YAESU! ..."

21 MHz

Probably the best band of all, open to somewhere just about anytime between early morning and last thing at night on most days. G3NOF mentions 0600z as the start of his researches, when the Pacific, JA, VK, ZL and W6/7 have been heard on different days; the short path to JA opens around 1000 and continues until early evening. W's start around 1000 and continue through the rest of the day, the W6/7 peaking around 1700/1800, the Pacific also being sometimes in evidence at this time. Don worked his SSB to A4XIU, A7XD, C31TD, D68GA, FO8FO, H44CF, H44HB, H44LW, H18PPB, HK0AB (Baja Nuevo), I2DMK/HC8, JA's including JA3GOE/M, KG6NAA, N7BJN up in Alaska, OJ0MA, ST2FF, SV1KP/5, VK's, VP2MSG, VS5DD, VS6BB, W6's, W7's, WB6PDG/AH2, XJ5AE/VE8, ZKICF (North Cook Is.), 3B8ZV and 9V1UH.

Thanks to the lost time already discussed, G2HKU only made a couple of contacts on the band, in SP2EFU/JW, and 3B8DB, using the key.

G2ADZ (Chessington) is very much of a CW man; his 21 MHz offering this time includes 9N1MM, UK0ZAB (Kamchatka), 4U1UN, KP4KK/DU2, VK's, YCOVM, VS6EE, OA4ARX, VK9NV (Norfolk Is.), 4S7MX, HM1JJ, HM5PB, TU4AW, and AP2TN. Bill reckons that for a keen operator the limiting factors would have been activity in a given part of the world and the amount of QRM.

On to G3FPK (Purley) who used the SSB to get to OX3AI, HR3JJR, VK5NTU, SV1IW/SV5 (Dodecanese) who said his QSL was to go via Box

3751, Athens; plus CW to N7AWG and WB7PAP, both in Montana, 8P6ON, VK3BLN, HH2VP (QSL to N4XR), HP1XEK, VK3MR, XL3LON (special event station in London, Ontario), SP2EFU/JW, HM1AQ, VP9DR and KV4H.

G3VFA also stuck to his key; with 2 watts he worked W9TO, EC8BN in the Canaries, VE3DTL, K1HI, K6XO, K6VNX, JA2PTN and JR3RNI: upping the power to between 25 and 100 watts input made QSOs to N7UT, K7GE, KD2W, AG4S, W3NZ, W9GXQ, W9LOF, W9SFR, K2GOY, JA2APN, J11IQT, AA4NC, UW9SU, SV1NN, JR3RNI, plus the usual horde of Europeans.

28 MHz

At the time of writing things are showing quite definitely the change of conditions to the seasonal peak, and most reporters note it. G3FPK found things variable from pretty flat — with VHF-type openings — right through to super. SSB produced CN8MC, ZB2FX, C31SJ, FC0FRZ, and J11KUL/JD1 to give country number 301. CW was not forgotten, either; it found HB4FF for a new prefix, 9V1TL, SM1CXE (Gotland), 7Z7FB in Dhahran (who hails from Southend and says QSL via RSGB), and K6TE.

G4HZW stuck to Ten all the time, with his FT-75 at 25 watts out into two-element Quad at 24 feet, all SSB. The band as quiet initially, but came into focus as the month progressed, culminating in the first W on August 24, the same date as in 1979. The QSOs include VK3NLJ, PY2DMT, HK3AXT, C31NT, LU5DAV, VK5NIJ, A4XGC, OJ0MA, 5B4JA,

TF3KM who broke into a local aerial-testing session when both Gs had the beam facing NW, FH8OM, 9X5PP, LU3AJW, JA2QBZ, JY5ZM, VU2YK, 4X6CW, 4X4MS, LU2HCO, VP8PP, CS1BT, ZP5RG, KV4CI, CE1BLL, 9Z7CSJ, KB2KN, PY5JO, ZE1AV, PZ1AP, SU1BA, OA8AA, 6W8IC, HS4AMI, 9Y2AL, PY2BDY, KB3BF and many Europeans.

G3NOF seems to have monitored the band quite a bit, but says his only QSO was with HK0AB (Baja Nuevo).

G2ADZ is firmly of the opinion that Ten is deserted too easily — often a "dead" band will be containing such beacons as 3B8MS and ZS6PH beacons at quite good strength, which is certainly justification enough for a few CQ calls — if we all did this, the results would be quite interesting. Bill worked his CW out to 8P6JD, VK4CJ, VK6IE, VK2BFJ, K3YD, CE3WD, PY's, LU's, DL1US/ST3, ZP5NW, CX6CW, ZL4JD on the long path, 5N0MAS, ZD8KM, and 5Z4YY. Gotaways included many VK's, TL8JM, many JA's, and a pirate VQ9RB, who had a pile-up on him and was controlling the pack like a good 'un! Bill's other problem was OE25/1GPU — who was sitting behind this weird callsign?

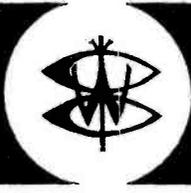
Naturally enough, G3CED was quite happy to work Europe when necessary if it helped get him through the tests he wanted to do, but he wasn't going to scorn UA9SGC at 559 — though the chap dropped into the pit before George could get his report back. EA8EY was more of a success, still on two watts, the QSO going through to completion. For the rest, it was largely European coverage in the summer conditions — probably Sporadic-E propagation.

Finals

G2BJY (Walsall) is one of the few remaining members of the Civilian Wireless Reserve (CWR) and he says that G8KI is trying to trace any members still around. Any members who may read this could please help by dropping a line to G8KI or G2BJY (both QTHR).

Final - Final

We've got through the news, and its time once again to ask you to look up the deadline and write your letters (the more the merrier) to your scribe, "CDXN", SHORT WAVE MAGAZINE, 34 HIGH STREET, WELWYN, HERTS. AL6 9EQ. Till then, good hunting.



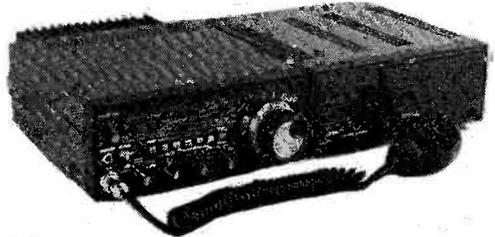
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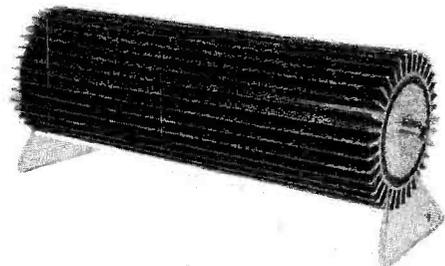
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RM-76 micro control	£55.00
TR-7800	£255.00

FM PORTABLE

Trio TR-2400	£199.00
SC-3 case	£10.95
ST-1 base stand	£39.50
BC-5 quick charger	£16.50
Icom IC-2E	£159.00
FDK Palm IV (70cm)	£159.00

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For light HF and large VHF arrays	£86.25
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or C-32 ball mount	£4.95
Then add:	
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Then choose your resonators:	
RM-10 for 10metres	£6.50
RM-15 for 15metres	£6.56
RM-20 for 20metres	£8.17
RM-40 for 40metres	£10.06
RM-80 for 80metres	£11.44
Accessories (optional):	
RSS-2 resonator spring	£4.08
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Add carriage £2.30 (Antenna) or 60p (accessories).	

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WESTERN DX-32 2-ele. beam, 10/15/20m	£80.50
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FROM SOUTH AND EAST. We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within ¼ mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose and immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.

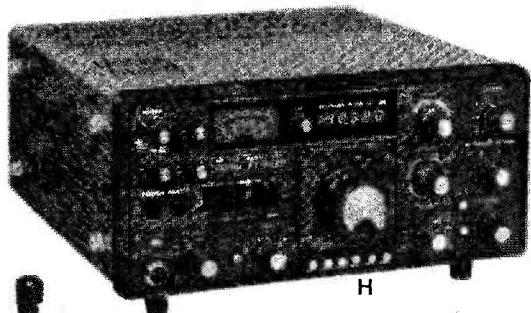
FROM NORTH. Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A4040 to the right and within 100yds. veer again to the right, approximately one mile further on brings you to the Fox & Goose. Turn right and see preceding directions.

FROM THE WEST AND SOUTH WEST. Follow M5 then M6 to Spaghetti Junction (see above). Alternatively, leave M5 at junction 4 or 3 and proceed to inner ring road. Turn South on ring road and leave on A47 (East). We are located three miles from this point.

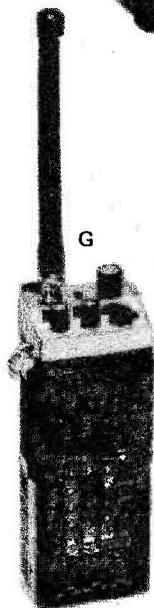
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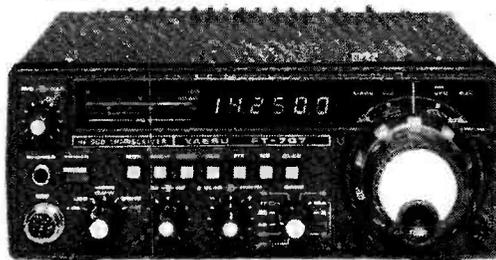
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YAESU FT-707

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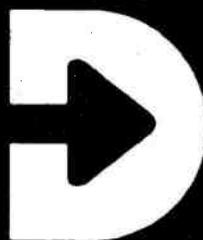
DON'T FORGET THAT WHEN YOU BUY FROM AMATEUR ELECTRONICS UK YOU ARE DEALING WITH ONE OF THE OLDEST ESTABLISHED AMATEUR RADIO BUSINESSES IN THE COUNTRY — SEVEN OF OUR STAFF BEING FULLY LICENSED ACTIVE OPERATORS. THE LATEST FULL TIME ADDITIONS TO OUR STRENGTH ARE JOE ROTHERY, G3RJR, WHO IS CHIEF SERVICE ENGINEER AND WHO HAS A LIFETIME OF EXPERIENCE IN ELECTRONICS, AND FRED RENDELL, G4HXK, WHO YOU WILL FIND ON OUR SALES FLOOR. BOTH JOE AND FRED, LIKE THE REST OF US, ARE VERY ACTIVE AND CAN BE HEARD REGULARLY ON THE BANDS. THE POINT THAT WE ARE MAKING IS THAT AMATEUR ELECTRONICS UK IS AN ORGANISATION DEDICATED TO THE AMATEUR RADIO HOBBY AND OFFERS YOU THE COMBINED EXPERIENCE OF LONG ESTABLISHED OPERATORS WHEN MAKING THAT IMPORTANT AND FINAL CHOICE ON EQUIPMENT. REMEMBER ALSO, THAT YOU HAVE THE ADVANTAGE OF DEALING WITH THE DIRECT IMPORTER WITH ALL THE BENEFITS THIS ENTAILS ON SPARES AND AFTER SALES SERVICE. IF YOU CANNOT CALL IN FOR A FRIENDLY CHAT WITH US THEN WE GUARANTEE YOU THE FINEST MAIL ORDER SERVICE AVAILABLE ON THE UK MARKET TODAY WITH OUR FREE SECURICOR DELIVERY FACILITIES. WHY NOT WRITE, PHONE OR CALL TODAY AND FIND OUT EXACTLY WHY AMATEUR ELECTRONICS UK HAS THE FINEST REPUTATION IN THE BUSINESS.

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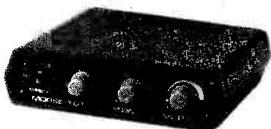
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Our two no-compromise audio filters give a remarkable ability to filter out the intelligence from the noise.

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the new "top-of-the-line" filter, offers extremely sharp pass-band edges for truly exceptional filtering performance on all modes, but especially for SSB. Its 10 poles of fully variable low and high pass filtering give sharper filter edges even than normal crystal filters. A separate manually tuned notch filter is also fitted.



As reviewed
in Aug's issue
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MODEL FL1

On the other hand, was recently described in "73 Magazine" (October 1979) as "truly the Rolls Royce of the current filter market". It is the only filter in the world which can notch out an interfering whistle from SSB

signals automatically. Additionally, for CW, bandwidths down to 20 Hz are practicable thanks to the use of "limited AFC" — another Datong exclusive.

Both filters connect in series with the loudspeaker and will improve virtually any receiver. An external DC supply is required.

Prices: All prices include delivery in UK. Basic prices are shown with VAT inclusive prices in brackets.

ASP £69.00 (£79.35)	D75 £49.00 (£56.35)	RFC/M £23.00 (£26.45)
FL2 £78.00 (£89.70)	FL1 £59.00 (£67.85)	UC1 £119.00 (£136.85)
D70 £43.00 (£49.45)	AD170 £33.00 (£37.95)	AD170 + Mains Power MPU (Mains Power Unit) £6.00 (£6.90)
		Unit £37.00 (£42.55)

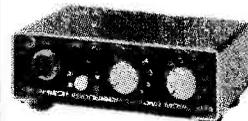
WORK MORE DX

Datong RF clippers make your speech sound louder and clearer. The worse the conditions the greater the benefit. This is exactly what you need for working DX. After all, if they can't hear you, you can't work them!

All three models use the same innovative r.f. clipping techniques which have made the name Datong synonymous with r.f. clipping.

MODEL ASP

is fully automatic with calibrated push-button selection of degree of r.f. clipping in steps of 6 db from 0 to 30 db. It adjusts itself to suit your voice and microphone.



MODEL D75

is manually adjusted and has LED monitoring to aid in setting.

MODEL RFC/M

is a fully tested printed circuit module for building into your own case.

All three units feature very long life battery operation and connect in series with your microphone.

No internal modifications are required to your rig.



RECEIVE MORE BANDS



The Datong UP-CONVERTER (Model UC1) converts any good quality ten-metre or two-metre receiver or transceiver into a really high performance general coverage receiver.

It gives full coverage in thirty 1MHz segments from 60 kHz to 30 MHz.

At low cost, UC1 adds a new dimension to your expensive amateur bands only equipment and for sheer performance beats most of the common general coverage receivers.

INDOOR ANTENNA



MODEL AD170

Active Antenna is designed for under-roof mounting and gives sensitive reception right through from below 60 kHz to Band 1 TV around 50 MHz. It needs no tuning and includes a switchable 12 db broadband amplifier.

Although only three metres long, Model AD170 has the same directional properties as a full size dipole, even at 60 kHz.

Full data sheets on any product available free on request. New literature includes: short form catalogue, new ASP data sheet, FL2 data sheet.

DATONG ELECTRONICS LIMITED

Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England Telephone (0532) 552461

		inc. vat	curr.			inc. vat	curr.
SWL-610	Dual Receiver magnetic	8.28	2.00	CS-1575	Dual trace 4ch. audio scope	270.25	5.00
C-1210	Dynamic, foam-padded	18.86	2.00	CO-13030	Sgl. trace 5 MHz service/student scope	109.25	5.00
C-1320	3.2-20ohms. <i>TELEX'S BEST</i>	26.22	2.00	DM-800	Dip resonance meter 700kHz-250MHz	51.75	1.00
MICROPHONES (battery powered)				AG-203	Sine/square generator. 10 Hz-1 MHz	120.75	5.00
PROCOM 1	High Output	11.96	2.00	AG-202	Sine/square generator. 20 Hz-200 kHz	65.55	5.00
PROCOM 11	Variable gain	17.95	2.00	SG-402	Matching RF generator. 100 kHz-30 MHz	52.90	5.00
CB-73R	Dynamic, noise-cancelling	23.92	2.00	DL-705	Digital multimeter	80.50	5.00
CB-73S	as above with 8-wire lead	25.30	2.00	FC-756	Frequency counter. 10Hz-500MHz	258.75	5.00
ADVANCED ELECTRONIC APPLICATIONS				TRIO EQUIPMENT			
MM-1	Morsematic Special Keyer	124.20	2.00	TS-820	160-10m Transceiver. 200w P.E.P.	669.30	5.00
MK-1	Keyer	49.45	1.00	DG-1	Digital readout to 100 Hz	121.90	1.50
ISO-144	2m Antenna	34.50	2.00	SP-820	Speaker	37.95	1.50
HUSTLER ANTENNAS				VFO-820	External V.F.O.	118.45	5.00
MO-1	Foldover Mast (fold is 15 inches above base)	13.80	5.00	YG-88C	CW Filter. 8 pole	36.80	0.50
MO-2	Foldover Mast (fold is 27 inches above base)	13.80	5.00	TS-520SE	160-10m Transceiver. 200w P.E.P.	437.00	5.00
BM-1	Bumper Mount	10.35	2.00	DG-5	Digital readout and freq. counter	103.50	1.50
C-32	Ball Mount	5.29	2.00	SP-520	Speaker	17.25	1.50
C-29	Stainless steel Spring	8.05	2.00	VFO-520S	External V.F.O.	96.90	5.00
RM-10	10m Resonator	6.90	2.00	VG-3395C	CW Filter. 8 pole	37.95	0.50
RM-15	15m Resonator	8.05	2.00	DK-520	Conversion Kit to fit DG-5 to older TS-520.	10.35	1.00
RM-20	20m Resonator	9.20	2.00	AT-200	160-10m Antenna Tuner. 200w	82.80	1.50
RM-40	40m Resonator	11.50	5.00	SM-220	Station Monitorscope	197.80	5.00
RM-80	80m Resonator	13.80	5.00	BS-8	TS-820 scan board for SM-220	48.30	0.50
SF-2	2m 5/8 whip	9.20	2.00	BS-5	TS-520 scan board for SM-220	48.30	0.50
RM-10S	High Power 10m Resonator	9.20	2.00	R-820	Amateur Band Receiver	690.00	5.00
RM-15S	High Power 15m Resonator	10.35	2.00	YG-455C	CW Filter. 500 Hz	58.65	0.50
RM-20S	High Power 20m Resonator	11.50	2.00	YG-455CN	CW Filter. 250 Hz	60.95	0.50
RM-40S	High Power 40m Resonator	13.80	5.00	YG-88A	AM Filter. 6 kHz	34.50	0.50
RM-80S	High Power 80m Resonator	18.40	5.00	TS-180S	160-10m solid state Transceiver. 200w P.E.P.	589.95	5.00
4-BTV	10-40m Vertical	69.00	5.00	TS-180S	As above but with Digital frequency memories	679.65	5.00
5-BTV	10-80m Vertical	87.40	5.00	VFO-180	External V.F.O.	96.80	2.00
DCX	Discone VHF/UHF 40-700MHz	13.80	5.00	SP-180	Speaker	36.90	2.00
DCL	Discone VHF/UHF 40-700MHz (with 50ft. coax)	20.70	5.00	DF-180	Digital frequency control	104.65	1.00
QD-1	Quick Disconnect	10.35	1.00	AT-190	160-10m Antenna Tuner	95.45	5.00
5105	Trunk lip Mount	8.05	1.00	PS-30	Mains Power Unit for TS-180	85.10	5.00
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CG-144	2m Colinear with Mount	23.00	5.00	TS-120V	80-10m mobile Transceiver. 20w P.E.P.	347.30	5.00
CGT-144	2m Colinear for Base Station use	29.90	5.00	MB-100	Mobile mounting bracket	17.25	1.00
G6-144A	2m Colinear for Base Station use (7dB)	52.90	5.00	YK-88C	CW Filter. 500Hz for TS-120S or TS-120V	28.75	0.50
G7-144	2m Colinear for Base Station use (7dB)	73.60	5.00	SP-120	External speaker	25.30	2.00
ASTATIC MICROPHONES				VFO-120	External V.F.O.	89.70	5.00
T-UG9-D104	Golden Eagle	71.30	2.00	AT-120	100w Antenna Tuner	55.20	2.00
T-UPG-D104	Silver Eagle	50.06	2.00	PS-20	AC Power Supply for TS-120V	44.85	5.00
UG8-D104	Crystal D104	32.20	2.00	PS-30	AC Power Supply for TS-120S	85.10	5.00
T-UG9-D104	D104 with amplifier and grip to talk	41.40	2.00	TL-120	80-10m 200w P.E.P. Linear for TS-120V	128.80	5.00
T-UP9-D104	D104 with amplifier and p.t.t.	41.40	2.00	TL-922	160-10m Linear Amp. 2kW. <i>Tubes included.</i>	672.75	5.00
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400	Hand microphone. Dynamic. <i>BUCKEYE</i>	5.75	2.00	MC-36S	Handheld Microphone. 50K	13.80	1.00
565-M6	Hand microphone. FET amp. <i>MARINER</i>	32.20	2.00	MC-30S	Handheld Microphone. 500 ohm	13.80	1.00
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555	Hand mic. noise-cancelling 4 wire	21.85	2.00	RD-300	High Power Dummy Load	49.30	2.00
557	Hand mic. noise-cancelling 6 wire	26.45	2.00	TS-770E	2m/70cm all mode Transceiver	763.60	5.00
531	Hand microphone. High impedance	8.05	2.00	SP-70	Matching Speaker	18.40	2.00
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CS-1830	Dual trace 30MHz B/w with delayed sweep	523.25	5.00	RM-76	Microprocessor control unit	60.95	1.50
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CS-1562A	Dual trace 10MHz auto run and trigger TB	261.05	5.00	PS-1200	Power unit charger for 2300/3200/2200GX	29.50	2.00
CS-1352	Dual trace 15MHz portable, mains/12v	362.26	5.00	TR-2400	2m synthesised handheld tcvr	210.45	5.00
				ST-1	Base stand and quick charger	43.70	2.00
				BC-5	12v quick charger	17.25	2.00
				SC-3	Carrying case	11.50	0.50
				PB-24		14.26	1.50
				TR-3200	70cm FM tcvr. fitted with 3 channels	164.45	5.00
				MB-1A	Matching mobile mount	9.20	1.00
				PB-10	Pack of 10ni-cad batteries	10.35	0.50
				TR-3200/2300	Spare power lead	1.30	1.60
				R-1000	Gen. cov. Receiver. 0.2-30MHz	297.85	5.00
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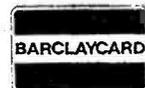
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PS-7	Power Supply 120V/240v for TR-7	207.00	5.00
PS-75	Sideband Duty P.S.U. for TR-7 120/240v	138.00	5.00
RV-7	Remote V.F.O. for TR-7	132.25	2.00
MS-7	Matching Speaker for TR-7 and R-7	29.90	2.00
R-7/DR-7	Digital Receiver 0-30 MHz	989.00	5.00
SL-300	CW Filter for TR-7 and R-7 (300Hz)	39.10	0.50
SL-500	CW Filter for TR-7 and R-7 (500Hz)	39.10	0.50
SL-1800	SSB/RTTY Filter for TR-7/R-7 (1800Hz)	39.10	0.50
SL-4000	AM Filter for R-7 Receiver (4000Hz)	39.10	0.50
SL-6000	AM Filter for TR-7 and R-7 (6000Hz)	39.10	0.50
AUX-7	Range Prog. board and 1 Receiver module	32.20	1.00
RRM-7	Range receiver modules for Aux-7 (500 KHz)	5.75	0.50
RTM-7	Range rcv. modules for Aux-7 (500 KHz)	5.75	0.50
NB-7	Noise Blanker for TR-7	66.24	1.00
NB-7A	Noise Blanker for R-7 Receiver	66.24	1.00
FA-7	Fan for TR-7 and PS-7	20.70	2.00
MMK-7	Mobile mounting kit for TR-7	34.50	2.00
MN-7	ATU/RF Wattmeter, 160-10 m (250w)	124.20	5.00
MN-2700	ATU/RF Wattmeter 160-10 m (2 kw)	207.00	5.00
WH-7	RF Wattmeter/VSWR Bridge (HF)	59.80	2.00
385-0004	Service Manual for TR-7	18.50	2.00
385-0005	Service Manual for R-7	18.50	2.00
7037	TR-7 Service Kit	37.95	1.00
L-7E	Linear Amp. 2kw, 10m-160m. Without Tubes.	759.00	10.00
	Tubes for L-7E (2 x 3-500Z)	138.00	5.00
TR-4CW(RIT)	Transceiver AM/SSB/CW with R.I.T.	496.80	5.00
AC-4	120/240v Power Supply for TR-4CW	109.25	5.00
34.PNB	Plug-in Noise Blanker for TR-4CW	73.60	1.00
DC-4	DC Power Supply for TR-4CW	138.00	5.00
RV-4C	Remote V.F.O. for TR-4CW	109.25	5.00
FF-1	Crystal Control for TR-4CW	39.10	1.00
MS-4	Speaker for TR-4CW; R-4C; SPR-4	29.50	2.00
TV-42LP	Low Pass Filter 100w	10.35	1.00
TV-3300LP	Low Pass Filter 2kw	18.40	1.50
7073	Hand Microphone for TR-7	18.40	1.00
7077	Desk Microphone for TR-7	29.90	2.00
DL-300	Dummy Load, 300w	20.70	1.00
DL-1000	Dummy Load, 1000w	37.95	2.00
RC5-4	Remote control ant. switch, 5 way (4 line)	82.80	5.00
CS-7	Remote control ant. switch, 5 way (7 line)	115.00	5.00
B-1000	Balun for MN-7 and MN-2700, 4:1	20.70	1.00
1525-EM	Encoder Microphone	36.80	1.00
AA-10	2m Amplifier, 1w in-10w output	46.00	1.00
WV-4	RF Wattmeter 20-200 MHz	69.00	2.00
SPR-4	Programmable gen. purpose Receiver	460.00	5.00
DC-PC	DC Power Cord for SPR-4	4.60	0.50
FL Filters	For R-4C, .25/.5/1, 5/4, 0/6.0 kHz, each	39.10	0.50
Manuals	Spare Operating Manuals	6.00	1.00
Crystals	Accessory Crystals for R-4C and SPR-4	6.44	0.50
Interface	R-7/TR-7 connecting cable	20.70	1.00
AK-75	Multiband Antenna	23.00	2.00
AA-75	Antenna Insulator Kit	2.30	0.50
RP-700	Receiver Projector	69.00	1.00
SP-75	Speech Processor	79.35	2.00

BENCHER PRODUCTS

BY-1	Keyer Paddle (Black base)	28.75	2.00
BY-2	Keyer Paddle (Chrome base)	37.75	2.00
8Y-3	Keyer Paddle (Gold plated)	82.00	2.00
ZA-1	Balun 3.5-30 MHz for dipoles	12.65	1.00
ZA-2	Balun 14-30 MHz for beam antennas	13.80	1.00

COLLINS EQUIPMENT

KWM-380	Amateur HF Transceiver	1897.50	10.00
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KWM-380 OPTIONS

AC-3801	Noise Blanker	124.20	5.00
AC-3802	Speech Processor		
AC-3803	Control Interface	86.25	2.00
AC-3810	CW Filter, 500 Hz	62.10	1.00
AC-3811	CW Filter, 250 Hz	62.10	1.00
AC-3812	RTTY Filter, 1.7 kHz	62.10	1.00
AC-3813	AM Filter, 6.0kHz	62.10	1.00

KWM-380 ACCESSORIES

AC-2801	Rack Mount	86.25	2.00
AC-2808	Blower Kit	124.20	2.00
AC-2821	DC Standby Power Cable	34.50	2.00
MM-280	Handheld Microphone	23.00	2.00
MM-281	Handheld Noise cancelling Mic.	28.75	2.00
SM-280	Desk Top Microphone	48.30	2.00
SM-281	Desk Top Noise cancelling Mic.	54.05	2.00
AC-2827	CW Key	18.40	2.00
AC-2828	Microphone Foot Switch	23.00	2.00
AC-2829	Headphones	41.40	2.00
AC-2830	Lightweight Headphones	23.00	2.00

KWM-380 BOOKS

NTN	Owners Manual	4.00	1.00
NTN	Service Manual	20.00	2.00

HAL COMMUNICATIONS

		inc. vat	curr.
DS-2000	KSR	322.00	5.00
	Optional Morse for DS-2000	98.90	5.00
	KSR version 3.X	920.90	5.00
DS-3000	KSR version 2.X	675.00	5.00
DS-3100	ASR super deluxe	1536.40	5.00
ST-6000	Demod./Keyer/Scope	414.00	5.00
ST-5000	Demod./Keyer	207.00	5.00
RVD-1005	V.D.U. Baudot	230.00	5.00
DKB-2010	Demod. keyboard with memory	253.00	5.00

TRANSCEIVERS

515	Argonaut, 5w. SSB/CW, 3.5-30 MHz	276.00	5.00
540	Triton IV 200w. SSB/CW, 3.5-30 MHz	437.00	5.00
544	Triton IV as above with Digital readout	546.25	5.00
545	Omni-A, Analog, Series B, SSB/CW, 1.8-30MHz	598.00	5.00
546	Omni-D, Dig. Series B, SSB/CW, 1.8-30MHz	701.50	5.00
570E	Century 21, CW only, 3.5-29 MHz	230.00	5.00
574E	Century 21, Dig. 70w. CW, 3.5-29 MHz	299.00	5.00
580	Delta Digital, 200w. SSB/CW, 9 Bands	552.00	5.00

POWER SUPPLIES

210/E	115/230 vac, 13vdc, 1A, for Argonaut	27.60	2.00
252M0/E	115/230 vac, 13vdc, 18A, for Omni	89.70	5.00
262M/E	230 vac, 13vdc, 18A, deluxe with VOX (Triton)	101.20	5.00
280	230 vac, for Delta tcvr.	92.00	5.00

ACCESSORIES

206A	Crystal Calibrator	18.86	2.00
208A	CW Filter for Argonaut	29.90	2.00
212	29.0-29.5 Crystal for Models 540/544	3.45	0.50
213	29.5-5.30 MHz Crystal for models 540/544	3.45	0.50
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240	160m Converter for Models 540/544	69.00	2.00
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243	Remote V.F.O. for Models 545/546	87.40	5.00
244	Dig. Display/Counter for Models 540/544	124.20	5.00
245	CW Filter for Models 540/544	17.25	2.00
247	Antenna Tuner	43.70	2.00
248	Noise Blanker for Models 545/546	32.30	1.00
249	Noise Blanker for Models 540/544	18.40	1.00
276	Crystal Calibrator for Model 570E	18.86	1.00
277	Ant. tuner/VSWR Bridge for Century 21	57.50	2.00
1140	DC Circuit Breaker for 540/544/545/546	5.75	1.00
1170	DC Circuit Breaker for Century 21	5.75	1.00

KEYERS

645	Ultramatic, dual paddle for 545/546	55.20	2.00
670	Single-paddle keyer for 570/574	18.86	2.00
KR-5A	Single-paddle keyer, 6-14 vdc.	25.30	2.00
KR-50	Ultramatic, dual paddle, 117 vac/6-14 vdc	69.00	2.00

AVANTI ANTENNAS

AH151-3G	2m on-glass mount antenna	19.75	5.00
AH150-3M	2m magnetic mount antenna (3dB)	24.95	5.00
AH450-5G	7cm on-glass mount antenna	21.85	5.00
AH450-3G	70cm on-glass mount antenna (3dB)	19.75	5.00
AH28-9B	10m dual polarity base antenna	79.35	5.00
AV-200	27 MHz on-glass mount antenna	17.25	2.00
AV-241	27 MHz magnetic mount antenna	25.30	5.00

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Original	Standard	46.00	2.00
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Champion		43.70	2.00
Vibro-Keyer	Deluxe	59.80	2.00
Vibro-Keyer	Standard	46.00	2.00

BEARCAT SCANNING RECEIVERS

BC-210		184.00	5.00
BC-220		258.75	5.00
BC-250		258.75	5.00

TELEX COMMUNICATIONS INC.

HFC-91	Underchin headphones	6.21	1.00
HMC-2	Underchin headphones	9.20	1.00
HTC-2	Twin Receiver headphones	14.72	1.00

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CM-610	3.2-20 ohms, high impedance mic	29.90	2.00
CM-1210	3.2-20 ohms, high impedance mic	39.10	2.00
CM-1320	3.2-20 ohms, high impedance mic	48.30	2.00
CM-1320S	3.2-20 ohms, Single headset	36.80	2.00

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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

SHURE MICS		
201	Hand ceramic omnidirectional high impedance	£14.49
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401A	Hand controlled magnetic high impedance	£16.56
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444	Desk adjustable height controlled magnetic	£32.43
526T	Desk controlled response transistor preamp	£39.33

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

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DL20	30W DC-150MHz with PL259 connector	£6.33
T-80	80W DC-500 MHz with SO239 connector	£22.94
T-150	150W DC-500MHz with SO239 connector	£32.78

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L.F. Coil 40/80/160 MTS		£6.56
L.F. Whip Telescopic		£3.34
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YE 7		£8.52
YM 24		£16.67
YM 37		£8.62
YM 34		£21.27
YM 35		£14.66

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AM802G Compressor - 3 outputs		£59.95
AM502G Compressor - 1 output		£39.95

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MMT 432/144R		£173.66
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MMT 144/28		£90.85
MMC 28/136		£24.90
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MMC 144/any IF		£24.90
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MMC 70/any IF		£24.90
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MMC 432/144S		£29.90
MMC 1296/any IF		£32.20
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MMA 144 preamp		£14.95
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OSKAR SWR 200		
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1536	Aux7	Programme Board — only if 0-1.5 or fixed freq. reqd.	£36.50
1537	NB7	Noise Blanker Module — if operating mobile	£74.91
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7021	SL300	CW Filter fitted for the Professional R.O.	£44.25
7022	SL500	CW Filter fitted for the Dedicated CW Man	£44.25
7023	SL1800	SSB/RTTY Filter	£44.25
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7026	SL4000	AM for Broadcast Reception Music + Voice	£44.25
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1335	MMK7	Mobile Mounting Kit, incl. Cabinet + Cables	£38.96

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1528	L7E	Linear Export 10-80M incl. WARC	£858.00
1538	MIN7	Antenna Network Match 250W	£134.00
1539	MIN2700	Antenna Network Match 2kW	£224.00
1510	B-1000	4:1 Balun, use with MN7/2700	£19.00
1531	MS7	Matching Speaker	£33.93
1514	WH7	HF Watt Meter/SWR 1.8-30MHz	£70.00
1525	1525EM	Encoding Mic. for UV3	£39.00
7073	7073	Service/Extender Board Kit for TR7	£44.00
7077	7077	Desk ASTATIC Mic. for TR7	£34.50

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1550	DL300	Dummy Load 300Watt	£23.50
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1610	TV75-HP	HPF TV Filter — mount on TV Set	£11.00
1606	TV-42-LP	100W cont. rate LPF; it works:	£11.70
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385-0002	UV3	Service Manual Comprehensive	£19.00
385-0004	TR7	Service Manual Comprehensive	£22.90

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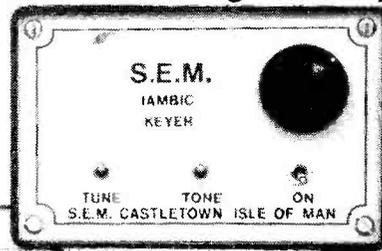
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It will match aeriols of 15-5000 Ohms, to your equipment. BALANCED or UNBALANCED at 1kW at 50 ohms. SO 239 and 4 mm terminals for co-ax or wire aeriols, both end fed and open wire. Price: £50.00. Ex stock. Or incorporating EZITUNE £69.50.

S.E.M. FORWARD/REFLECTED POWER METER — £29.17 Ex stock.**S.E.M. EZITUNE**

Makes SWR Bridges obsolete. Noise generator & 50 ohm SWR Bridge & R.F. Switch combine to allow you to tune up your transmatch etc without transmitting. Saves your P.A. Stops Q.R.M.

S.E.M. EUROPA C 2 METRE TRANSVERTER

£126.50. Repeater shift £15.00.

SENTINEL DUAL GATE MOSFET CONVERTERS

SENTINEL 2 metre converters: IFs, 28-30MHz, 4-6MHz, 2-4MHz. 2dB N.F. 30dB gain. £23.00 Ex stock.

SENTINEL X 2 metre converters — same as above with internal mains supply — £26.50 Ex stock.

SENTINEL TOP BAND CONVERTER — £20.80 Ex stock.

Prices include VAT and delivery. *Belling Lee sockets standard, SO239s £1.73 extra. 12 months guarantee. To order: C.W.O. or credit card. Phone your credit card number for same day service. Belling Lee Plugs 25p. PL259 plug and reducer 75p.

Need more info? Ring or write.

DATONG ELECTRONICS LIMITED

3 MAJOR NEW PRODUCTS

GENERAL COVERAGE CONVERTER MODEL PC-1

Parametric mixer plus LSI synthesiser give superb performance in new general coverage adaptor for two-metre receivers. Model PC-1 represents yet another contribution to the state-of-the-art from Datong. Combining a remarkable parametric mixer with LSI synthesiser Model PC-1 transforms any two-metre all-mode receiver or transceiver into a superb communications receiver covering 10 kHz to 30 MHz in thirty segments each covering one megahertz.

- Simply connects in two metre receiver's antenna lead
- Gives full coverage from 30 MHz right down to below 20 kHz
- Ultra simple controls - simply select the MHz band required on Model PC-1 and tune the kHz on your two metre receiver.
- Correct input filters automatically selected by internal logic
- High input intercept (15 dbm) means that PC-1 will not overload first
- Negligible internal noise generation
- Fully digital LSI synthesiser design for long term reliability
- Attractive green LED illuminated dials
- Compact attractive styling blends with all modern transceivers.

Our new parametric mixer completely eliminates conventional transistors or FET's from the signal path and replaces them by varactor diodes. The result is superb strong signal handling performance (input intercept 15 dbm) with negligible noise generation.

The combination of Model PC-1 with your good quality two-metre receiver will give performance comparable to that of really top class general coverage receivers and far superior to that of common general coverage receivers.

And the beauty is that you probably already own the expensive bit! In effect for just over £100 you get a general coverage receiver of truly superb performance. In operation Model PC-1 is delightfully simple. No manual preselector tuning is required. Instead internal decoding logic selects one of six bandpass input filters as the two decade "MHz" selector switches are operated. For operation at VLF (below 500 kHz) a panel push-button selects a 500 kHz low-pass filter. This broadband technique gives almost constant high sensitivity over the full tuning range (even to 20 kHz!) and the parametric high-level mixer avoids the spurious signals which are often an undesired by-product of broad-band systems.

Model PC-1 requires a non-critical external power source of 12 volts at 100 mA. Our Model MPU is suitable (Price £6.90 including VAT)

Price: £105.00 + VAT (Total: £120.75)

OUTDOOR ACTIVE DIPOLE ANTENNA MODEL AD370

Sensitive broadband receiving antenna for outdoor mounting, covering 200 kHz to 30 MHz.

Model AD370 is a new active dipole antenna especially suitable for outdoor mounting and represents an addition to our existing active antenna system (Model AD170).

FEATURES

- Weather resistant construction for outdoor use
- Excellent sensitivity from 200 kHz to well over 30 MHz
- Strong signal performance to professional standards
- Overall length only 104 inches. Uses two taper-ground stainless steel whips 50 inches long
- Fitted with 8 metres of coaxial down lead (easily extended if necessary)
- Good rejection of interference picked up by the feeder due to excellent balance.

Model AD370 makes an ideal outdoor (or indoor) antenna for use with good general coverage communications receivers.

Mounted outdoors, for example, screwed to a gable-end or window frame, the antenna is quite unobtrusive and can be used where normal antennas would be impracticable.

The two 50 inch tapered steel whips supplied with AD370 give excellent pick-up sensitivity thanks to specially designed circuitry. From below 200 kHz to well over 30 MHz Model AD370 gives performance virtually equivalent to very much larger conventional antennas. Moreover compared with unbalanced antennas Model AD370 shows good rejection of interference picked up by the feeder.

The active circuitry is housed in a substantial water resistant polycarbonate case with gasket seal. Eight metres of coaxial cable are fitted as standard.

Model AD370 can be supplied either as an alternative head unit (complete with whips and feeder) for use with an existing AD170 installation, or complete with interface unit for new installations. Model AD170 is of course still available, as normal for indoor installations.

Prices: Complete antenna system (comprising Model AD370 head unit with eight metre cable and interface unit type IB5, requiring 12 volts at 140mA):

£45.00 + VAT, total £51.75

Special package price complete with MPU or MPU/1 mains power unit: £49.00 + VAT, total £56.35

Model AD370 head unit with 8 metre cable (for use with an existing AD170 antenna system): £33.00 + VAT, total £37.95

VERY LOW FREQUENCY CONVERTER MODEL VLF

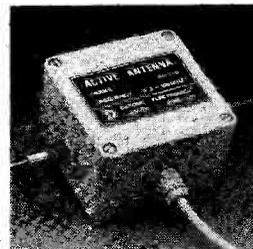
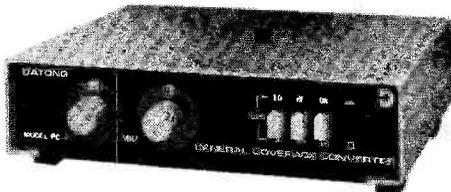
Converts signals in the DC to 500 kHz range to the range 28,000 to 28,5000 MHz.

Model VLF adds the "missing band" to existing communications receivers. Most receivers do not cover the region below several hundred kilohertz. Model VLF plugs the gap and gives high sensitivity in this neglected region.

FEATURES

- Adds the VLF band to "general coverage" receivers. Simply connects in series with the antenna
- Picks up Omega, time signals, beacons etc, plus longwave broadcasts, with sub-microvolt sensitivity
- Used with an amateur-bands-only HF receiver Model VLF gives you quick access to LW and MW broadcast stations (with reduced but usable sensitivity above 500 kHz)
- Quality construction in diecast box: SO239 connectors, crystal controlled, LED indication, on/off switch
- Operates from built-in 9 volt battery (PP3) or external power supply (5-15 volts DC at 5 mA)
- Antenna connects straight through when unit is switched off (for reception only).

Price: £22.00 + VAT, total £25.30



DATONG ELECTRONICS LIMITED

Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Tel (0532) 552461



OSL leads the field in supplying crystals world wide to major communications companies, broadcasting authorities and posts and telecommunications administrations. As a result we can supply the amateur with a high quality, competitively priced product over a frequency range from 10kHz to 225MHz. Get the power of the professionals in crystal supply behind you!

2 METRE STOCK CRYSTALS. Price £1.83 for one crystal. £1.74/crystal when two or more purchased.

HC6/U	HC6/U	HC25/U	HC25/U	HC25/U	HC6 &	
30pF TX	30pF TX	30pF and	20pF and	25pF and	25/U	
		40pF TX	30pF RX	20pF TX	SR RX	
RO	4.0277	8.0555	12.0833	14.9888	18.1250	44.9686
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	45.0083
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	44.9333*
S9	—	—	12.1020	14.9472	18.1531	44.9416*
S10	—	—	12.1041	14.9500	18.1562	44.9500*
S11	—	—	12.1062	14.9527	18.1593	44.9583*
S12	—	—	12.1083	14.9555	18.1625	44.9666*
S13	—	—	12.1104	14.9583	18.1656	44.9750*
S14	—	—	12.1125	14.9611	18.1687	44.9833*
S15	—	—	12.1145	14.9638	18.1718	44.9916*
S16	—	—	12.1167	14.9667	18.1750	44.9900*
S17	—	—	12.1187	14.9694	18.1781	44.9983*
S18	—	—	12.1208	14.9722	18.1812	44.9166*
S19	—	—	12.1229	14.9750	18.1843	44.9250*
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
S23	4.0437	8.0875	12.1312	14.9861	18.1968	44.9583

SR = Series Resonance *HC25 only

Also in stock: RO to R7 for FT221 RO to R7 and S8 to S23 for following: Belcom FS1007, FDK TM56, Multi 11 Quartz 16 and Multi 7, Icom IC2F, 21, 22A and 215, Trio Kenwood Z200, Z200, Uniden 2030 and Yaesu FT2FB, FT2 Auto, FT224, FT223 and FT202.

Also in stock 4 and 8 MHz TX in HC6/U for 145.8 MHz. Icom crystals TX for 145.6 MHz (RR0). 44 MHz RX crystals in HC6 for 145 (RR0). All at above price.

4 METRE CRYSTALS for 70.26 MHz in HC6/U at £2.25. TX 8.78250 MHz. RX 6.7466 or 29.78 MHz in stock.

70cm CRYSTALS in stock 8.0222 and 12.0333 in HC6 £1.85. Pyc Pocketfone PF1, PF2, PF70 and Wood and Douglas £4.50 a pair or TX £2.25, RX £2.50, SU8 (433.2) RBO, RB2, RB4, RB6, RB10, RB11, RB13 and RB14.

CONVERTER CRYSTALS in HC18/U at £2.85. In stock 38.666, 42.000, 70.000, 96.000, 101.000, 101.500, 105.666 and 116.000 MHz.

STONE BURST AND I.F. CRYSTALS in HC18/U at £2.25 in stock. 7.168 MHz for 1750 kHz and 10.245 MHz for 10.7 MHz IF's.

FREQUENCY STANDARDS in stock £2.75. HC6 200 kHz, 455 kHz, 1000 kHz, 5.000 MHz and 10.000 MHz. HC13 100 kHz, HC18 1000 kHz, 7.000 MHz, 10.700 MHz, 48.000 MHz and 100.00 MHz.

PRICES ARE EX VAT. PLEASE ADD 15%.

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London SE18 3LR

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MADE TO ORDER CRYSTALS SINGLE UNIT PRICING

	Price Group	Adjustment Tolerance ppm	Frequency Ranges	Price and Delivery	
				A	B
Fundamentals	1	200 (total)	10 to 19.999 kHz	—	£23.00
	2	200 (total)	20 to 29.999 kHz	—	£16.50
	3	200 (total)	30 to 99.999 kHz	—	£10.50
	4	200 (total)	100 to 999.999 kHz	—	£6.00
	5	50	1.00 to 1.499 MHz	£9.00	£6.00
	6	10	1.50 to 1.999 MHz	£4.75	£4.20
	7	10	2.00 to 2.599 MHz	£4.75	£4.00
	8	10	2.60 to 3.999 MHz	£4.55	£3.70
	9	10	4.00 to 20.999 MHz	£4.55	£3.60
	10	10	21.00 to 24.000 MHz	£6.00	£5.40
3rd OVT	11	10	21.00 to 59.999 MHz	£4.55	£3.60
5th OVT	12	10	60.00 to 99.999 MHz	£5.00	£4.00
	13	10	100.00 to 124.999 MHz	£6.15	£5.20
5th, 7th & 9th OVT	14	20	125.00 to 149.999 MHz	—	£6.00
	15	20	150.00 to 225.00 MHz	—	£7.50

Unless otherwise requested fundamentals will be supplied with 30pF load capacity and overtones for series resonance operation.

HOLDERS — Please specify when ordering — 10 to 200 kHz HC13/U, 170 kHz to 170 MHz HC6 or HC33/U, 4 to 225 MHz, HC18 and HC25.

Please note that it is not always possible to provide the A delivery service but a telephone call will confirm its availability. Any orders received for A delivery when it is not available will automatically be placed on B delivery and a credit note issued for the difference in price.

DISCOUNTS. 5% mixed frequency discount for 5 or more crystals at B delivery. Price on application for 10 or more crystals to same frequency specification. Special rates for bulk purchase schemes including FREE supply of crystals used in UK repeaters.

EMERGENCY SERVICE SURCHARGES (to be added to A delivery prices). 4 working days £12, 6 working days £7, 8 working days £5, 13 working days £3 (maximum of 5 crystals on 4 day delivery).

CRYSTAL SOCKETS HC6/U and HC25/U 16p.

MINIMUM ORDER CHARGE £1.50.

COMMERCIAL USERS. Crystals can be supplied for MPU, industrial control, etc. in the range 4-21 MHz fundamental and 3rd OVT 18 to 60 MHz at £1.15 for 100 off. This is only a limited example of our capabilities. Please enquire about other quantities, frequency ranges, watch and sub-carrier crystals. We can supply crystals for marine and land mobile radio telephone use. Send for details.

TERMS. Cash with order, cheques and postal orders payable to OSL Ltd. All prices include postage to UK and Irish addresses. Please note Southern Irish cheques and postal orders are no longer acceptable. Please send bank draft in pounds Sterling.

OVERSEAS DISTRIBUTORS

West Germany, Austria and Benelux countries — SSB Electronic, Karl Arnold Str. 23, 5860 Iserlohn, West Germany.
 Denmark — Asbjorn Jorgensen, Aabrinken 1, Tapdrup, DK800, Viborg, Denmark. Portugal — Sorubal SARRL, Rua General Pimenta de Castro, 15-81, Lisboa 5, Portugal.
 (Enquiries invited from companies in other countries.)

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This FABULOUS SSTV SCAN CONVERTER with 64K of random access memory will enable you to receive and/or send TV pictures all over the world using your normal (completely unmodified) receiver or transceiver and a T.V. monitor. Remember there are now over 13,000 SSTV stations in operation from well over 100 countries and more being added every day. Don't miss out on all the fun. At only £666 including VAT & Securicor delivery the '400' is outstanding value. Send your s.a.e. for full details today. **AERO & GENERAL SUPPLIES, BUILDING 33, EAST MIDLANDS AIRPORT, CASTLE DONINGTON, DERBY, DE7 2SA.**

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A five day course, leading from basic principles to preparation for the Radio Amateurs Examination, is available in the Georgian City of Bath. The tuition is given by G3UWJ lecturer and private tutor in Amateur Radio who, for ten years, has prepared numerous students from the ages of 15 to 70+ who are now licensed amateurs. The classes are essentially small so that each student receives the required amount of personal tuition to ensure that the syllabus is completed in five days.

For further details please write, enclosing a S.A.E., to:

PETER BUBB — tuition
58 Greenacres, Bath, Avon, BA1 4NR.

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PROFESSIONAL COMPLETE CRYSTAL SERVICE AMATEUR

Prices shown exclude VAT — UK Customers please add 15%.

70 CM CRYSTALS

Due to the much higher multiplication involved (3 times that on 2m) all our stock 70cm crystals are to much higher tolerances than our standard range. We are stocking the following channels: RB0 (434.60/433.00), RB2 (434.65/433.05), RB4 (434.70/433.10), RB6 (434.75/433.15), SU8 (433.20), RB10 (434.85/433.25), RB11 (434.875/433.275), RB13 (434.925/433.325), RB14 (434.95/433.35), SU18 (433.45), SU20 (433.50) — TX & RX for use with: — PYE UHF Westminster (W15U), UHF Cambridge (U10B), Pocketfone (PF1) AND UHF PF70 Range, and STORNO CQL/COM 662 all at £2.32. For the U450L Base Stn we have the TX crystals for the above channels. The RX crystals for the U450L Base Stn together with TX and RX crystals for any other 70cm channel (eg RB/SU12 (434.90/433.30) RTTY, SU16 (433.40), SU22 (433.55) etc.) for most UHF equipments are available at £4.48 for crystals up to 63MHz, and £5.16 for 63 to 105MHz to amateur spec or £5.26 for up to 63MHz and £6.05 for 63 to 105MHz to the same closer spec as our stock items. Delivery approx. 5/6 weeks.

TWO METRE CRYSTALS

CRYSTAL FREQUENCY RANGE USE (Tx or Rx) and HOLDER	6 MHz-TX-HC25U	8 MHz-TX-HC6/U	10 MHz-RX-HC6/U	11 MHz-RX-HC6/U	12 MHz-TX-HC25U	14 MHz-RX-HC25U	18 MHz-TX-HC25U	44 MHz-RX-HC6/U	44 MHz-RX-HC25U	52 MHz-RX-HC25U
OUTPUT FREQUENCY										
144.4 (433.2)	b									
144.480	c									
144.800	c									
144.850	c									
145.000/R0T	a	a	a	a	a	a	a	a	a	a
145.025/R1T	c	c	c	c	c	c	c	c	c	c
145.050/R2T	a	a	a	a	a	a	a	a	a	a
145.075/R3T	c	c	c	c	c	c	c	c	c	c
145.100/R4T	a	a	a	a	a	a	a	a	a	a
145.125/R5T	c	c	c	c	c	c	c	c	c	c
145.150/R6T	a	a	a	a	a	a	a	a	a	a
145.175/R7T	c	c	c	c	c	c	c	c	c	c
145.200/R8T	a	a	a	a	a	a	a	a	a	a
145.200/S14	c	c	c	c	c	c	c	c	c	c
145.350/S14	a	a	a	a	a	a	a	a	a	a
145.400/S16	c	c	c	c	c	c	c	c	c	c
145.425/S17	a	a	a	a	a	a	a	a	a	a
145.450/S18	c	c	c	c	c	c	c	c	c	c
145.475/S19	a	a	a	a	a	a	a	a	a	a
145.500/S20	c	c	c	c	c	c	c	c	c	c
145.525/S21	a	a	a	a	a	a	a	a	a	a
145.550/S22	c	c	c	c	c	c	c	c	c	c
145.575/S23	a	a	a	a	a	a	a	a	a	a
145.600/R0R	c	c	c	c	c	c	c	c	c	c
145.625/R1R	a	a	a	a	a	a	a	a	a	a
145.650/R2R	c	c	c	c	c	c	c	c	c	c
145.675/R3R	a	a	a	a	a	a	a	a	a	a
145.700/R4R	c	c	c	c	c	c	c	c	c	c
145.725/R5R	a	a	a	a	a	a	a	a	a	a
145.750/R6R	c	c	c	c	c	c	c	c	c	c
145.775/R7R	a	a	a	a	a	a	a	a	a	a
145.800/R8R	c	c	c	c	c	c	c	c	c	c
145.950/S38	a	a	a	a	a	a	a	a	a	a

CRYSTALS MANUFACTURED TO ORDER

Prices shown are for one off, to our amateur spec., closer tolerances are available, please send us details of your requirements.

A Low frequency fundamentals in HC13/U or HC6/U

Adj. tol. ±50ppm. Temp. tol. ±100ppm 0to + 70°C.

6.0to 19.999kHz	£28.12	80to 99.999kHz	£10.06
20to 39.999kHz	£17.74	100to 159.99kHz	£9.25
40to 79.999kHz	£12.40	160to 499.99kHz	£6.19
		500to 799.99kHz	£7.30

B High frequency fundamentals/overtones in HC6/U, HC18/U or HC25/U

Adj. tol. ±20ppm. Temp. tol. ±30ppm - 10 to 60°C.

‡800to 900.9kHz (fund)	£9.75	*21 to 24.99MHz (fund)	£6.73
‡1.0to 1.499MHz (fund)	£10.35	*25to 30MHz	£8.28
‡1.5to 2.599MHz (fund)	£4.93	*15to 62.99MHz (30/T)	£4.48
‡2.6to 20.99MHz (fund)	£4.48	*60to 105MHz (50/T)	£5.16
‡3.4to 3.999MHz (fund)	£6.21	*105to 125MHz (50/T)	£7.76
‡4.0to 5.999MHz (fund)	£4.93	125to 180MHz (O/T)	£7.50
* 6.0to 20.99MHz (fund)	£4.48	180to 25MHz (O/T)	£12.49

Delivery *Normally 5/6 weeks (express available), all other frequencies 7/8 weeks. Holders: Low frequencies HC 13/U or HC 6/U dependent on frequency. High frequencies are available in HC 6/U, HC 18/U or HC 25/U unless marked ‡ only available in HC 6/U or † only available in HC 18/U and HC 25/U, HC 17/U (replacement for FT 243) and HC 33/U (wire end HC 6/U) available as per HC 6/U above at 30p extra on HC 6/U price. Unless otherwise specified, fundamentals will be supplied to 30pf circuit conditions and overtones to series resonance.

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We can supply crystals to most commercial and MIL specifications, with an express service for that urgent order. Also for commercial use, eg TV or computer crystals, etc, we can supply at very competitive prices. Please send S.A.E. for details or telephone between 4.30-7pm and ask for Mr. Norcliffe.

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Many types made to order crystals are available on our EXPRESS SERVICE with a delivery of three days on our class "A" service. Telephone or Telex for details.

TERMS: CASH WITH ORDER—MAIL ORDER ONLY—S.A.E. WITH ALL ENQUIRIES—PRICES INCLUDE P.&P. (BRITISH ISLES) EXCEPT WHERE STATED—OVERSEAS CHARGED AT COST.

PRICES: (a) £1.95; (b) £2.32; (c) £2.50; (e) £4.48.

AVAILABILITY: (a), (b), (c) stock items, normally available by return (we have over 5000 items in stock); (e) 4/6 weeks normally but it is quite possible we could be able to supply from stock.

N.B. Frequencies as listed above but in alternative holders and/or non stock loads are available as per code (e).

ORDERING. When ordering please quote (1) Channel; (2) Crystal frequency; (3) Holder; (4) Circuit conditions (load in pf). If you cannot give these, please give make and model of equipment and channel or output frequency required and we will advise if we have details.

4M. CRYSTALS FOR 70.26 MHz—HC6/U

TX 8.7825 MHz and RX 6.7466 MHz or 29.780 MHz £2.32.

10.245 MHz 'ALTERNATIVE' IF CRYSTALS £2.32. For use in Pye and other equipment with 10.7 MHz and 455 kHz IF's to get rid of the "birdy", just able 145.0 MHz in HC6/U, HC18/U and HC25/U.

CRYSTAL SOCKETS—HC6/U, HC13/U and HC25/U (Low loss) 16p each

CONVERTER/TRANSVERTER CRYSTALS—HC18/U

All at £3.00, 38.6666 MHz (144/28), 42 MHz (70/28), 58 MHz (144/28), 70 MHz (144/4), 71 MHz (144/2), 95 MHz (342/52), 96 MHz (1.296/432/144), 101 MHz (432/28), 101.50 MHz (434/28), 105.6666 MHz (1.296/28) and 116 MHz (144/28).

TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS

200 KHz and 455 KHz in HC6/U £3.50
100 KHz in HC13/U and 1 MHz in HC6/U £2.95
5 MHz in HC6/U and 10 MHz + 10.7 MHz in HC6/U + HC25/U £2.80

CRYSTALS FOR MICROPROCESSOR USE

Please let us know your requirements eg 4MHz HC 18/U 1 off £2.00, 100 off £1.10, 1000 off 90p, 25,000 off 50p.

ANZAC MD-108 DOUBLE BALANCED MIXER

5-500 MHz supplied with full details for only £5.95.

Optimum Performance with KW Ancillaries



DECCA-KW107 SUPERMATCH
Antenna Tuning System Incorporates E-ZEE Match, SWR/RF power meter; Dummy Load; Antenna switch.

DECCA-KW109 SUPERMATCH
A high power version of the KW107 is available.

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Antenna Tuner 10-50 metres, matches 50/75 ohm input to co-ax fed antenna's, also twin feeder and single wire systems.

DECCA-KW BALUN Mk. II
The Decca-KW Balun is broadband-3 to 30 MHz, rated up to 2 KW p.e.p. 1:1 Ratio 50 ohms "unbalanced" feed to "balanced" output. Waterproof moulded case. Suitable for Dipole and Beam Antennas.

DECCA-KW ANTENNA SWITCH. Selects up to 3 Antennas. Low-insertion loss up to 200 MHz. 1kW p.e.p. rating.

Other KW Favourites—Decca KW Dummy Load. KW Traps (original and the best); KW Trap Dipoles; Stockist for HY-Gain beams and Verticals; CDR Rotators; Shure Microphones, etc.
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KW

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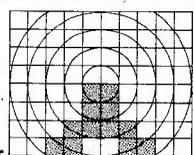
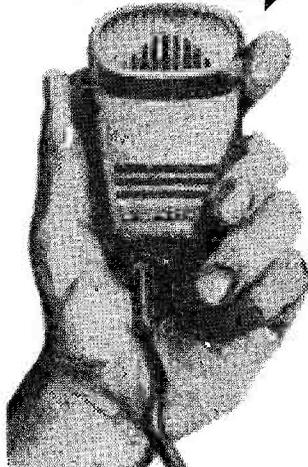
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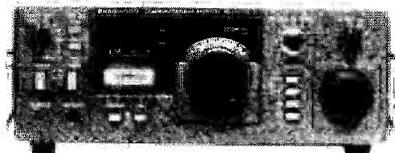
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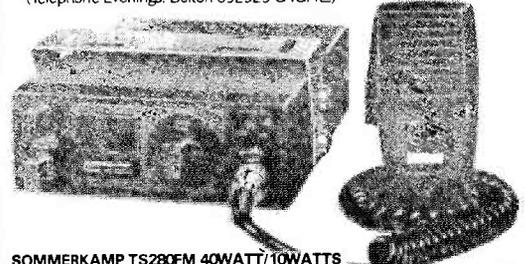
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