

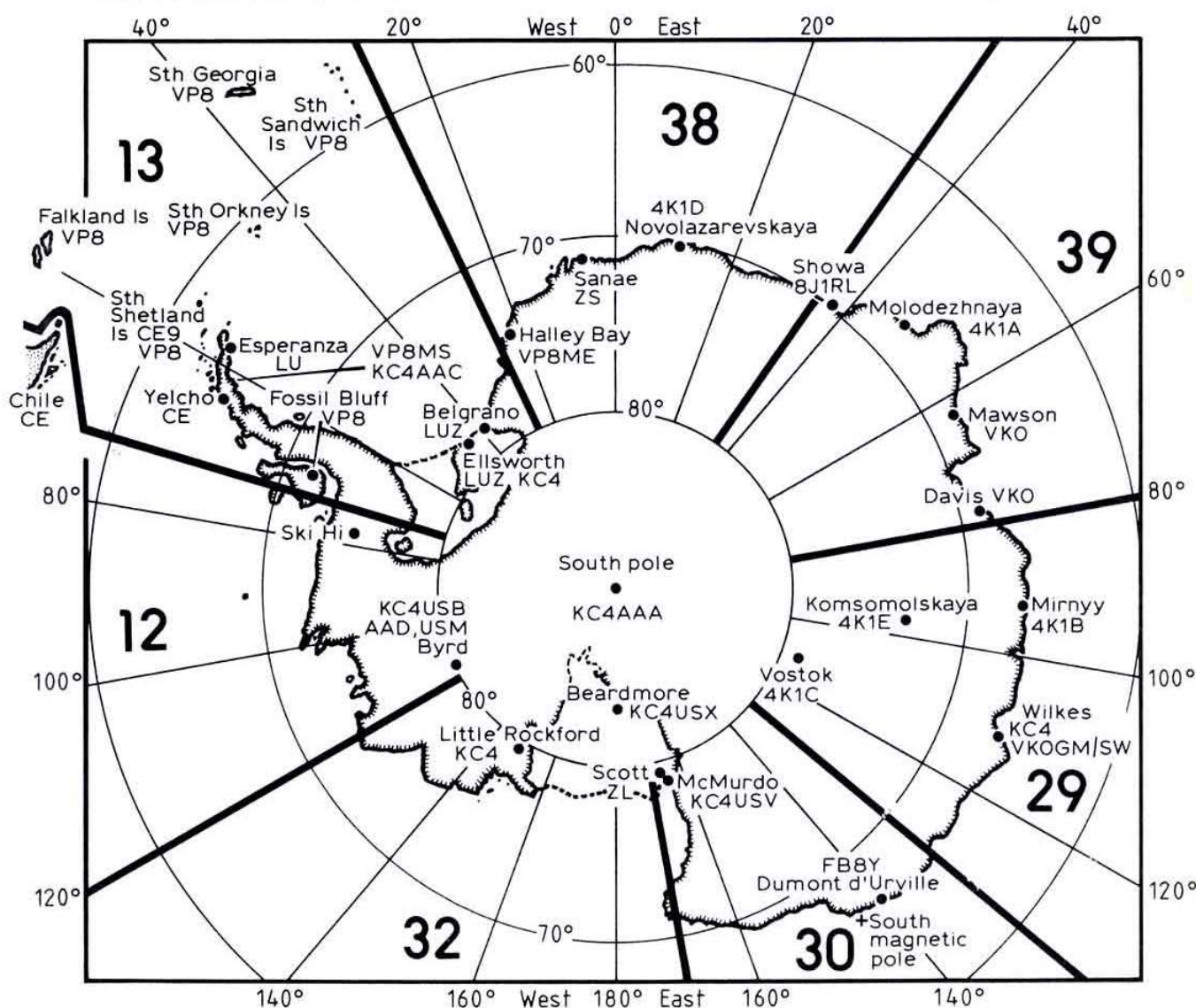


October 1980

radio communication

journal of the Radio Society of Great Britain

ANTARCTICA, SHOWING PREFIX AREAS AND CQ DX ZONES



Please note we will *not* be exhibiting at Leicester this year

CATRONICS FOR TRIO

TRADE UP TO TRIO AT CATRONICS

TS120S

MULTUM IN PARVO



TS120S Brief Specification

Frequency Range: 80m to 10m Amateur Bands
Mode: CW, USB, LSB
RF Power output: 200W PEP
RX sensitivity: 10dB S/N at 0.25µV
Power requirements: Max. 18A at 13.8V DC
Price: £432
20W PEP version also available: TS120V at £347

THE CENTRE FOR

TS770

ALL MODE 2M + 70CM



TS770 Brief Specification

Frequency Range: 144-146MHz
430-440MHz
Mode: SSB (USB, LSB), CW, FM
RF Output Power: 10 watts
Only for FM: 10W (Hil) Approx. 1W (LOW)
SSB/CW 0.5µV for 10dB
(S + N) / N
FM 1µV for 30dB (S + N) / N
20dB quieting (FM): Less than 0.4µV
Price: £763



The message we are saying is that Catronics Ltd is an authorised Trio dealer with the full service and spares organisation backed by Lowe Electronics Ltd

COME TO



SECOND HAND EQUIPMENT

We always have a selection of used equipment in stock, currently as follows:

TR2200G	£100.00
TR8300	£160.00
TR3200	£150.00
DRAKE 2C	£120.00
C146	£115.00
IC30A	£130.00
IC201	£230.00
NAG2200-144XL	£300.00
9R59DS	£45.00
TS520S	£375.00

TR7800

2M FM SYNTHESISED



TR7800 Brief Specification

Frequency range: 144-145.995MHz
RF Output power: H1 25W, LO 5W (adjustable)
Rx sensitivity: 0.2µV for 12dB SINAD
Autoscan: 5kHz or 25kHz
Memories: 15 inc 1 x priority
Repeater shift: + / - 600kHz & Reverse
Frequency display: 4 digit LED & Mem. no.
Price: £268

AMATEUR RADIO

TS180S

THE NEWEST HF TRANSCEIVER



TS180S Brief Specification

Frequency range: 160m to 10m Amateur Bands
Mode: CW, USB, LSB, FSK
RF Input Power SSB: 200 watts PEP
CW: 160 watts DC
FSK: 100 watts DC
RX sensitivity: 10dB S/N at 0.25µV
Power requirements: Max. 20A at 13.8V DC
Price: £589
or £679 with dig. freq. cont.



We are 300 yards from Wallington Railway Station (London Bridge or Victoria). Frequent buses from Croydon and Sutton. Three large car parks within 100 yards. Hire purchase facilities available on all equipment. Credit cards accepted. Mail orders—normally dealt with on day of receipt. Express delivery arranged. All prices include VAT.



**CATRONICS LTD, DEPT T10, COMMUNICATIONS HOUSE,
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five weeks before publication date

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GREAT BRITAIN 1980

LOWE ELECTRONICS Ltd



TRIO TS180S



£679.65 inc VAT
(including DFC memory unit)

Trio's TS180S with DFC is an all solid-state HF transceiver designed for the DXer, the contest operator, and all other Amateurs who enjoy the 160 through 10-metre bands. The following features prove, beyond doubt, that the TS180S is the finest rig available!

Digital Frequency control (DFC) including four memories and manual scanning. Memories are usable in transmit and/or receive modes. Memory frequencies to be tuned in 20-Hz steps up or down, slow or fast, with recall of the original stored frequency. It's almost like having four remote VFOs!

All solid-state . . . including the final. No dipping or loading. Just dial up the frequency, peak the drive, and operate.

High power . . . 200W p.e.p./160W dc input on 160-15 metres, and 160W p.e.p./140W dc on 10 metres. Also covers more than 50kHz above and below each band (28-30MHz), WARC, etc., and receives WWW on 100MHz.

Improved dynamic range.

Single-conversion system with highly advanced PLL circuit, using only one crystal with improved stability and spurious characteristics.

Built-in microprocessor-controlled large digital display. Shows actual VFO frequency and difference between VFO and "M1" memory frequency. Blinking decimal points indicate "out of band". Monoscale dial, too.

IF shift . . . Trio's famous passband tuning that reduces QRM.

Selectable wide and narrow CW bandwidth on receive (500-Hz CW filter is optional).

Automatic selection of upper and lower sideband (SSB NORM/SSB REV switch).

Tunable noise blanker (adjustable noise-sampling frequency).

RF AGC ("RGC"), which activates automatically to prevent overload from strong local signals.

AGC (selectable fast/slow/off).

Dual RIT (VFO and memory/fix).

Three operating modes—SSB, CW and FSK.

Improved RF speech processor.

Dual SSB filter (optional), with very steep shape factor to reduce out-of-passband noise on receive and to improve operation of RF speech processor on transmit.

13.8 VDC operation.

TRIO TS120V/S

TS120V £347.30 inc VAT

TS120V	£347.30	TS120S	£432.40
PS20 4 Amp	£44.85	PS30 20 Amp	£85.10
AT120	£55.20	MC355 mic	£13.80
SP120	£25.30	TL120 linear	£128.80
VFO120	£89.70		

THE SYSTEM APPROACH



What do we mean by the "System Approach"?

Well, take the TS120V and you have the finest 20W p.e.p. mobile HF transceiver you could buy. Many operators are even buying it as a second station because it's so good. Consider its features, the single conversion PLL derived top performance; the accurate digital readout; the passband tuning; the noise blanker; the superb engineering; THEN maybe add the PS20 mains power supply and you have an equally great home station; OR maybe add the multi-function VFO120 second VFO unit; OR the SP120 external speaker; OR the 100W AT120 antenna tuner or maybe even a superb Microwave Modules 2 metre or 70



cm transverter to get you up on the VHF and UHF bands. It all adds up to a fine station tailored exactly to your own needs.

If you need more power, the TL120 200W p.e.p. linear is now available, but you will need a heavier 12V supply to run it. A suitable unit would be the PS30 which delivers up to 20 amps fully regulated and protected. Lots of people are buying the PS30 as a general purpose heavy duty supply for shack use.

Finally, should you really want high power all the time, consider the TS120S which incorporates all the features of the TS120V but has a built-in high power, fully protected 200W p.e.p. linear and it's still not too expensive to enjoy!

TAKE A GOOD LOOK AT THE PRICES!!!

THE GREAT HF LINE-UP BY TRIO

LOWE ELECTRONICS Ltd



TRIO

R1000



£298.00 inc VAT

THIS PRICE INCLUDES DC KIT FITTED

The R1000 uses an advanced PLL system in an up-conversion scheme to a high (48MHz) first IF to remove any possibility of image responses. The receiver covers the entire frequency range from below 200kHz right up to 30MHz in 30 bands, each 1MHz wide. The bands are selected, not by ambiguous knob twiddling as in receivers using the Wadley loop but by a 30 position band switch which controls the PLL system.

The band switch also electronically selects the appropriate band pass filter network in the RF stages of the receiver so there are no "preselector" or "antenna trim" controls to twiddle—simply set the band switch to the range required—that's it!

A highly stable VFO tunes each 1MHz range and its linear, back lit scale makes readout easy. However, in addition to this dial, Trio have also provided 5 digit true frequency digital readout so as to guarantee spot-on accuracy on any frequency. As a further feature, the digital display can also be switched to read time, this being derived from a quartz standard. Marvellous for accurate log keeping. The display uses high intensity readout units which can be dimmed for use in low light conditions.

As for what else is inside this superb instrument—selectivity is catered for by three custom made IF filters; a 12kHz wide AM filter; 6kHz narrow AM filter; and a new 2.7kHz SSB filter with a shape factor of better than 1:2.6:60dB. Selectable sidebands are available at the touch of a switch. As an option, on request, you can have 6kHz AM wide, 2.7kHz AM narrow and 2.7kHz SSB. The 12kHz filter remains in the set for use if required.

For the first time in mid-price receiver, a true noise blanket is provided to remove pulse type ignition noise.

To minimise front end overload, a step RF attenuator is included which gives 0-6dB attenuation in four steps.

All the rear panel connectors are recessed on a sloping panel so that you can stand the receiver either on its back, or pushed back against a wall when used in conventional shelf mounting. The antenna inputs allow the use of either a high impedance wire aerial or a 50ohm balanced input so that the proverbial long lump of wire will work really well with the R-1000.

This receiver is so advanced it makes everything in its price range completely obsolete.

**VOTED "MY FAVOURITE TRANSCEIVER"
BY RADIO AMATEURS WORLDWIDE**

SPECIFICATIONS

GENERAL

Frequency Range:	160 meter band-1.8 to 2.0MHz 80 meter band-3.5 to 4.0MHz 40 meter band-7.0 to 7.5MHz 20 meter band-14.0 to 14.35MHz 15 meter band-21.0 to 21.5MHz 10 meter band-28.0 to 29.7MHz
Mode:	WWV -15.0MHz (receive only) SSB (USB, LSB), CW
Antenna Impedance:	50 to 75 Ohms
Frequency Stability:	Within ± 1 KHz during one hour after one minute of warm-up, and within 100Hz during any 30 minutes period thereafter

Power Requirements:	120/220 V AC, 50/60Hz
Power Consumption:	Transmit: 280 Watts Receive: 26 Watts (with heater off)
Dimension:	333 (13-1/8) wide x 153 (6-0) high x 335 (13-3/16) deep mm (inch)
Weight:	16.0kg (35.2lbs)

TRANSMITTER

RF Input Power:	SSB: 200 Watts PEP CW: 160 Watts DC
Carrier Suppression:	Better than 40dB
Sideband Suppression:	Better than 50dB
AF Response:	400 to 2,600Hz

RECEIVER

Sensitivity:	0.2 μ V for 10dB (S+N)/N
Selectivity:	SSB: 2.4kHz/-6dB, 4.4kHz-60dB CW: 0.5kHz/-6dB, 1.5kHz/-6dB (with optional CW filter)
Image Ratio:	Better than 50dB
IF Rejection:	Better than 50dB
AF Output Power:	2 Watts (8 Ohms load)
AF Output Impedance:	4 to 16 Ohms



TS520SE

In the face of ever increasing complexity in amateur radio equipment, it's 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 on the market today. Of course, the bare figures cannot tell you just how nice it 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?" The TS520SE standard specification includes CW wide/narrow switching (using the optional 500Hz filter), semi breakin 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.

LOWE ELECTRONICS Ltd



TRIO TR2300

£166.75 inc. VAT

Nicad Pack £10.35 inc

VB2300 £49.45 inc

The high sensitivity receiver section uses a combination of effective RF filters providing optimum cross modulation rejection across the entire band. An extra low profile speaker uses a samarium cobalt magnet to reduce equipment size whilst improving speaker efficiency and clarity of reproduction.

The remarkable asset of the TR2300 has to be its unexcelled versatility. Using the carrying case and shoulder strap, you can take the 2300 anywhere, powered by the rechargeable ni-cad batteries, and this is certainly the way that most operators use the rig. Sit the 2300 on top of a 12V dc supply at home, however, using the power cord provided, and you have a terrific home station FM rig.

If you want mobile operation, slot the 2300 into an MB1 mounting bracket, possibly add the matching VB2300 amplifier and you have a really high performance mobile transceiver—and being so small, the TR2300 fits almost anywhere. The front panel layout was designed for ease of operation and the back illuminated dial is so easy to read that it's a delight to use.

TR2300—truly the transceiver for all seasons.

Now—if you insist on a handheld, and don't need the versatility of the 2300, take a look at the new TR2400.

TR2400

£210.45 inc. VAT

(includes Nicads, charger & helical aerial)

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.

1. **Large LCD digital frequency readout.** Clearly readable even in direct sunlight, with black illumination for night use. Virtually no current drain (unlike LED displays) so display stays on all the time. Shows RX and TX frequencies and memory channels. Also included in display are indicators for "on air", "memory recall", "battery status" and "lamp".
2. **Frequency control functions.** Keyboard entry of any frequency from 144–146MHz in 5kHz increments. Up/down manual scanning from 144–146MHz in single or fast continuous 5kHz steps.
3. **10 memories** (retained by battery backup), one of which can be used as a non-standard repeater shift. Automatic scanning of all 10 memory channels is provided, and scanning can be for a busy channel or the next free channel.
4. **Full repeater operation** and also instant reverse repeater operation at the touch of a switch. Proper auto tone burst provided.
5. **Fast 1½-hour base charger** and stand with full external microphone facilities available.
6. **Lock switches** are provided to prevent misoperation of the keyboard and also to disable the press to talk switch.



7. **Power output** of over 1.5W to a BNC aerial connector (flexible whip supplied as standard). Decent size batteries for long operating time.
 8. **Superb mechanical design** in the Trio tradition of top engineering, based on a die cast frame for real drop-proof performance.
 9. **Supplied complete with Nicad pack, charger, rubber helical aerial**—ready to go.
- The TR2400 is the best available; would you expect less than the best from Trio?

It's a little more expensive than its competitors—but oh so far ahead in performance.

THE TRIO 2 METRE TWINS

LOWE ELECTRONICS Ltd



TRIO
TR9000



2 metre MULTIMODE

£345 inc VAT

APOLOGY

To all those who want the TR9000 and can't get one. The demand for the TR9000 has been staggering, and Trio simply cannot make enough sets to meet it. However, I can assure you that they are attempting to meet our requirements and the rig will certainly delight you when it finally sits in your shack. Thank you for being so patient, and if you want more information on this amazing transceiver, just ask us for the latest leaflet.

COMING SOON THE TS830S

THE TRIO REPLACEMENT FOR THE OUTSTANDING TS820

Take a close look at the photo for all the detail



WE HOPE TO HAVE THE TS830S AT LEICESTER

TRIO

IMPORTANT INFORMATION

TRIO

As sole official distributors for Trio, we recommend that you purchase your Trio equipment from an approved dealer (full list on request). Any dealer *not* on this list has no connection with the Trio UK sales and service organisation and cannot, despite claims to the contrary, offer any meaningful guarantee of backup service on Trio equipment.

LOWE ELECTRONICS Ltd

 **TRIO**

TR7800

2m FM
AT ITS VERY BEST
£268 inc VAT



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 25W on transmit (typically 30 to 35W on random samples), and an incredible receiver which is typically producing sensitivity measurements of 0.12 microvolts for 12dB SINAD. 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 to 14. "So what?" sez you. "Aha!" sez I, that means that if your 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 25kHz 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.

SPECIFICATIONS

(GENERAL)

Semiconductors:

MPU 1, ICs 18, transistors 58,

FETs 9, diodes 77

144-0000 to 145-995MHz

Frequency range:

Frequency synthesizer:

Mode:

Antenna impedance:

Power requirement:

Grounding:

Operating temperature:

Current drain:

Digital control, phase locked VCO

FM (F3)

50Ω

13-8V DC ±15%

Negative

-20°C to +50°C

0-4A in receive mode with no input signal

6A in HI transmit mode (Approx.)

2-5A in LOW transmit mode (Approx.)

Dimensions:

175mm (6 7/8") wide

64mm (2 1/2") high

206mm (8 1/4") deep

(projections not included)

Weight:

2.1kg (4.63lbs) approx.

(TRANSMITTER SECTION)

RF output power (at

13-8V DC, 50Ω load):

Modulation:

Frequency tolerance:

(-20°C to +50°C)

Spurious radiation:

Maximum frequency

deviation: (FM)

Microphone:

(RECEIVER SECTION)

Circuitry:

Intermediate frequency:

HI 25W min

LOW 5W approx. (Adjustable)

Variable reactance direct shift

Less than $\pm 20 \times 10^{-4}$

Less than -60dB

±5kHz

Dynamic microphone with PTT switch

Double conversion superheterodyne

1st IF.....10-695MHz

2nd IF.....455kHz

FM better than 0.2μV for 12dB SINAD

FM 12kHz (-6dB)

Better than 60dB

0-16μV (threshold)

Less than 0.2μV (threshold)

More than 2.0W across 8Ω load (10% dist.)

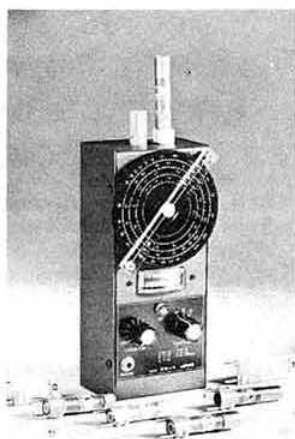
THIS RIG REALLY SHOWS THE WAY TO GO

LOWE ELECTRONICS Ltd

FX1

STATION WAVEMETER

**£28
inc VAT**



The Lowe FX-1 wavemeter is a totally new instrument which will form a necessary part of every amateur station. Covering the range 700kHz to 250MHz in seven bands, the FX-1 has high sensitivity meter indication, amplified LED indicator, and audio output for headphone monitoring of the signal. A separate antenna terminal is also provided for connection of an external pickup antenna if it is required.

The set of seven coils are all enclosed in protective sleeves, and the coils for the ranges 42-110 and 83-250MHz are of printed construction for real stability. The tuning dial is easy to read and is colour coded to match the coils. The complete coil set is housed inside the unit so you should never encounter the irritating situation when the coil you need has been mislaid.

Housed in a rugged metal case measuring 176 x 74 x 65mm, the FX-1 is a good looking, high performance wavemeter and should certainly be in every amateur radio station.

"A staggering technical achievement"; "How can they get it into such a small size"; "Outperforms any rig I've ever had"; these are typical of the comments made by amateur radio operators after seeing and using the remarkable AR240A 2 metre FM handheld transceiver. What does it mean to you? Well, at last you can really take your amateur radio with you, anywhere you want to go, because in this handheld unit, you have a complete synthesized 2 metre FM transceiver covering 144-148MHz in 5kHz steps. Also included are + and - 600kHz repeater shifts and a crystal controlled tone burst unit.

INCLUDED IN PRICE—NICAD PACK, CHARGER, WHIP, XTAL TONE BURST, ETC.

AR22 2m FM

SYNTHESIZED POCKET RECEIVER 141-150MHz IN 5kHz STEPS

This amazing receiver covers the range 141 to 150MHz in 5kHz synthesized steps with an automatic tuning system to maintain its remarkable performance across the entire range. The AR22 comes complete with built-in rechargeable battery pack and a mains charger so that you can take it anywhere. It will fit into a shirt pocket too . . . Absolutely astonishing, but not expensive. See it soon.

£83 inc VAT



AR240A 2m FM

SYNTHESIZED HAND-HELD 144-148MHz TRANSCEIVER **£168 inc VAT**



**2W
OUTPUT
ON
BUILT-IN
BATTERIES
PROVIDED**



The HC1400 is a powerful (30 watts) 2 metre FM transceiver for mobile/fix station use, with a most comprehensive array of features. Using a TMS 1100 microcomputer to control all functions gives complete and easy operation of a complex transceiver.

Features include coverage from 144 to 148MHz in 5kHz steps; digital frequency readout of transmit and receive channels; selectable channel steps using either the all-electronic channel control or the optional remote control microphone; high power TX (30 watts plus); three memories for storing any frequencies within the tuning range for instant recall and also for programming repeater shifts of up to 4MHz wide.

Normal repeater and reverse repeater shifts are provided together with a fully automatic tone burst. It's too much to talk about in a short advertisement so why not call us and ask any questions. It's top quality, certainly; top value, undoubtedly; at **£199 inc VAT**.

Remote frequency readout available.

HC1400 £199 inc VAT

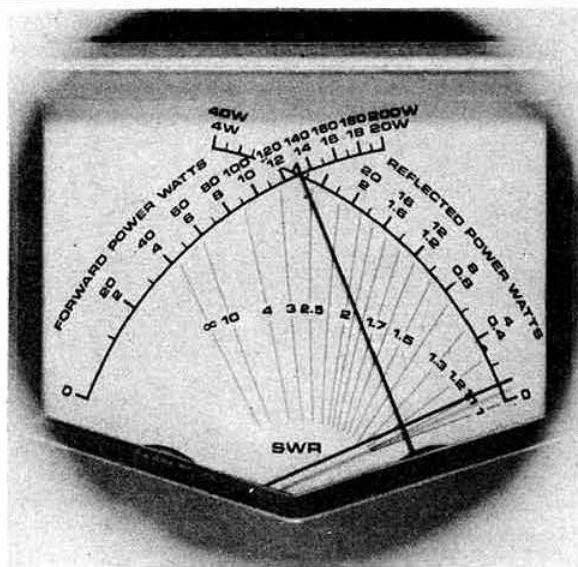
HOKUSHIN AERIALS—THE MOST POPULAR THERE ARE

GPV5	2m BASE STATION COLINEAR	£22.00 inc VAT
HF5	80-10m VERTICAL	£41.40 inc VAT
GDX2	50-480MHz 3dB DISCONE	£36.80 inc VAT

CARR. BY
SECURICOR
£4.50

FULL LIST OF
MOBILE AERIALS
IN OUR CATALOGUE

LOWE ELECTRONICS Ltd



WHAT DO YOU KNOW ABOUT CROSS POINTER POWER METERS?

Until recently, the in-line measurement of RF power and SWR involved calculation or the use of two instruments. Now, DAIWA have introduced a range of power meters which provide an elegant solution to the whole problem of RF measurements. Utilising two toroidal current transformers to detect true forward and reflected power, and feeding the outputs to a twin movement meter with crossed pointers, it is now possible to measure forward power (LH scale), reflected power (RH scale) and SWR (where the pointers cross) at a single glance. The photograph shows 130W forward power, 1W reflected, and an SWR of about 1.2 to 1. The DAIWA CN series power meters represent the ultimate power meter for the professional and amateur alike, and are indispensable in the fully equipped station. Three models are currently available covering frequencies right up to 2.5GHz so there's one for you whatever your interests.

CN620A	1.8-150MHz up to 1kW	£52.81 inc VAT
CN630	140-450MHz up to 200W	£71.00 inc VAT
CN650	1.2-2.5GHz up to 20W	£95.00 inc VAT



CN620A £52.81 inc VAT



CNA1001A ANTENNA TUNER
£129.95 inc VAT

SWR/Power meter.	CNA1001A Specification	
	Frequency range	3-30MHz inc new bands
	Line impedance	50 Ohms
	Power ranges	Forward 20/200 Watts
		Reflected 4/40 Watts
	Meter accuracy	± 10% of full scale
	Power rating	500W pep
	Input power for auto tune	1-10W
Tuner	Frequency	3-5, 7, 10, 14, 18, 24, 28MHz
	Input impedance	50 Ohms
	Output impedance	10-250 Ohms
	Operate time	45sec maximum
Size 225 x 90 x 245mm	Weight 3-6kg	Dummy load 10W (50W 1 minute)
Outputs for two antenna systems SO239 connectors		

The new CNA1001A antenna tuner from Daiwa has already changed the whole concept of antenna tuning in the amateur radio station. No longer do you have to fiddle with this control and that control in order to reach a match condition, simply push a button and let the tuner do it for you.

The CNA1001A incorporates a sensitive reflected power detector which monitors SWR all the time. At the first push of the operate button, a motor driven gearbox drives the load and match variable capacitors through their entire range in overlapping small increments seeking a correct match. When matching is achieved, the motor drive stops and that's that. The CNA1001A needs only a small sniff of RF to work on (typically 5 watts) so you needn't worry about blowing up your PA, and it covers all the current and future amateur bands from 3-30MHz, includes switching for two antenna systems, a 10 watt (50 watt 1 minute) dummy load and best of all includes a cross needle power and SWR meter.

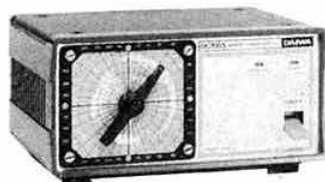
This section measures power from 0-200W in two ranges and reflected power from 0-40W together with the unique Daiwa cross pointer SWR system. All this in one compact unit requiring only 12V dc to drive the tuning motors.

DAIWA
INDUSTRY CO., LTD

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The Daiwa range of rotators are probably the best amateur rotators available. The quality of construction is up to the high standards we have come to expect from Daiwa and the rotator system is of a completely new design which eliminates "out of sync" operation and for the first time gives a true 360° indication on a circular scale based on a great circle map centred on the UK.

Both the DR7500 and DR7600 can be supplied with either of the controllers available, and both upper and lower mast clamps allowing mounting inside a standard tower or on the top of a pole. The DR7500 will handle beams up to and including 3-element tribanders, whilst the DR7600 will handle up to and including a 2-element 40 metre beam.

Each rotator system is supplied complete with rotator unit, control unit, and upper and lower mast clamps.

The rotators can be ordered as either "R" or "X" versions. The "R" suffix denotes the controller with the back lit scale and control by switches marked "left" and "right" to drive the rotator round. The controller pointer then smoothly indicates the direction in which the rotator is pointing. However, as an alternative, the "X" suffix unit is of the preset type where the controller pointer is turned by the operator to the beam heading required. The rotator then turns to this heading and stops. Correct operation of the rotator is indicated by a discreet flashing light on the control unit. With this type of control unit, you can go into the shack, set the rotator turning to the direction you need and then do something else whilst the rotator comes round.

Either control unit can be specified with either of the two rotators, ie DR7500R is the smaller rotator with the round control whilst DR7500X is the same rotator but with the preset control unit.

DAIWA ROTATOR SYSTEMS

DR7500X £98 inc

DR7500R £108 inc

DR7600X £135 inc

DR7600R £144.90 inc



CS201 £11.98 inc VAT
2-WAY COAX SWITCH
0-500MHz
PLUS DAIWA QUALITY

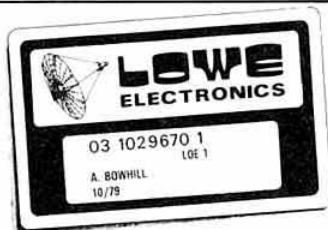


SR9 2m FM MONITOR
TUNABLE + CRYSTAL CONTROL
£46 inc VAT

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

FOR ALL THAT'S BEST IN HAM RADIO CONTACT US AT MATLOCK ANYTIME



***This is the choice for the man that wants
the most from his mobile—the IC260E***

ALL MODE 2m MAXIMIZER

£339 inc VAT

The IC-260E is obviously 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.

144MHz ALL-MODE TRANSCEIVER INCORPORATING A MICROCOMPUTER—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 144-146MHz 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-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



IC-260E £339 inc.

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. 145.999.9MHz when the dial goes below 144.000.0MHz. Recycling changes 145.999.9MHz to 144.000.0MHz as well. Quick tuning in 1kHz steps is available, and fine tuning in 100Hz steps in the SSB and CW modes, and 5kHz steps and 1kHz 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.

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COMMUNICATIONS COMPUTER **TONO THETA 7000E**

The new Theta 7000E means that every Amateur can enjoy the visual display of CW, RTTY, and ASCII in both transmit and receive modes. Just connect the TONO to any TV set via the antenna terminals or to a page printer from the parallel port provided. Bring up your CW speed in receiving or sending by either watching receiver sent or from recorded cassettes. Connection to the transceiver is via the key, phone and mic sockets.

THETA 7000E. SOME OF THE OUTSTANDING FEATURES

Printer interface

Wide range of transmitting and receiving speeds—10CW speeds + 8RTTY
Built in demodulator for high performance for 170, 425 & 820Hz shift
Crystal controlled modulator for AFSR—Hi or Lo tone
Convenient ASCII key arrangement
Large capacity display memory—2 pages 32chr × 16 lines split screen for Rx & Tx if required
Automatic transmit/receive switch
Anti noise circuit
Battery backed-up memory 7 channels of 64 chrs
Send function
Buffer memory—53 character type ahead
Rub out function
Simultaneous access of the memory

Pre-loading function
CR (carriage return) LF (Line feed) cancel function
Cursor control function
Word Mode operation
Automatic CR/LF (72, 60 or 80 chrs per line)
Echo function
Word Wrap around function
Transmit/receive in ASCII mode in RTTY
CW identification function
Mark and break (space and break) system
Monitor circuit
CW practice function
Variable CW weights
Cross pattern checking output terminal
Log computer output provided
Test message function (Ry and QBF)

£640.00 inc

PLEASE ASK FOR THE PRICE LIST OF ACCESSORIES FOR THIS UNIT—INCLUDING DOT PRINTER, MONITORS, ETC.

THE ICOM SIDEBAND PORTABLES



IC-202S
£169 inc VAT

IC-202S

The IC-202S is a very well designed 2m SSB portable. It offers: 3W pep output on USB, LSB and CW. * Large Battery capacity (HP11 type) or Nicads if you wish * A special VXO circuit to provide smooth tuning and crystal stability needed for SSB operation on 2m. * Each of the four 200 kHz band positions allows operation anywhere in 2m. (Supplied with 144·2 and 144·2-144·4) * Top of the band Oscar xtals available for "cross-pond working" * It has a DC socket and SO239 sockets for mobile or base station working, barefoot or as a prime mover. * Mobile mounting brackets, Nicad packs, chargers, cases all available options. You must agree, a very versatile well proved rig.



IC-402
£242 inc VAT

IC-402

The 70cm twin of the 202S having very similar features, covering the frequency range of 432-435·2 MHz.



FROM

THANET

OF COURSE





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



**25 Watts—5 Memories—Scanning—600kHz AND User Selectable Repeater Shift—
Full Coverage in 5kHz or 25kHz 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 148MHz if required
- ★ Four digit LED display
- ★ 25 Watts output or TW 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 600kHz 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
- ★ Optional up/down scanning mic now available

**£255
in VAT**

**NOW
WITH
IMPROVED
FRONT
END**

Please note that from THANET you get a full year's warranty on *all* parts and labour (including PA's). Orders direct to us are despatched free using registered first class post.

FROM **THANET** OF COURSE



**DON'T WORRY—WE GUARANTEE ALL SOLID-STATE RIGS INCLUDING PA's
MUST BE THE BEST VALUE IN 2m BASE STATIONS**

ICOM IC251E £479 inc



AFTER YEARS OF SUCCESS THE IC-211E HAS NOW BEEN REPLACED BY THE IC-251E. NOT JUST A FACELIFT, BUT A NUMBER OF IMPORTANT DEVELOPMENTS HAVE BEEN INCORPORATED.

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 IC-251E provides FM, USB, LSB, CW coverage in the 144-146MHz frequency range. Thus the IC-251E 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 100MHz to 100Hz digits.

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

EASIER OPERATION AND LIGHTER WEIGHT—The most compact, lightest weight all-mode 144MHz transceiver. First to use a pulse power supply in communication equipment, for lighter weight. 50mm-diameter large tuning control knob for smooth and easy tuning. Trouble-free controlling knobs for both receiving and transmitting. LED indicator for transmit and receive 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 ohms, 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 IC-251E 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.

MODES—USB, LSB, CW and FM. 10 watts output.

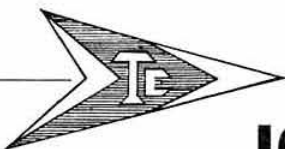
SENSITIVITY

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

IC-251E Price £479 inc.

IC-251E Typical Technical Characteristics: General numbers of semiconductor: Transistors 99, FETs 12, ICs 37, Diodes 132. Frequency coverage: 144-146MHz (easily extended to 148MHz at no extra charge). Frequency resolution: SSB 100Hz steps FM 5kHz steps, 1kHz steps with TS button depressed. Frequency Control: Microcomputer based 100Hz step Digital PLL synthesizer Independent Transmit-Receive Frequency Capability. Frequency Readout: 7 digit LED 100Hz readout. Frequency stability: Within ± 1.5 kHz. Memory channels: 3 channels, any inband frequency programmable. Usable conditions: Temperature: -10°C to $+60^{\circ}\text{C}$ (14°F to 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 5.0Kgs. Transmitter Output power SSB 10W (PEP), CW 10W FM 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 60dB below peak power output. Carrier Suspension: More than 40dB below peak power output. Unwanted sideband: More than 40dB down at 1000Hz 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 10.7MHz FM 10.7MHz, 455kHz. Sensitivity: SSB, CW Less than 0.25 microvolts for 10dB S + N/N, FM more than 30dB S + D/N + D at 1 microvolt. Less than 0.3 microvolts for 20dB Noise quieting. Squelch sensitivity (FM only): Less than 0.4 microvolts. Spurious response rejection ratio: More than 60dB. Selectivity: SSB, CW More than ± 1.2 kHz at 6dB point Less than ± 2.4 kHz at -60 dB point. FM More than ± 7.5 MHz at -60 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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ICOM DOES IT ALL!



We are proud to announce the arrival of
ICOM's new 9-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:

Antenna Impedance:

Power Requirement:

Current Drain:

-10°C—+60°C
50Ω
13-8V DC, negative ground, ±15%
Min audio output 0-9A, Max audio output
1-2A, Transmit: SSB 16A, CW, RTTY 20A,
AM 14A
111 (H) × 241 (W) × 311 (D) mm.

Dimensions:

Transmitter

Emission Mode:

Output Power:

CW (A1), RTTY (F1), SSB (USB/LSB), AM
100W continuous (AM 40W)

Modulation System:

Spurious Output:

Harmonic Output:

Carrier Suppression:

Unwanted Sideband:

Microphone Imp.

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

More than 60dB below peak power output
More than 60dB below peak power output
More than 40dB below peak power output
More than 50dB down at 1000Hz AF output
1-3KΩ, dynamic with built-in pre-amp.

Receiver

Receiving system:

Receiving Mode:

Intermediate Freq.:

Superhetrodyne, with continuous bandwidth
control.

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

1. 39-731MHz

2. 9-0115MHz

3. 10-750MHz

4. 9-0115MHz

Less than 0-25 micro-volts for 10dB S+N/N

Sensitivity:

Spurious Response

Rejection Ratio:

Selectivity:

More than 60dB

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

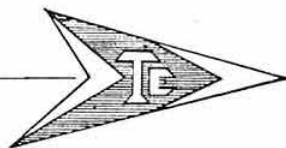
Audio Output:

Audio Impedance:

More than 2 Watts
8Ω

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**2E
COMP
RESULT**

THE IC-2E HANDY TALKY

**PROBABLY THE SMALLEST MADE,
VERY SENSITIVE
AND LOTS OF OPTIONS**

"GOOD TO HAVE ONE IN YOUR HAND"

COMPLETE WITH NICADS, MAINS CHARGER, RUBBER DUCK, ETC



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 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

IC-2E £159 inc VAT

Accessory prices: Case £3; Spare Nicad £15.50; Car charger £2.75; Empty battery case £5.

SPECIFICATIONS:

Transistors, 4—FETs, 3—ICs, 6—Diodes, 21.

Frequency coverage 144 145-995 but will go to 147-995.

Frequency Resolution 5kHz steps. Frequency control by digital PLL synthesizer with thumbwheel switches.

Frequency stability within ± 1.5 kHz.

Useable temperature -10 degrees C to 60 degrees C.

Antenna Impedance 50 ohms.

Power supply requirements DC 8-4V; with attendant battery pack DC 7.2-10.8V negative ground is acceptable.

Current drain at 8-4V

Transmitting: High 1.5W Approx 550 MA

Low 0.15W Approx 220 MA

Receiving at max audio output Approx 130 MA

Squelched Approx 20 MA

Dimensions 116.5mm (H) \times 65mm (W) \times 35mm (D) without battery pack

ICBP3 Battery pack 40mm (H) \times 65mm (W) \times 35mm (D)

Weight 470g including battery pack and flexible antenna.

Transmitter output power High 1.5W; Low 0.15W at 8-4V.

Mode F3, variable reactance frequency modulation, ± 5 kHz.

Spurious Emissions more than 60dB below carrier.

Microphone built-in Electret condenser, Optional Speaker Mic can be used.

Operating Mode, Simplex or Duplex ± 600 kHz from receive frequency.

Receiver Double conversion superheterodyne FM.

Intermediate Frequency 1st 10.695MHz; 2nd 455kHz.

Sensitivity More than 26dB S + N + D/N + D at 1 μ V. Less than 0.2 μ V for 12dB sinad. Squelch sensitivity—less than 0.2 μ V.

Spurious response Rejection ratio more than 60dB.

Selectivity More than ± 7.5 kHz at -6dB point

Less than ± 15.0 kHz at -60dB point

Audio output More than 300mW—8 ohms.

Tone call Crystal controlled.

**RESULT OF THE IC-2E COMPETITION—B-A-G-E-H-C-D-F
WINNER—H. E. STANWAY, GM3JOA, 30 DURHAM AVENUE, EDINBURGH**

AGENTS (PHONE FIRST—All evenings and weekends only, except Barnsley and Burnley)

Scotland—Jack GM8GEC (031-665 2420)

Wales—Tony GW3FKO (0874 2772) Burnley—(0282 38481) Midlands—Tony G8AVH (021-329 2305)

North West—Gordon G3LEQ (Knutsford (0565) 4040) Yorkshire—Peter G3TPX (0226 382517 Evenings) (0226 5031 Day)

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MICROWAVE MODULES LTD

TRANSVERTORS, LINEARS AND ACCESSORIES

TO BE USED WITH  ICOM EQUIPMENT



MMT432/144R (70cm Linear Transvertor)

Use with IC202S, IC260, IC255E, IC240, IC251. We also stock 2m to 4m and 2m to 10m units

£173.65

**2m 40W
£69**

MML Linear Amplifiers 2m & 70cm
Power ranges of 25-100W output
Prices from £48.30 to £228.65
For use with all ICOM 2m and 70cm rigs



MM2000 (RTTY to UHF TV Receive Converter)

For use with any ICOM, HF or VHF or UHF rig

£169

£29.90

MMA144V (2m RF Switched Preamplifier)

This excellent low noise preamp will improve any 2m rig



WE HAVE THESE AND MOST OTHER MICROWAVE MODULES' FINE PRODUCTS IN STOCK AT HERNE BAY. JUST CALL OR RING FOR ADVICE—DETAILS ETC.

REMEMBER—QUALITY FIRST

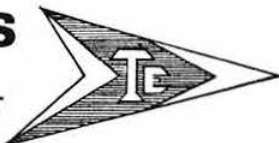


THANET ELECTRONICS

LTD

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Secretary: Fred Hopewell, P.O. Box 36, Loughborough LE11 1DW

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ADMISSION: 75p. Concessionary Tickets 50p for Parties of 15 or over

NO ADVANCE TICKETS. ON RECEIPT OF YOUR REMITTANCE WITH ORDER, TICKETS WILL BE
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WATERS & STANTON ELECTRONICS

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FDK MULTI-700EX

**2m 25W OUTPUT
+ PRIORITY SCANNING**



COMPARE THE PRICE £199 inc VAT

- Full coverage of the 144-146MHz band with facilities for 12.5kHz steps anywhere in the band.
- Large four digit LED frequency display tuned in 40 x 25kHz steps in each 1MHz range.
- A specially designed five stage helical-resonator assembly together with the latest dual-gate MOSFET front end ensures excellent cross-modulation characteristics.
- Built-in crystal controlled automatic tone-burst with ± 600 kHz shift for repeater operation and optional +1.6MHz shift for use in conjunction with FDK/MUV-430A UHF transverter.
- Four additional priority channels-two diode matrix programmable in 12.5kHz steps and two crystal controlled for any frequency between 144-146MHz.
- Channel scanning of two chosen channels either synthesizer/matrix or matrix/crystal.
- Continuously variable RF output control from 1-25 watts.
- Advanced PLL technology provides good stability with low spurious output; integral power supply noise filter eliminates vehicle line noise and an automatic protection circuit protects the RF output power module against poor SWR, open or short circuit.

Complete with microphone
and mobile mounting brackets

£199 inc VAT

MOBILE SAFETY MICS

We have a shipment of safety mics due in by the time you read this advert. The model 202S clips onto the lapel and comes with gear lever control box at £20.95. Also in stock is model 202H which has a neck band and boom plus gear lever control box, incorporating up/down frequency control and tx/rx switch. £29.95. These mics suit all transceivers except the ICOM IC255.

2-METRE MOBILES AT UNBEATABLE PRICES . . . !

FDK MULTI-750E

2m (& 70cm) ALL-MODE



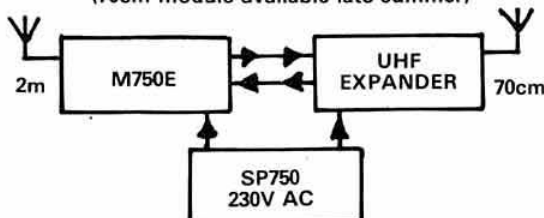
AMAZING VALUE £299 inc VAT

- Simple and smooth VFO control gives either 100Hz or 5kHz steps on both FM and SSB modes for optimum convenience.
- The large green fluorescent display tube gives full frequency readout to 100Hz and provides safe and clear readout for both night and day operation.
- Standard features include noise-blanker, RIT control with switch, RF attenuator gain control, automatic crystal controlled tone-burst, high and low power switching and remote up/down frequency control microphone unit.
- Compare its compact size and light weight, its smart appearance and comprehensive front panel controls. Simple and reliable operation is made possible by employing advanced solid-state and logic techniques.
- A dual VFO is employed for the selection of two independent frequencies anywhere in the band. This also enables split frequency operation, particularly useful when used in conjunction with the optional "UHF-EXPANDER" transverter.

For normal repeater operation a pre-programmed shift is selected by front panel selector.

M750 BUILDS INTO A 2m & 70cm PACKAGE

(70cm module available late summer)



FDK products are distributed by:

FDK UNITED KINGDOM, WARREN HOUSE, MAIN ROAD, HOCKLEY, ESSEX, ENGLAND.

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18/20 MAIN ROAD, HOCKLEY, ESSEX. Tel: (0702) 206835

£89.95

FOR A HANDHELD?
YES . . . AND INCLUDING
NI-CADS & AC CHARGER

PALM II £89.95* inc.vat
PALM IV (70cms) £149* inc.vat

Both units come complete with all accessories and fitted S20, 22/SU20 plus 600kHz and 1.6MHz shifts. Extra channels £3 each.

* If xtal controlled toneburst required please add £10.

SAE FOR LEAFLETS

FDK

VHF PRODUCTS

**12 MONTHS WARRANTY
PARTS & LABOUR**

Send SAE for full details

FDK

VHF TM56B MONITOR

**CHANNEL
SCANNING**
230VAC/12VDC



The TM56 is one of our most popular models, combining great performance with modest price. The TM56B has the basic receiver design of our mobiles and includes its own 230 volt AC supply, plus external 12V DC input. 12 fixed channel positions are included, plus 4 autoscans positions. Any one of the Autoscan channels can be cancelled. Amateur band and marine band versions available fitted 10 channel and 9 channel respectively. **New reduced prices of £79.00 for either model**

NEW PRODUCTS

**2M "PROFESSIONAL"
HANDHELD
MONITOR**



8-CHANNEL SCANNING

Without doubt, this is a really rugged little VHF 2-metre monitor receiver having excellent sensitivity. Supplied with S20 (or channel 16 in the marine version) there is a total capability of 8 channels. Each channel can be manually selected or the entire 8 can be scanned automatically. Every channel is fitted with individual lockout switches and LED's indicate the channels selected. Extra xtals £2.50 each

PRICE INCLUDES NI-CAD BATTERY
PACK, WHIP ANTENNA, POCKET
ANTENNA, AC CHARGER AND
MOBILE MOUNTING CLIP

£69.95 inc.
VAT

2M FM TX MONITOR

**. . . OR HOW TO TELL IF
YOUR TONEBURST IS WORKING!**



This amazing little unit plugs into the antenna line (power rating 5-15 watts) and detects the FM signal via its RF powered discriminator and passes the audio to a standard earpiece. Amazing! Now there should be no excuse for testing tonebursts! Price including VAT and postage **£12.95**.



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TRIO



NEW LOW PRICES ALL MODELS STOCKED

24 HOUR DELIVERY—
—FROM THE PEOPLE YOU CAN TRUST



ALL PRICES INCLUDE 15% VAT

TRIO TS120V £347
TS120S £432

**SOLID STATE RIG
RELIABLE AT LAST**

Up until now there has been a natural reluctance to accept solid state HF rigs as anything but a second rig or mobile unit with dubious reliability of the PA devices. Now at last the new TS120 series gives you 80-10 metre coverage at either 10 watts output or 100 watts output. Digital readout and variable selectivity are just two features that put them in a class above any other solid state rig we know of (apart from the TS180S)—even those costing nearly £1,000. The TS120 will put to shame many of the older valve PA designs and can confidently be regarded as a good reliable base or mobile station—and no tune-up means instant QSY from band to band at the flick of a switch.
STOP PRESS TS120V + 4 amp PSU (not Trio) £369 inc. VAT



NEW TRIO TR7800 25W FM TRANSCEIVER

The new TS7800 is a remarkable new 25 watt transceiver having a host of features that put it head and shoulders above the competition in the £250 class. Touch pad tuning, 14 memories, priority channel auto alarm, up/down mic frequency control etc, etc—all go to make this unit a super package. Reverse repeater is available at the touch of a button and auto-scan is available over either the entire band or just the memories. Separate digital displays indicate both frequency (transmit and receive) and the memory channel numbers. There's a host of other features that we cannot mention in the space available but for the price of a 12p stamp we'll be happy to send you the full colour brochure.

NEW TRIO R1000 RECEIVER

YOUNG—BUT VERY MATURE!

Every one is individually tested by us and despatched by Securicor

£298 inc VAT—A REAL WINNER

REMEMBER—WE CARRY THE FULL TRIO RANGE AND ALL STOCK COMES FROM THE APPOINTED UK DISTRIBUTOR. DON'T TAKE CHANCES—BUY FROM WSE



NEW TRIO TR9000

2 METRE FM/SSB/CW MOBILE OR BASE ONLY

£345 inc VAT



NEW

TRIO
TR2400 £210 inc VAT

The new TR2400 really does eclipse all other hand-helds in its sheer technology. There's no other model that can approach its performance. The large LCD readout has low current drain and the 1.5 watts output is a good compromise between effective communication and reasonable battery drain. 10 memories, automatic scanning, instant reverse repeater operation, 144 148MHz etc etc—all adds up to the new leader in hand-helds... the Trio TR2400. Get your Barclaycard or Access cards ready for this one... half its fascination is operating it—the other half is owning it.

NEW TS770E

2m/70cm IN STOCK £763

NEW TR7800

2m FM-25W IN STOCK £268

The new Trio TR9000 heralds the beginning of a new era in 2 metre mobile or base station operation. A host of new features that makes its direct competitor look pretty expensive! FM has two tuning rates either 25kHz or 12kHz per step. On SSB the tuning rate is in 100Hz steps or with the search button depressed, it will step in 10kHz at the same time searching for signals within each 10kHz segment. Dual VFO enables the operator to hold one frequency whilst searching for another. The inclusion of five memory channels provides for the storage of your five favourite frequencies. Built-in scan permits FM scanning 25 or 12kHz steps with momentary pauses on busy channels whilst providing continuous scanning of SSB/CW over 2MHz. Positive or negative repeater shifts are already programmed into the unit. For base station use, the PS20 AC supply can be used plus the SP120 external speaker and the BO-9 system base plinth. An exciting rig at a very reasonable price. Send today for details.

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YAESU—SALES PLUS NEW LOW PRICES

(NEW FT480 2m SSB transceiver in stock)

FRG7 RECEIVER

£189 inc. VAT

0.5-30MHz

Securicor Delivery



FRG7000 RECEIVER

£299 inc. VAT

Digital readout

0.2-30MHz

Securicor delivery

FT707 (10W) £465 inc. VAT
FT707 (100W) £499 inc. VAT
12V DC transceiver
80-10 metres
plus New bands!
Free Securicor delivery



FT101Z £488 inc. VAT

FT101ZD £569 inc. VAT

160-10M transceiver

230V AC operation

Free Securicor delivery

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DenTron

MLA 2500B

160-10m 2kW PEP

£695 inc. VAT

and delivery

Send 25p for complete

DenTron HF Catalogue



**NEW 'B' VERSION NOW IN STOCK
FITTED HIGH/LOW POWER SWITCHING**

- * 1kW DC continuous
- * ALC circuit
- * 3 speed cooling
- * Military specifications
- * 234V/117V AC
- * 2 of EIMAC 8875 tubes

- * R.F. Wattmeter (incl. p8p)
- * Size 5 1/2" x 14" x 14"
- * Weight 47lb.
- * Ideal for SSTV/RTTY
- * 3rd order down 30dB +
- * 40 watts drive for 1kW

160-10m ATU's also in stock

DenTron GLA1000B

£295

inc VAT
& DELIVERY



This beautiful HF linear covers 80 to 10 metres and has its own built-in 117/234V power supply. Its diminutive size means less table space needed but without sacrificing power capability. Weighing in at just 24 pounds it measures only 11 1/2" x 11" x 11" with room to spare inside. An almost silent fan ensures cool running whilst the little power house generates 1200 watts input on SSB or 1kW DC for CW. RF drive required is approx. 80 watts and the amplifier can be instantly switched in or out of circuit. Comprehensive metering monitors HF volts, PA current and output RF voltage. Altogether a linear we can thoroughly recommend at a price you can afford—just £295 delivered.

NEW! WELZ SUPER POWER/SWR METERS



These SWR meters are an exciting new product that provides an accuracy previously only available on expensive laboratory type equipment. They have a

guaranteed power accuracy of 10% (minimum) and a directional characteristic of over 30dB. A wide range sensor is used for each range and in the SWR mode sensitivity is approx. 2.5 watts for full scale deflection from 1.8 to 500MHz. Sensitivity remains constant throughout the range. In the power mode 3 switchable ranges can be selected to suit all power levels. The units are not cheap but bearing in mind that they are as accurate and more versatile than the famous "Bird", then you will begin to realise that this is the kind of instrument you will purchase and keep for the rest of your life.

- Model SP200** 1-8 160MHz
Dual antenna selector
Power range 20W/200W/1kW
- Model SP300** 1-8 500MHz
Triple antenna selector
Power range 20W/200W/1kW
- Model SP400** 130MHz 500MHz
Single antenna selector
Power range 5W/20W/150W.

At time of going to press prices were not known. Please telephone or write for prices and delivery.

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FLY THE FLAG WITH MICROWAVE MODULES

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MMT1296/144
23cm Transverter
Input 5 500mW or 10 watts 144MHz
Output 1-3 watts into 50 ohms
Receiver N.F. 2-9dB Tx spurious -40dB
Power requirements 13-8V at 0-5 amps

A NEW FRONTIER!

MML144/25W
or 100W linears
Input 3 watts or 10 watts
Output 30 watts or 100 watts (10dB gain)
Bandwidth 144-148MHz at 0-5dB
RF or Manual switching. Fully protected output
Power requirements 13-8V at 3 amps or 12 amps

THE BEST LINEARS WE KNOW OF



DX RECORD HOLDERS



CONTEST WINNERS



MMT432/144R
2m to 70cm transverter
Input 10 watts nominal
Output 10 watts 50 ohms
Receiver N.F. 3dB. Tx spurious 65dB
Repeater switching + / -
1-6MHz
Power requirements 13-8V at 2-1 amps

ALL MODES 70cm

MMA144V Ultra low noise pre-amp
Noise factor 1-3dB (individually measured)
Switching—RF sensing
Through power 100 watts
DC failure—reverts to "straight through"
Power gain 15dB. Power requirements 12-5V at 75ma

THE MOST SENSITIVE PRE-AMP EVER PRODUCED!



COMPLETE PRICE LIST (CARRIAGE PAID THROUGHOUT THE WORLD)

TRANSVERTERS

MMT28/144 (10m linear transverter)	£90.85
MMT144/28 (2m linear transverter)	£99.00
MMT432/28-S (70cms linear transverter)	£136.85
MMT432/144-R (70cms linear transverter)	£173.65
MMT70/28 (4m linear transverter)	£115.00
MMT70/144 (4m linear transverter)	£115.00
MMT1296/144 (23cms linear transverter)	£184.00

LINEAR AMPLIFIERS

MML144/25 (2m 25 watt linear amplifier)	£48.30
MML144/100 (2m 100 watt linear amplifier)	£142.60
MML144/40 (2m 40 watt linear amplifier)	£69.00
MML432/20 (70cms 20 watt linear amplifier)	£69.00
MML432/50 (70cms 50 watt linear amplifier)	£113.85
MML432/100 (70cms 100 watt linear amplifier)	£228.65

RECEIVE CONVERTERS

MM2000 (RTTY to TV converter)	£169.00
MMC28/144 (10m converter)	£24.90
MMC50/28 (6m converter)	£24.90
MMC50/28LO (6m converter)	£26.90
MMC70/28 (4m converter)	£24.90
MMC70/28LO (4m converter)	£26.90
MMC144/28 (2m converter)	£24.90
MMC144/28LO (2m converter)	£26.90
MMC432/28-S (70cms converter)	£29.90
MMC432/144-S (70cms converter)	£29.90
MMC1296/28 (23cms converter, 10m output)	£32.20
MMC1296/144 (23cms converter, 2m output)	£59.80

FREQUENCY COUNTER

MMD050/500 (500MHz digital frequency meter)	£69.00
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Price £ inc VAT

Price £ inc VAT

MMD600P (600MHz prescaler)	£23.00
MMDP1 (frequency counter probe)	£11.50
RECEIVE PREAMPLIFIERS	
MMA28 (10m preamplifier)	£14.95
MMA144V (2m RF switched preamplifier)	£29.90
MMA1296 (23cms preamplifier)	£29.90
FILTERS	
MMF144 (2m filter)	£6.90
MMF432 (70cms filter)	£6.90
VARIOUS	
MMV1296 (70cms to 23cms varactor tripler)	£34.50
MMS384 (384mHz frequency source)	£27.60
ATTENUATOR	
MMR15/10 (15dB attenuator, BNC terminations)	£5.75

ALL UNITS ARE FULLY GUARANTEED FOR 12 MONTHS

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ON ANY ITEMS NOT LISTED
COMPETITIVE PRICES ON ALL YAESU ITEMS

TRIO

TS820S 160 10m transceiver 200W digital	£791.00 (4.50)
TS520SE 160 10m transceiver 200W pep	£437.00 (4.50)
SP520 Speaker	£17.25 (1.50)
AT200 160 10m antenna tuner	£82.80 (1.50)
R820 The ultimate amateur band receiver	£690.00 (4.50)
TS180S 160 10m solid state 200W pep transceiver	£679.65 (4.50)
VFO 180 External VFO	£96.60 (1.50)
SP180 Speaker	£36.80 (1.50)
AT180 160 10m antenna tuner	£95.45 (4.50)
TS120S 80 10m mobile transceiver 200W pep	£432.00 (4.50)
TS120V 80 10m mobile transceiver 200W pep	£347.30 (4.50)
MB100 Mobile mounting bracket	£17.25 (1.00)
SP120 External speaker	£25.30 (1.25)
VFO120 External VFO	£89.70 (4.50)
AT120 100W antenna tuner	£55.20 (1.50)
PS20 AC power supply for TS120V	£44.85 (4.50)
PS30 AC power supply for TS120S and TS180	£85.10 (4.50)
TL120 80 10m 200W pep linear for TS120V	£128.80 (4.50)
MC50 Deluxe dual impedance desk microphone	£24.15 (1.50)
MC35S 50K fist microphone	£13.80 (1.00)
MC30S 500ohm fist microphone	£13.80 (1.00)
LF30A HF low pass filter 1kW	£18.40 (1.00)
RD300 High power dummy load	£48.30 (1.50)
TS770E 2m/70cm all mode dual bander with European rpt shifts	£763.60 (4.50)
SP70 Matching speaker	£18.40 (1.00)
TR9000 2m synthesised multimode mobile	£345.00 (4.50)
BO9 Base plinth for TR9000	£32.20 (4.50)
TR7800 2m 25W synthesised FM mobile/fixed station transceiver	£268.00 (4.50)
TR2300 2m FM portable transceiver PLL with all 80 FM channels	£166.75 (4.50)
VB2300 10W booster	£49.45 (1.50)
MB2 Mobile mount	£17.25 (1.00)
RAT1 Helical rubber antenna	£6.90 (0.50)

AMAZING VALUE 4 amp PSU

We've bought a quantity of really superb 4amp 12v power supplies at a super price. These are fully protected and have a transformer 50% larger than anything similar. Send for yours today. £22.95 inc. VAT. Carriage £1.50



DENTRON

MLA 2500 160-10m 2Kw linear	£699.00 (N/C)
MT3000A 3Kw 160-10m tuner	£275.00 (N/C)
Clipperton 'L' 160-10m linear 2Kw	£459.00 (N/C)
JR Monitor 160-10m tuner 300W	£59.95 (N/C)
W-2 160-10m PEP/SWR meter	£59.95 (N/C)
HF 200A Transceiver	£399.00 (N/C)
1kW 80 10m linear 240v	
GLA1000B	£295.00 (N/C)

VHF MONITOR Rx's

TM56B 12v/240 AC auto scan 10ch's	£79.00 (N/C)
TM56B Marine model 9ch's	£79.00 (N/C)
SR9 12v DC Marine model	£46.00 (N/C)
Extra xtals	£2.45 (N/C)
FDK	
Multi 3000 2m All mode	£395.00 (N/C)
Multi 750 2M FM/SSB/CW	£299.00 (N/C)
Multi 700EX 2m 25 watts	£199.00 (N/C)
Multi Palm II 2m hand-held special package	£99.95 (N/C)
M-11/Q16 xtals	£5.00
Palm II xtals	£3.00
Multi-Palmsizer 2m synthesised 40 channel hand-held	£149.00 (N/C)
Multi Palm IV 70cms	£159.00 (N/C)
AR	
AR240A Synthesised hand-portable	£168.00 (N/C)

MIZUHO

2m SSB 1 watt portable	£135.00 (N/C)
Extra xtals	£3.00

NAIGAI

2200 2m 500w PIP linear	£429.00 (N/C)
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ADONIS MICROPHONES

AM802G Compressor - 3 outputs	£59.95 (N/C)
AM502G Compressor - 1 output	£39.95 (N/C)

ASP MOBILE ANTENNAS

201 - 2m 1 wave	£3.50 (1.00)
2009 - 2m 5/8th wave	£9.25 (1.00)
677 - 2m 5/8th wave deluxe	£14.95 (1.00)
462-70cms colinear	£8.25 (1.00)
667 - 70cms colinear deluxe	£17.95 (1.00)
Magnetic base and cable	£8.50 (1.00)
"No-hole" boot mounts	£3.75 (0.50)

JAYBEAM (HF)

TB 3 ele 2Kw Beam	£155.00 (2.00)
VR3 Triband vertical	£39.00 (2.00)

HF ANTENNAS

HQ 1 20-15-10m mini-quad	£96.50 (2.50)
C4 20-15-10m vertical	£48.50 (2.00)
Mosley Mini-beam 600W 10 15 20	£99.00 (2.00)
Mosley 20-15-10m mini-beam 600w	£99.00 (2.00)
Mosley 2Kw version	£129.00 (2.00)
TA32 600 watts 20-15-10m	£89.00 (2.00)
TA33 600 watts 20-15-10m	£133.40 (2.50)
Hy-gain 14 AVQ 40-10m	£60.00 (2.00)
Hy-gain 18 AVT/VVB 80-10m	£87.00 (2.25)
Mosley TD3JR 20-15-10m dipole	£35.00 (1.00)
Mosley RD5 SWL ham dipole	£36.30 (1.00)
EL-40X 80-40 Mini dipole	£27.50 (1.00)
HF5 5 band vertical	£41.50 (1.00)

VHF ANTENNAS (JAYBEAM)

4Y/4M 4el yagi	£17.20 (2.00)
C5/2M 5db colinear	£40.00 (2.00)
5Y/2M 5el yagi	£10.25 (1.50)
8Y/2M 8el yagi	£13.25 (1.50)
10Y/2M 10el yagi	£28.40 (2.00)

All prices include VAT at 15%
Carriage costs shown in brackets

ELECTRONIC

KEYERS

£29.95



Yes, it's true, this little unit has all the features you would expect from something costing a lot more. Built-in paddle, dot memory for easy sending, semi- or fully-automatic switch settings, variable speed control, LED indicators, etc. It matches all modern transceivers and comes complete with instructions and can be either self-powered from HP7 cells or external DC supply.

ANTENNAS (contd)

PBM10/2M 10el parabeam	£33.60 (2.00)
PBM14/2M 14el parabeam	£40.80 (2.50)
5XY/2M X'd 5 element	£20.70 (1.50)
8XY/2M X'd 8 element	£25.80 (2.00)
10XY/2M X'd 10 element	£34.30 (2.00)
Q4/2M 4el quad	£21.50 (1.50)
Q6/2M 6el quad	£28.50 (2.00)
D5/2M 5 over 5	£18.30 (1.50)
D8/2M 8 over 8	£24.85 (2.00)
SVMK vertical Kit	£6.60 (1.25)
UGP/2 Ground plane	£9.35 (1.25)
HO/2M 2m halo	£4.25 (0.75)
HM/2M Above with 24" mast	£5.05 (1.00)
C8/70cm 8db colinear	£45.40 (2.50)
D8/70cm 8 over 8	£20.45 (2.00)
PBM18/70 18 el parabeam	£24.75 (2.00)
MBM/48 70 el Multibeam	£28.20 (2.00)
MBM88/70 88 el Multibeam	£37.50 (2.00)
8XY/70 8 el X'd yagi	£31.05 (1.50)
12XY/70 12 el X'd yagi	£38.50 (2.00)
D15/1296 15 over 15	£30.95 (1.50)

ACCESSORIES

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)
Stolle 2010 rotator	£50.00 (1.50)
Stolle 2050	£40.75 (1.50)
SWL ATU	£16.50 (0.75)
Shure 444 microphone	£27.50 (0.75)
Shure 201 microphone	£11.75 (0.75)
Shure 526T microphone Type II	£36.35 (0.75)
Hand Morse key	£10.50 (0.50)
MM202S Safety microphone	£20.95 (0.50)
50ohm balun	£11.25 (0.50)
UR67 per metre	£0.69 (0.05)
UR43 per metre	£0.22 (0.03)
5 core cable per metre	£0.30 (0.03)
HP3A high pass filter	£3.00 (0.20)
Drake low pass filter	£18.40 (0.75)
TV1 ferrite rings	£0.35 (0.05)
Plastic antenna insulators	£0.30 (0.05)
Twin SWR meters 3-150MHz	£12.95 (0.50)

MONDAY—SATURDAY 9-5:30

WATERS & STANTON ELECTRONICS

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PRICES SHOWN EXCLUDE VAT; UK CUSTOMERS PLEASE ADD 15%

★ **COMPLETE CRYSTAL SERVICE** ★
PROFESSIONAL
AMATEUR

70cm CRYSTALS

Due to the much higher multiplication involved (three 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), SUB (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 CQ/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.

4m CRYSTALS FOR 70.26MHz — HC6/U

TX8-7825MHz and RX6-7466MHz or 29-7800MHz £2.32.
10-245MHz "ALTERNATIVE" I.F. CRYSTALS-£2.32 For use in Pye and other equipment with 10-7MHz and 455kHz I.F.s to get rid of the "birdy" just above 145-0MHz. In HC6/U, HC18/U and HC25/U.
CRYSTAL SOCKETS — HC6/U, HC13/U and HC25/U (Low loss) 16p each. 10p P. % P. per order (P. & P. free if ordered with crystals).

CRYSTALS MANUFACTURED TO ORDER

Prices shown are for one off to our amateur specs; 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 0 to +70°C	
6 to 19-999kHz	£28.12
20 to 39-999kHz	£17.74
40 to 79-999kHz	£12.40
80 to 99-999kHz	£10.60
100 to 159-999kHz	£9.25
160 to 499-999kHz	£6.19
500 to 799-999kHz	£7.30

B High frequency fundamentals/overtones

Adj. tol. ±20ppm, Temp. tol. ±30ppm 10 to +60°C	
+800 to 999-9kHz (fund)	£9.75
*1-0 to 1-499MHz (fund)	£10.35
*1-5 to 2-599MHz (fund)	£4.93
*2-6 to 20-999MHz (fund)	£4.49
*3-4 to 3-999MHz (fund)	£6.21
*4-0 to 5-999MHz (fund)	£4.93
*6-0 to 20-999MHz (fund)	£4.48
* 21 to 24-99MHz (fund)	£6.73
* 25 to 30MHz (fund)	£8.28
* 21 to 62-99MHz (3 O/T)	£4.48
* 60 to 105MHz (5 O/T)	£5.16
* 105 to 125MHz (5 O/T)	£7.76
* 125 to 180MHz (O/T)	£7.50
* 180 to 250MHz (O/T)	£12.49

* Delivery Normally 5/6 weeks (express available) — all other frequencies 7/8 weeks.
Holders — Low frequencies HC13/U or HC6/U dependent on frequency.

Mid and high frequencies are available in HC6/U, HC18/U or HC25/U unless marked + only available in HC6/U or o only available in HC18/U and HC25/U.
HC17/U (replacement for FT243) and HC33/U (wire end HC6/U) available as per HC6/U above at 30p extra on HC6/U price.
Unless otherwise specified, fundamentals will be supplied to 30pf circuit conditions and overtones to series resonance.

CRYSTALS FOR PROFESSIONAL USE

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.

EXPRESS SERVICE

Many types of made-to-order crystals are available on our "EXPRESS SERVICE" — with 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.

TWO METRE CRYSTALS

CRYSTAL FREQUENCY RANGE USE (TX or and HOLDER)	4MHz-TX-HC6/U	6MHz-TX-HC25/U	8MHz-TX-HC6/U	10MHz-RX-HC6/U	11MHz-RX-HC6/U	12MHz-TX-HC25/U	14MHz-RX-HC25/U	18MHz-TX-HC25/U	44MHz-RX-HC6/U	44MHz-RX-HC25/U	52MHz-RX-HC25/U
144.4 (433.2)	b	e	b	e	e	b	e	e	e	e	e
144.480	e	e	e	e	e	e	e	e	e	e	e
144.800	c	e	e	e	e	c	e	e	c	e	e
144.850	e	e	e	e	e	e	e	e	e	e	e
145.000/R0T	a	c	a	c	c	b	b	a	a	c	c
145.025/R1T	a	c	a	e	e	b	b	a	a	e	e
145.055/R2T	a	c	a	e	e	b	b	a	a	e	e
145.975/R3T	a	c	a	e	e	b	b	a	a	e	e
145.100/R4T	a	c	a	e	e	b	b	a	a	e	e
145.125/R5T	a	c	a	e	e	b	b	a	a	e	e
145.150/R6T	a	c	a	e	e	b	b	a	a	e	e
145.175/R7T	a	c	a	e	e	b	b	a	a	e	e
145.200/R8T	a	c	a	e	e	b	b	a	a	e	e
145.300/S12	e	e	e	e	e	e	e	e	e	e	e
145.350/S14	e	e	e	e	e	e	e	e	e	e	e
145.400/S16	e	e	e	e	e	e	e	e	e	e	e
145.425/S17	e	e	e	e	e	e	e	e	e	e	e
145.450/S18	a	e	e	e	e	b	b	a	a	e	e
145.475/S19	a	e	e	e	e	b	b	a	a	e	e
145.500/S20	a	c	a	c	c	b	b	a	a	c	c
145.525/S21	a	c	a	c	c	b	b	a	a	c	c
145.550/S22	a	c	a	c	c	b	b	a	a	c	c
145.575/S23	a	c	a	c	c	b	b	a	a	c	c
145.600/R0R	a	c	a	c	c	b	b	a	a	c	c
145.625/R1R	e	e	e	e	e	b	b	a	a	c	c
145.650/R2R	e	e	e	e	e	b	b	a	a	c	c
145.675/R3R	e	e	e	e	e	b	b	a	a	c	c
145.700/R4R	e	e	e	e	e	b	b	a	a	c	c
145.725/R5R	e	e	e	e	e	b	b	a	a	c	c
145.750/R6R	e	e	e	e	e	b	b	a	a	c	c
145.775/R7R	e	e	e	e	e	b	b	a	a	c	c
145.800/R8R	a	c	a	c	c	b	b	a	a	c	c
145.950/S38	a	e	e	c	e	e	e	a	e	e	e

PRICES: (a) £1.95, (b) £2.32, (c) £2.50, and (e) £4.48, AVAILABILITY: (a), (b) and (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 supply from stock. N.B. Frequencies as listed above but in alternative holders and/or non stock loadings 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.

CONVERTER/TRANSVERTER CRYSTALS — HC18/U.

All at £3.00, 38-6666MHz (144/28), 42MHz (70/28), 58MHz (144/28), 70MHz (144/4), 71MHz (144/2), 95MHz (342/52), 96MHz (1,296/432/144), 101MHz (432/28), 101-50MHz (434/28), 105-6666MHz (1,296/28) and 116MHz (144/28).

TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS

200kHz and 455MHz in HC6/U £3.50
100kHz in HC13/U and 1MHz in HC6/U £2.95
5MHz in HC6/U and 10MHz and 10-7MHz in HC6/U and HC25/U £2.80.

CRYSTALS FOR MICROPROCESSORS

Please let us know your requirements e.g. 4MHz HC18/U, 1 off, £2.00; 100 off, £1.10; 1000 off, 99p; 25,000 off, 50p.

ANZAC MD-108 DOUBLE BALANCED MIXER

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

2 ALEXANDER DRIVE, NESWALL, WIRRAL, MERSEYSIDE, L61 6XT. Tel: 051-342 4443

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WIDEST CHOICE, LARGEST STOCKS, PROMPTEST DEAL AND
FAST, SURE SERVICE RIGHT THROUGH—



YAESU FT-480

YAESU'S new FT-707 'WAYFARER' is an ultra-compact HF solid-state unit which has some of the most advanced features available on HF gear today and which includes the new band allocation of 30, 17 and 12 metres. It has an outstanding receiver performance and the noise blanker makes mobile operating a delight. Available also is the 12 memory channel VFO FV-707DM and a rugged PSU for base station operation. (Optional) £500.25 VAT included.

The exciting new FT-480R 2 METRE MULTI-MODE MOBILE represents the very latest in state-of-the-art 2 metre equipment. It incorporates features sadly missing in 2 metre gear by other makers and can be regarded as the definitive model in it's field. If you doubt that statement all you have to do is to seek out a proud owner! £359.00 VAT included.



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, G4HXX, 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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Full demonstration
facilities. Free
Securicor delivery.



HOW TO REACH US (EASY PRIVATE PARKING ON OUR 90ft FORECOURT)

FROM SOUTH AND EAST. We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within ½ 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 100 yds. 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.

Hours: 9.30–5.30 Continuous including Saturdays—Early closing Wednesday, 1 p.m.

AMATEUR ELECTRONICS UK

source for **YAESU MUSEN**



H

WE ARE PLEASED TO ANNOUNCE A NEW PRICE STRUCTURE FOR YAESU PRODUCTS WHICH GIVES THE PURCHASER EVEN BETTER VALUE FOR MONEY FOR AMATEUR RADIO'S FINEST EQUIPMENT RANGE. NOW, FROM THE WORLD'S NUMBER ONE MANUFACTURER COMES THE OPPORTUNITY FOR EVERY OPERATOR AND SWL TO OWN THE BEST ON THE MARKET AND GONE IS THE NECESSITY FOR SETTling FOR SECOND BEST.



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- A** FT-202 The ever-popular 2m FM hand-held. Superb value at. **£99.00** VAT incl
- B** FT-901DM. Truly the HF Transceiver with a reputation beyond compare. Every Operator's ultimate dream. **£799.25** VAT incl
- C** FT-225RD. No other 2 metre base-station can match the tried and proven FT-225RD Multimode. **£499.00** VAT incl
- D** FT-107M. YAESU's pace-setting all solid state HF Transceiver. Now exceptional value Complete with internal PSU and memory, only. **£690.00** VAT incl
..... **£887.80** VAT incl
- E** FRG-7. The finest value for money general coverage receiver available on the market today. Rugged and reliable and so many thousands in use. **£199.00** VAT incl
- F** FRG-7000. This is the general coverage receiver for the man who insists on the best and only the best. **£299.00** VAT incl
- G** FT-207R. The sophisticated 207 is still the best buy in synthesized 2-metre hand-helds at **£199.00** VAT incl
- H** FT-101ZD. Don't settle for the rig with the add-on digital counter, settle for latest technology with the world famous YAESU MUSEN FT-101ZD HF Transceiver. Now superb value at **£569.25** VAT incl



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EAST ANGLIA—AMATEUR ELECTRONICS UK—EAST ANGLIA, DR T. THIRST (TIM) G4CTT, NORWICH 06925 403
NORTH EAST—NORTH EAST AMATEUR RADIO, DARLINGTON 0325 55969
SOUTH EAST—AMATEUR ELECTRONICS, UK—COASTAL, CLIFTONVILLE, KENT
KEN McINNES, G3FTE, THANET (0843) 291297. 9 a.m.—10.30 p.m.



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MICROWAVE MODULES LTD

CAN YOU BELIEVE

RECENT ADDITIONS TO OUR FAMOUS RANGE

MM2000-RTTY TO TV CONVERTER



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A COMPLETE TERMINAL UNIT AND TV INTERFACE WHICH ONLY REQUIRES AN AUDIO INPUT FROM A SUITABLE RECEIVER, TO ENABLE A LIVE DISPLAY OF OFF-AIR RTTY AND ASC11 ON A DOMESTIC UHF STANDARD TV SET.

ONLY £169 inc VAT (p&p £1.75). BEAT THAT !!

MMT1296/144-1296MHz LINEAR



**THE ONLY TRANSVERTER
COMPLETE 1296MHz TRANSVERTER !!**

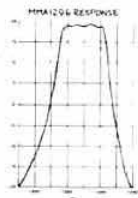
LOOK AT THESE FEATURES—FOR JUST £184 inc VAT (p&p £2.25)

- ★ FULL PIN DIODE AERIAL CHANGEOVER
- ★ 1.3 WATTS TX OUTPUT
- ★ EXCELLENT FILTERING
- ★ 2.9dB NOISE FIGURE RECEIVE CONVERTER

STOP PRESS !!

NOW AVAILABLE WITH A GUARANTEED NOISE FIGURE OF LESS THAN 1.5dB FOR JUST £15 EXTRA (inc VAT)

MMA1296-1296MHz LOW NOISE RECEIVE PREAMPLIFIER



TWO STAGE PREAMP WITH EXCELLENT FILTERING
GAIN : 18dB
N.F. : 2.9dB

ONLY £29.90 inc VAT (p&p 65p)

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MMK1296/144-LOW-NOISE 1296MHz RECEIVE CONVERTER



FEATURES INCLUDE:-

- ★ EXCELLENT FILTERING
- ★ 2.9dB NOISE FIGURE

ONLY £59.80 inc VAT (p&p £1.75)

STOP PRESS !!

NOW AVAILABLE WITH A GUARANTEED NOISE FIGURE OF LESS THAN 1.5dB FOR £15 EXTRA (inc VAT)

MMA144V-144MHz ULTRA LOW NOISE RF SWITCHED PREAMP

ONLY £29.90 inc VAT (p&p 65p)



This highly popular preamp uses one of the latest MOSFETS yielding a genuine overall noise figure of better than 1.3dB. In the straight through mode, the unit will accept 100 watts.

REAL VALUE FOR MONEY!

OUR TRANSVERTER COLLECTION

MMT28/144-10 METRE LINEAR TRANSVERTER



NOW THE WINTER MONTHS ARE WITH US AGAIN, WHY NOT PUT THAT MULTIMODE 2 METRE RIG ONTO 10 METRES, WITH THIS SUPERB LINEAR TRANSVERTER, PRODUCING 10 WATTS OUTPUT, THIS UNIT IS ALL YOU NEED TO HAVE THE BENEFIT OF THE 10 METRE BAND.

ONLY £90.85 inc VAT (p&p £1.75)

MMT144/28-2 METRE LINEAR TRANSVERTER

FEATURES INCLUDE:-

- ★ 10 WATTS RF OUTPUT
- ★ HIGHLY SENSITIVE RECEIVE CONVERTER
- ★ ALL-MODE LINEAR OPERATION
- ★ RF VOX CHANGEOVER



ALL THIS AND MORE FOR £99.00 inc VAT (p&p £1.75)

MMT432/28-S-70cm LINEAR TRANSVERTER

WITH SATELLITE SHIFT INCLUDED



Dual range linear transverter covering 432-434MHz and 434-436MHz. The ultra-linear transmit converter produces a clean 10 watts RF output and the highly sensitive receive converter makes the unit ideal for all modes of operation

PRICE: £136.85 inc VAT (p&p £1.75)

MMT432/144-R-70cm LINEAR TRANSVERTER

WITH REPEATER SHIFT: £173.65 inc VAT (p&p £1.75)

This transverter has been specifically designed to allow your Multimode 2 metre rig to be used on 70cms. A 1.6MHz repeater shift facility is included and alternately, the transverter may be used in simplex mode

- ★ 10 WATTS RF OUTPUT
- ★ ULTRA LOW NOISE RECEIVE CONVERTER
- ★ ALL-MODE OPERATION
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MICROWAVE MODULES LTD

YOUR EYES ??

ALL MODE 2 METRE LINEARS

MML144/25—2 METRE, 25W LINEAR & RECEIVE PREAMP



£48.30 inc VAT
(p&p £1.75)

1 WATT IN, 10 WATTS OUT
3 WATTS IN, 25 WATTS OUT
Designed for use with hand
portable rigs, this unit will
give increased receive and
transmit performance so
that mobile flexibility may
be gained at a cost of just

NEW MML144/40—2M, 40W

LINEAR & RECEIVE PREAMPLIFIER

FEATURES INCLUDE:-
★ 40 WATTS OUT for
10 WATTS IN
★ LOW-NOISE RECEIVE
PREAMP
★ IDEAL FOR FIXED OR
MOBILE USE
★ RF VOX CHANGEOVER



ALL THIS AND
MORE FOR JUST
£69.00 inc VAT
(pup £1.75)

MML144/100—2 Metre, 100 Watt LINEAR



£142.60 inc VAT
(p&p £2.75)

IDEAL FOR FIXED OR
MOBILE/PORTABLE USE

★ 100 WATTS OUT FOR
10 WATTS IN
★ RF VOX CHANGEOVER
ALSO AVAILABLE WITH
LOW NOISE RECEIVE
PREAMP AT NO EXTRA
COST (MML144/100P).

ALL MODE 70cm LINEARS

NEW MML432/20—70cm, 20W LINEAR & RECEIVE PREAMP



★ ALL MODE LINEAR OPERATION
ONLY £69.00 inc VAT (p&p £1.75)

FEATURES INCLUDE:-
★ 20 WATTS OUT FOR 3
WATTS IN
★ LOW-NOISE RECEIVE
PREAMP
★ RF VOX CHANGEOVER

MML432/50—70cm 50 WATT LINEAR & RECEIVE PREAMPLIFIER



ONLY £113.85 inc VAT (p&p £2.75)

FEATURES INCLUDE:-
★ 50 WATTS OUT FOR 10
WATTS IN
★ LOW-NOISE RECEIVE
PREAMP
★ IDEAL FOR FIXED OR
MOBILE USE
★ RF VOX CHANGEOVER

MML432/100—70cm 100 WATT LINEAR AMPLIFIER



SOLID ENGINEERING AT £228.65
inc VAT (p&p £2.75)

IDEAL FOR FIXED OR
MOBILE/PORTABLE USE

★ 100 WATTS OUTPUT
FOR 10 WATTS INPUT
★ PROTECTION CIR-
CUITS HIGH VSWR
AND THERMAL SHUT-
DOWN
★ RF VOX CHANGEOVER

VARIOUS PRODUCTS

MMD050/500—500MHz DIGITAL FREQUENCY COUNTER



ONLY £69.00 inc VAT (p&p 65p)

COVERS 0.45-500MHz
IN TWO RANGES
THIS IS A COMPACT,
VERSATILE 6-DIGIT
FREQUENCY COUNTER,
SUITABLE FOR ALL
THOSE LITTLE JOBS
AROUND THE SHACK.
ALL YOU NEED IS 12
VOLTS AT 300mA.

MMD600P 600MHz ÷ 10 PRESCALER



REAL VALUE AT £23.00 inc VAT
(p&p 65p)

FEATURES INCLUDE:-
★ 50-600MHz Coverage
★ ÷10 Operation
★ Compatible with any
frequency counter
★ 12 Volt DC operation

MMC432/28S & MMC432/144S



£29.90 inc VAT
(p&p 65p)

THIS DUAL RANGE
432MHz CONVERTER IS
AVAILABLE WITH AN
I.F. OUTPUT OF
28.30MHz OR
144.146MHz. THE IN-
CLUSION OF TWO
RANGES, 432-434MHz
AND 434MHz-436MHz
MAKES THIS CON-
VERTER SUITABLE FOR
BOTH SATELLITE AND
TERRESTRIAL COM-
MUNICATION.
GAIN:30dB N.F.:30dB

MMV1296

432MHz TO 1296MHz
VARACTOR TRIPLER. THIS
UNIT ACHIEVES A MINIMUM
OF 50% EFFICIENCY AND
WILL ACCEPT UP TO 30
WATTS OF 432MHz DRIVE.
SUITABLE FOR FM, AM and
CW

ONLY £34.50 inc VAT (p&p 65p)

MMC144/28

HIGH PERFORMANCE 2 METRE MOSFET CONVERTER



IF OUTPUT : 28-30MHz
GAIN : 30dB
N.F. : 2-5dB

PRICE: £24.90
inc VAT (p&p 65p)

ALSO AVAILABLE FOR 4 METRES
AT THE SAME PRICE (MMC70/28)

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ALL MICROWAVE MODULES PROD-
UCTS CARRY A FULL 12 MONTH
GUARANTEE INCLUDING PA
TRANSISTORS

WE WELCOME YOUR ORDERS AND
ENQUIRIES WHICH WILL BE DEALT
WITH EFFICIENTLY AND COURTEOUSLY
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PERSONAL CALLERS ARE ALSO VERY
WELCOME, BUT PLEASE PHONE FIRST

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ICOM IC-2E



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 16V 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 or 700kHz for you travellers!

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 all for

£159 inc VAT & carriage

IT'S NEW!

A SYNTHESIZED VHF FM RECEIVER

AR-22



FEATURES INCLUDE

- ★ Full band coverage, 141.000-149.995MHz
- ★ Direct frequency reading in 5kHz steps by digital thumbwheel and slide switch
- ★ Automatic electronic RF tuning system for wide band coverage
- ★ Compact and lightweight
- ★ Rugged, reliable double sided glass-epoxy printed circuit board
- ★ High performance mini rubber flexible antenna
- ★ Includes nicads and charger

£83 inc VAT & carriage

THE LATEST 2M FM RIG FROM TRIO

TR-7800



£265 inc VAT & carriage

FEATURES INCLUDE

- ★ 15 Multifunction channels, selectable with rotary control
- ★ Priority Alert. Audible warning plus immediate operate switch
- ★ Internal battery backup for all memories
- ★ Full coverage 144.000 to 145.995MHz in either 5kHz or 25kHz steps
- ★ Front panel keyboard of frequency selection, scan control and memory programming
- ★ Frequency readout and channel in LED display
- ★ 25W power output with Hi/Low power switch



Bredhurst electronics

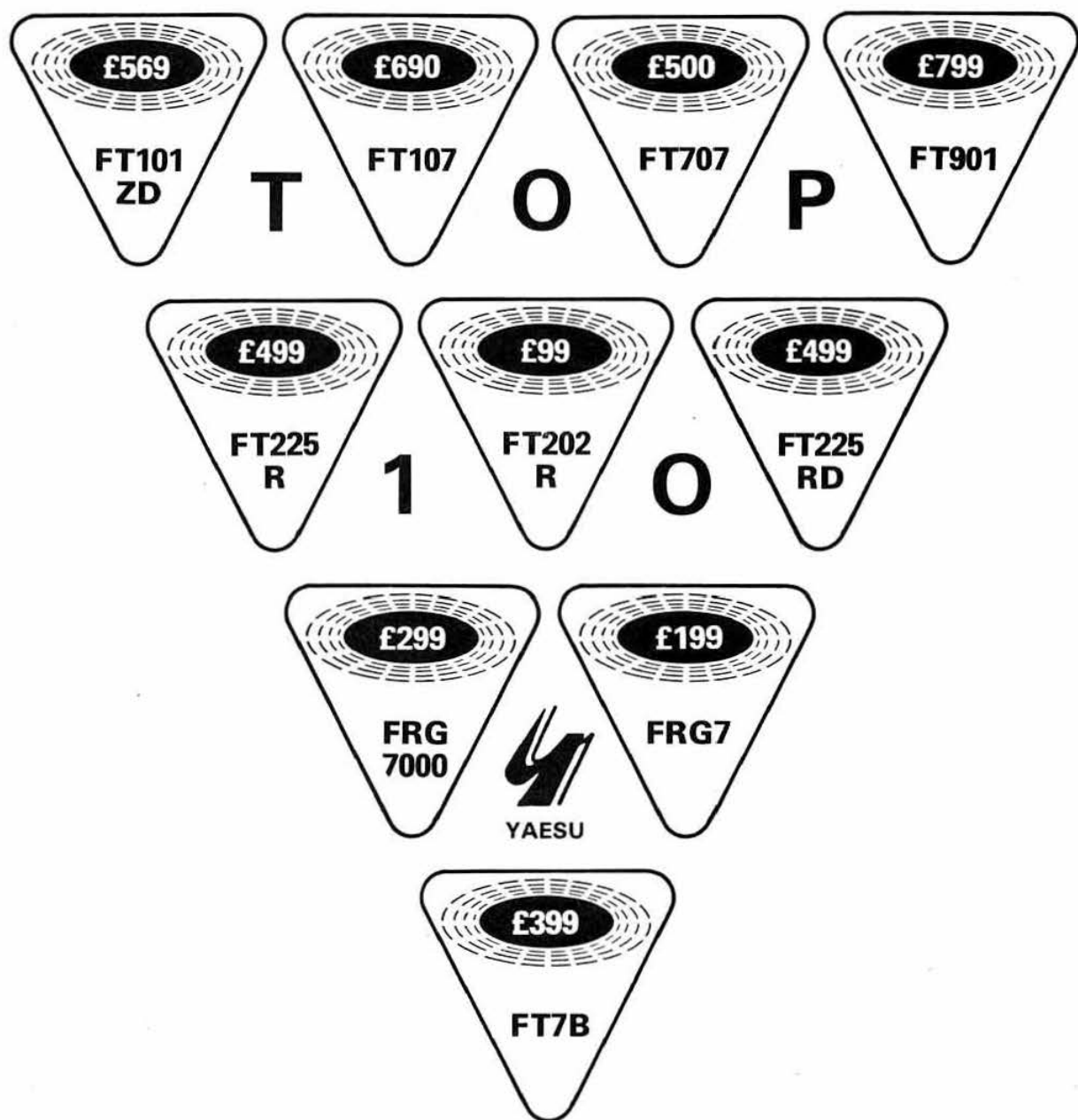
HIGH STREET, HANDCROSS, W. SUSSEX 0444 400786

TRANSCEIVERS	RECEIVERS	ACCESSORIES
HF	HF	C&P 75p per item
TRIO TS120V £347.00	LOWE SRX30 £158.00	YAESU QTR24 world clock £18.40
TRIO TS120S £432.00	YAESU FRG7 £199.00	YAESU QTR24D (quartz) £24.50
TRIO TS520SE £437.00	TRIO R1000 £298.00	YAESU YH55 headphones £10.00
YAESU FT707 £500.00	YAESU FRG7000 £299.00	TRIO HS4 headphones £10.35
YAESU FT101Z £488.00		TRIO HS5 headphones £21.85
YAESU FT101ZD £569.00	2-METRE	SWR 25 (twin meter) £13.00
TRIO TS830S POA	SEARCH 9 £45.00	SWR T435 (70cm) £34.00
TRIO TS180S (with DFC) £679.00	FDK TM56B (+ scan) £74.00	SWR SW110 (2M) £35.00
YAESU FT107M £690.00	AR22 synthesized £83.00	SWR CN620 (2M) £52.81
	BEARCAT 220 £258.00	SWR CN630 (70cm) £71.50
2-METRE FM MOBILES		DUMMY LOAD DL20 (C&P 50p) £5.95
ICOM IC240 £169.00	MARINE VHF	DUMMY LOAD T80 £21.95
FDK MULTI 700EX £199.00	SEARCH 9 £45.00	DUMMY LOAD T150 £32.00
STANDARD C8800 £250.00	SR11 (+ scan) £59.00	DUMMY LOAD DL1000 £38.00
ICOM IC255E £255.00	FDK TM 56B (+ scan) £74.00	COAX SWITCH 2-way (C&P 50p) £6.65
TRIO TR7800 £265.00	BEARCAT 220 £258.00	COAX SWITCH 2-way slide (70cm) (C&P 50p) £6.65
2-METRE FM H/HELDS	AIR BAND	COAX SWITCH 5-way rotary £10.20
FDK PALM II £99.00	WALTHAM W144 £29.95	POWER SUPPLY 12V 4A £22.95
YAESU FT202R £99.00	R517 (VFO + 3ch) £49.50	POWER SUPPLY 4V 6A £29.95
FDK PALMSIZER £149.00	AP 12 (12ch) £120.00	POWER SUPPLY 12V 7A cont £46.00
ICOM IC2E £159.00	BEARCAT 220 £258.00	POWER SUPPLY YAESU FP12 12A £78.00
AOR AR240A £165.00		POWER SUPPLY 12V 25A cont Carriage £2.00 £91.00
TRIO TR2300 £166.00	SAFETY	7MHz TRAPS 500 watts (C&P 50p) £6.95
YAESU FT207R £199.00	KEEP BOTH HANDS ON THE WHEEL USING THE ADONIS MM202S LIGHTWEIGHT MOBILE MICROPHONE	FF50DX low pass filter £19.95
TRIO TR2400 £210.00		LF30A low pass filter £18.40
2-METRE MULTIMODES		POPULAR ANTENNAE
FDK MULTI 750 £299.00		JAYBEAM ANTENNA
ICOM IC260E £339.00		ASP MOBILE ANTENNA
TRIO TR9000 £345.00		ALL AT COMPETITIVE PRICES
YAESU FT480R £359.00		HYGAIN HF ANTENNA
ICOM IC251E £479.00		MINI PRODUCTS
YAESU FT225RD £557.00		ROTATORS (C&P £2.50)
MICROWAVE MODULES		SKYKING SU2000 £39.95
Full range in stock e.g.		AR30 (Light VHF) £47.15
MMA 144V Preamp £29.90		9502 COLOROTOR (Med VHF) £49.95
MMD 50/500 Counter £69.00		AR40 (Large VHF) £59.80
MML 144/40 Linear £69.00		KR400 (Med VHF) £105.00
Price includes VAT & carriage		CD44 (Med HF) £114.00
TRY OUR MAIL ORDER SERVICE		HAM TV (Large HF) £166.75
		OR VISIT OUR RETAIL PREMISES
		CALLERS WELCOME

TO ORDER ANY OF THE ABOVE ITEMS SIMPLY WRITE ENCLOSING A CHEQUE OR PHONE YOUR CREDIT CARD NUMBER TO:

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REDUCTIONS!

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SUBSTANTIAL REDUCTIONS ON ALL MAJOR ITEMS OF YAESU MUSEN

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★ TWO YEAR GUARANTEE ★ SPEEDY SECURICOR SERVICE ★

YAESU MUSEN

★ LARGEST UK IMPORTER ★ FREE FINANCE SCHEME ★

HF EQUIPMENT

		net £	inc VAT £
FT7B			
FT7B	Transceiver, mobile	346.96	399.00
YC7B	Digital readout	59.00	67.85
FP12	Power Supply	68.00	78.20
FT101Z			
FT101Z	Transceiver Analogue	425.00	488.75
FT101ZD	Transceiver Digital	495.00	569.25
DIG101Z	Readout module	75.00	86.25
DCT101Z	Inverter Kit	30.00	34.50
FV101Z	External V.F.O.	110.00	126.50
FV101DM	Synthesized V.F.O.	205.00	235.75
YD148	Desk Microphone	17.50	20.13
YE7A	Hand Microphone	7.50	8.63
XF89HC	CW Filter 600Hz	20.00	23.00
XF89HCN	CW Filter 350Hz	20.00	23.00
FC901	Antenna Tuner	110.00	126.50
YR901	CW/RTTY Reader	380.00	437.00
YK901	CW/RTTY Keyboard	100.00	115.00
MODR901	VHF TV Modulator	8.50	9.78
60MAR901	60mA loop kit	15.50	17.83
YVM1	Video Monitor	125.00	143.75
FTV901(2)	Transverter c/w 2m	235.00	270.25
430V107V901	70cm Module	155.00	178.25
50V107V901	6m Module	60.00	69.00
70V107V901	4m Module	75.00	86.25
Y0901P	Monitorscope c/w pan.	270.00	310.50
Y0901	Monitorscope	230.00	264.50
PAN0901	Paradaptor kit	45.00	51.75
SP901P	Speaker c/w patch	45.00	51.75
SP901	Speaker external	25.00	28.75
FL2100Z	Linear Amplifier	315.00	362.25
FT107			
FT107	Transceiver Digital	600.00	690.00
FV107	External V.F.O.	80.00	92.00
FC107	Antenna Tuner	85.00	97.75
FP107E	PSU/Speaker	93.00	106.95
FP107	Internal 12V PSU	85.00	97.75
FTV107	Transverter Frame	96.00	110.40
FTV107(2)	Transverter c/w 2m	180.00	207.00
144V107V901	2m Module	88.00	101.20
50V107V901	6m Module	60.00	69.00
430V107V901	70cm Module	155.00	178.25
SP107P	Speaker c/w patch	48.00	55.20
SP107	External speaker	24.00	27.60
XF89GA	AM Filter 6kHz	20.00	23.00
XF89HC	CW Filter 600Hz	20.00	23.00
XF89HCN	CW Filter 350Hz	20.00	23.00
YM34	Desk Microphone	18.50	21.28
YM35	Tuning Microphone	11.00	12.65
YM36	Noise cancel mic	12.00	13.80
YM37	Fist Microphone	7.50	8.63
DMST107	Digital Memory Module	87.00	100.05

HF EQUIPMENT

		net £	inc VAT £
FT707			
FT707S	Transceiver 10W	405.00	465.75
FT707	Transceiver 100W	435.00	500.25
FP707	Power Supply	95.00	109.25
FC707	Antenna Tuner	65.00	74.75
FV707DM	Digital V.F.O.	155.00	178.25
MR7	Rack Unit	13.00	14.95
MMB2	Mobile Bracket	13.00	14.95
FRB707	Switching Box	19.00	21.85
XF89HC	CW Filter 600Hz	20.00	23.00
XF89HCN	CW Filter 350Hz	20.00	23.00
YM34	Desk Microphone	18.50	21.28
YM35	Tuning Microphone	11.00	12.65
YM36	Noise cancel mic	12.00	13.80
YM37	Fist Microphone	7.50	8.63
FTV107	Transverter frame	96.00	110.40
FTV107	Transverter c/w 2m	180.00	207.00
144V107V901	2m Module	88.00	101.20
50V107V901	6m Module	60.00	69.00
430V107V901	70cm Module	155.00	178.25
FT901			
FT901DM	Transceiver Deluxe	695.00	799.25
FT901D	Transceiver	630.00	724.50
FT901DE	Transceiver	620.00	713.00
FMV7901	FM Module	24.00	27.60
KEYT901	Keyer Module	24.00	27.60
MEMT901	Memory Module	75.00	86.25
DCT901	Inverter kit	30.00	34.50
FV901DM	Synthesized V.F.O.	205.00	235.75
FC902	Antenna Tuner	110.00	126.50
YR901	CW/RTTY Reader	380.00	437.00
60MAR901	60mA Mod kit	15.00	17.83
MODR901	VHF Modulator	8.50	9.78
YVM1	Video Monitor	125.00	143.75
FTV901(2)	Transverter c/w 2m	235.00	270.25
430V107V901	70cm Module	155.00	178.25
50V107V901	6m Module	60.00	69.00
70V107V901	4m Module	75.00	86.25
Y0901P	Monitorscope c/w pan	270.00	310.50
Y0901	Monitorscope	230.00	264.50
PAN0901	Paradaptor kit	45.00	51.75
SP901P	Speaker c/w patch	45.00	51.75
SP901	Speaker external	25.00	28.75
FL2100Z	Linear Amplifier	315.00	362.25
YK901	CW/RTTY Keyboard	100.00	115.00
ACCESSORIES			
YP150	Power meter/load	55.00	63.25
YH55	Headphones	9.00	10.35
FF501	Low Pass Filter	17.35	19.95
QTR240	Quartz time clock	21.70	24.95
FP12	12A PSU	68.00	78.20
FP4	4A PSU	36.00	41.40
FSP1	Mobile speaker	8.65	9.95

VHF EQUIPMENT

		net £	inc VAT £
FT202R			
FT202R	Handheld 1w 6Ch	86.09	99.00
YM24	Ext Speaker/mic	14.50	16.68
NC1	Mains charger	16.50	18.98
PA1	12v Battery Eliminator	16.50	18.98
FLC1	HD Leather Case	18.00	20.70
Xtals	Xtals Stock	4.35	5.00
NICDS	"AA" size 500mA Each	0.87	1.00
FT207R			
FT207R	Handheld 12kHz Synth	173.04	199.00
NC1A	Mains Charger	16.50	18.98
NC2	Fast Charger/Eliminator	34.50	39.68
NC9	Small Charger	6.50	7.48
NBP9	NiCd pack	14.50	16.68
FLC2	HD Leather Case	18.00	20.70
FBA1	Battery Charger/adaptor	2.25	2.59
PA2	12v Battery Eliminator	14.50	16.68
YM24	Ext Speaker/mic	14.50	16.68
FT225			
FT225R	Transceiver multimode	390.00	449.00
MEMT225	Transceiver 2m Digital	433.91	499.00
DIST225	Memory Module	80.00	92.00
	Digital Display module	50.00	57.50
FT227			
FT227RXS	Tx/Rx 2m c/w scanner	250.00	287.50
FT227RBST	Tx/Rx 2m c/w stepper	245.00	281.75
FT480			
FT480R	2m SSB/FM/CW	312.17	359.00
FP80	Power Supply	T.B.A.	T.B.A.
FT720			
FT720R	Control Box	130.00	149.00
S72	Switching Box	48.00	55.20
E72S	Extension Cable 2m	20.00	23.00
E72L	Extension Cable 4m	23.65	27.20
720RV	Deck 2m 10W	145.00	166.75
720RVH	Deck 2m 25W	150.00	172.50
720RU	Deck 70cm 10W	175.00	201.25
MMB3	Mounting Bracket	4.35	5.00
FT780R			
FT780R	70cm SSB/FM/CW	T.B.A.	T.B.A.
FP80u	Power Supply	T.B.A.	T.B.A.
CPU2500			
CPU2500R	Tx/Rx 2m 25W	280.00	322.00
CPU2500RS	Tx/Rx 2m 25W	327.00	376.05
CPU2500RS	Tx/Rx 2m 10W	260.00	299.00
CPU2500RS	Tx/Rx 2m 10W	287.00	330.05
CPU2500RK	Tx/Rx 2m 25W	307.00	353.04
CPU2500RKSt	Tx/Rx 2m 25W	316.00	363.40
CPU2500RKSt	Tx/Rx 2m 10W	273.00	313.95
CPU2500RKSS	Tx/Rx 2m 10W	300.00	345.00



SOUTH MIDLANDS COMMUNICATIONS LTD

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Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton



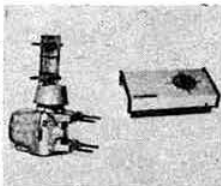
South Midlands

SMC FOR THE WIDEST CHOICE IN ROTATORS

CDE

Accurate, silent self-calibrating control box. Dial up desired beam heading, push knob; motor rotates to that position and then switches off.

For UHF and small VHF use



RC5W 5-core control cable per metre 26p
AR30 (post and packing free) £41.00

CDE

Upper support bearing for AR30, AR20, etc.

Takes 1 1/2" stub and 1 1/2" mast.



Post and packing 85p
CD562 £6.75

STOLLE

Upper support bearing for all "offset" Stolle.

Takes 1 1/2" stub and 2" mast.

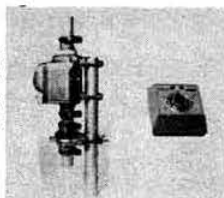


Post and packing £1.00
RZ100 £10.00

STOLLE

Automatic control box. Dial desired direction and the rotator turns to the position and stops. Turning shaft (up to 1 1/2") passes through rotator.

For UHF and small VHF use.

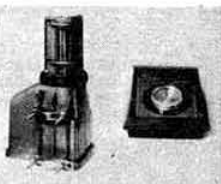


RC5W 5-core control cable per metre 26p
2010 (post and packing free) £45.00

CHANNEL MASTER

Automatic control box. Dial direction secondary pointer gives position during travel.

Takes 1-2" mast and 1-1/2" stub.



RC3W 3-core control cable per metre
9502A (post and packing free) £40.00

CHANNEL MASTER

Upper mast support bearing.

Takes 2" mast and 1 1/2" stub.



Post and packing £1.20
9523 £10.20

Rotary bearing 3-way guying.

Takes 1 1/2" mast.

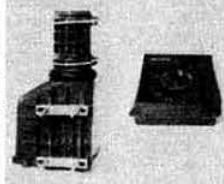


Post and packing 85p
9525 £11.30

CHANNEL MASTER

Automatic control box. Dial direction secondary pointer gives position during travel. Stainless steel hardware. Heaviest duty "offset type". To 5sq ft.

Takes 1-2" masts and 1-2" stub.

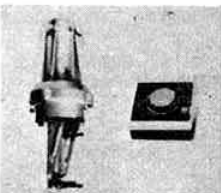


RC3W 3-core control cable per metre
9508 (post and packing free) £57.00

STOLLE

Automatic control box. 24V AC motor. Light-weight head.

To 2 1/2sq feet. Takes 1 1/2-1 1/2" tube.

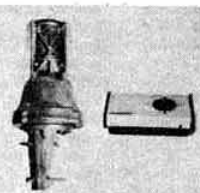


RC0W core control cable per metre
506 (Rail £1.65) £25.00

CDE

Accurate, silent self-calibrating control box. Dial up desired beam heading, push knob; motor rotates to that position and then switches off.

For VHF use and light HF use c/w low casting.



RC5W 5-core control cable per metre 27p
AR40 (post and packing free) £52.00

CDE

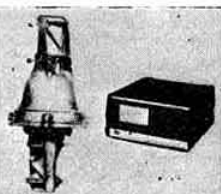
Four position preset plus normal manual controls. Handles aerials up to 5sq ft of wind area. Supplied with lower mast fit casting.



RC5W 5-core control cable per metre 27p
BT1 (post and packing free) £79.50

CDE

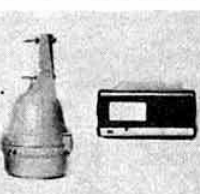
Large illuminated meter gives read out of antenna heading at all times. Armature brake. Low voltage meter. Handles antennas to 8 1/2sq ft.



RC8W 8-core rotor cable per metre 39p
CD46 (Securicor Delivery free) £99.00

CDE

Large illuminated meter gives read out of antenna heading at all times. Wedge solenoid brake mechanism. Handles antennas to 15sq ft.



RC8W 8-core rotor cable per metre 39p
HAM IV (Securicor Delivery free) £145.00

CDE

Large illuminated meter gives read out of antenna heading at all times. Wedge solenoid brake mechanism. Handles antennas to 30sq ft.



RC8W 8-way rotor cable per metre 39p
T2X (Securicor Delivery free) £199.00

PRICES DO NOT INCLUDE VAT (15%)

SOUTH MIDLANDS COMMUNICATIONS LIMITED.

OSBORNE ROAD, TOTTON
SOUTHAMPTON, SO4 4DN
Hours of business:
9-5.30 Monday-Friday
9-1.30 Saturday



Head Office, Showrooms
Cables: Aerial Southampton
Telex: 477351 SMCOMM G
Tel: Totton (0703) 867333 (3 lines)

A	G3ZUL	Brian	Stourbridge	(03843) 5917
G	G13KDR	John	Bangor	(0247) 55162
E	GMBGEC	Jack	Edinburgh	(031865) 2420
N	G13WNY	Mervyn	Tandragee	(0782) 840666
T	GW3TMP	Howarth	Pontybodkin	(036287) 846/324
S	GW4GSW	Alan	Swansea	(0792) 24140

Communications Ltd

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HF ANTENNAS

GEM QUAD PRODUCTS			
GQ2E	2 Ele antenna	£124.00	R £3.75
GQ3E	3 Ele antenna	£187.00	R £6.45
GQ4E	4 Ele antenna	£249.00	R £7.05
GQCK1	Con kit 1 ele	£63.00	R £2.90
GQCK2	Con kit 2 ele	£125.00	R £4.20
GQSPIDER	Centre piece	£26.25	SP £1.25
GQSPREADER	Spreader arm	£9.85	R £1.50

HY GAIN HF ANTENNA			
12AVQ	Vertical 10-20m	£37.50	SR £1.50
14 AVQ/WB	Vertical 10-40m	£52.50	SR £1.50
18 AVT/WB	Vertical 10-80m	£76.00	SR £1.50
14 RMQ	Roof mount kit	£19.50	SR £1.50
18V	Vertical 10-80m	£27.80	SR £1.50
18HT	"HY Tower"	£225.00	R £10.90
103BA	3 Ele Yagi 10m	£51.00	SR £1.50
105BA	5 Ele Yagi 10m	£92.00	R £2.75
153BA	3 Ele Yagi 15m	£62.75	R £2.05
155BA	5 Ele Yagi 15m	£117.50	R £4.15
203BA	3 Ele Yagi 20m	£117.50	R £4.35
204BA	4 Ele Yagi 20m	£155.00	R £5.10
205BA	5 Ele Yagi 20m	£205.00	R £6.60
402BA	2 Ele Yagi 40m	£158.00	R £4.55
DB10/15A	3 Ele 10-15m	£115.00	R £3.40
TH3JNR	3 Ele 10-20m	£113.50	SR £2.15
TH2MK3	2 Ele 10-20m	£109.75	R £2.25
TH3MK3	3 Ele 10-20m	£157.00	R £4.05
TH5DXX	"Thunderbird"	£178.30	R £4.70
TH6DXX	"Thunderbird"	£205.00	R £5.90
HYQUAD	2 Ele Quad	£169.00	R £4.25
BN86	Balun ferrite 1:1	£13.50	SP £1.00
LA1	Lightning arrest	£39.50	SP £0.65

JAYBEAM HF ANTENNA			
VR3	Vert 10-20m	£34.00	R £1.50
TB3	3 Ele 10-20m	£135.00	R £3.75

MINIBEAM ANTENNA			
C4	Vert miniature	£42.15	SR £1.50
HQ1	"Mini" quad	£83.85	SR £2.80

MOSLEY HF ANTENNA			
TA32JRE	2 Ele beam	£78.00	R £2.25
TA33JRE	3 Ele beam	£116.00	R £2.40
TA33JHPE	3 Ele c/w balun	£132.00	R £2.60
MUSTANG 2	2 Ele beam	£117.00	R £2.40
MUSTANG 3	3 Ele beam	£145.00	R £2.60
RD5	Dipole ham	£35.00	SP £1.25
SWL7	Dipole B.C.	£35.00	SP £1.25

SMC TRAPPED DIPOLE			
SMC TD/S	Standard 14swg	£26.50	SP £1.50
SMCTD/HP	Hi power 14swg	£29.50	SP £1.50
SMCTD/P	Portable ant	£32.50	SP £1.50

SMC-HS ANTENNA			
SMCHF5V	Vertical 10-80m	£35.00	SR £1.50
SMCHF5R	Radial kit loaded	£25.65	SR £1.50

G WHIP HF MOBILE			
GW BASE	Base Standard	£3.90	SP £0.55
TRIBANDER	Antenna 10-20m	£21.50	SP £0.75
LF40-160	Loading coil each	£5.70	SP £0.45
LFWHIP	Telescope whip	£2.90	SP £0.45
MULTIMOBILE	Antenna 10-20m	£25.00	SP £1.00
MM40-160	Loading coil each	£5.70	SP £0.45
MMWHIP	Telescope whip	£2.90	SP £0.45
FLEXIWHIP	Antenna 10m	£15.00	SP £0.75
FF15-160	Loading coil each	£5.70	SP £0.45

HY GAIN MOBILE ACCS.			
415	Bumper strap	£10.80	SP £1.50
499	Body mount	£10.80	SP £1.00
511	Spring H.D.	£9.50	SP £1.25
417	Spring medium	£8.20	SP £1.00

SMC-HS MOBILE			
SMC15SE	Ele 15m 1-72m	£11.00	SP £1.25
SMC10E	Ele 10m 1-27m	£10.00	SP £1.25
SMC10SE	Ele 10m 1-72m	£11.00	SP £1.25
SMCSOCA	Cable assembly	£3.00	SP £0.55
SMCGCD	Gutter clip	£3.00	SP £0.55
MX93/M	Dust cover	£0.40	SP £0.35

CABLES & CONNECTORS R.F.

COAXIAL 50 OHM CABLE			
URM95	Solid centre 2-3mm	p/m	£0.20
UR43	Solid centre 5-0mm	p/m	£0.20
UR76	Stranded core 5-0mm	p/m	£0.22
RG58U	Stranded core 5-0mm	p/m	£0.22
RG213	Low loss 10-2mm	p/m	£0.48
UR67	Low loss 10-2mm	p/m	£0.52

COAXIAL 75 OHM CABLE			
307EP	Economy type	p/m	£0.16
UR70	Stranded light 5-7mm	p/m	£0.24
UR39	Medium duty 7-8mm	p/m	£0.36
UR57	Low loss 10-2mm	p/m	£0.57

BALANCED TWIN CABLE			
302	75 Ohm Light duty	p/m	£0.14
306	300 Ohm Ribbon	p/m	£0.15
2X21	240 Ohm Dual foam	p/m	£0.11

BNC COAXIAL PLUG 50 OHM			
UG88	Standard type 5-5mm		£0.64
UG959	Large Type 11-2mm		£2.60

BNC COAXIAL SOCKET 50 OHM			
UG90	Standard, 4 hole type		£0.66
UG1094	Nut fixing type		£0.62
UG89	Free cable end 5-5mm		£0.82

BNC COAXIAL COUPLER 50 OHM			
UG914	Back to back female		£0.93
UG491	Back to back male		£0.93
UG274	"T" 2 female 1 male		£1.44
SMS 3F BNC	"T" 3 female		£1.74

BNC COAXIAL ELBOW 50 OHM			
UG306	Elbow male - female		£1.62

BNC CABLES 50 OHM			
BNC18BNC	1-5' RG58 BNC ends		£2.22
BNC36BNC	3-0' RG58 BNC ends		£2.30
BNC36CROC	3-0' RG58 BNC/clips		£2.17

UHF COAXIAL PLUG			
PL259	Standard type 11-2mm		£0.48
PL259P	Push on type 11-2mm		£0.69
UG175	Reducer 5-0mm		£0.12
UG176	Reducer 5-6mm		£0.12

UHF COAXIAL SOCKET			
PL259R	Reduced type 5-0mm		£0.58
PL259A	De-luxe type 11-2mm		£0.98
PL259B	De-luxe type 5-0mm		£0.98
PL259SS	"Solderless" 11-2mm		£0.55
PL259SL	"Solderless" 5-0mm		£0.55
PL259E	Angle type 5-0mm		£0.83
PL259M	Metric type standard		£0.65
PL259PM	Panel mount 4 hole		£0.93

UHF COAXIAL ADAPTOR			
PL258	Back to back female		£0.79
PL274	Back to back chassis		£0.93
PL258M	Back to back male		£1.20
M359	Elbow male - female		£0.93
M358	"T" 2 female 1 male		£1.20
M358AF	"X" 3 female 1 male		£1.48
M458	"X" 3 female 1 male		£1.85
UG255	UHF socket - BNC plug		£1.53
UG273	UHF plug - BNC socket		£1.53
SO/FP	UHF socket - F plug		£0.60
SO/25	UHF socket 2-5mm jack		£0.69
SO/35	UHF socket 3-5mm jack		£0.69

UHF CABLES			
PL36PL	3-0' RG58 PL259 ends		£1.61

N COAXIAL PLUG 50 OHM			
UG536	Small type 5-5mm		£2.35
UG21	Standard type 11-2mm		£1.15

N COAXIAL 50 OHM			
UG58	Standard 4 hole fix		£0.82
UG1052	Free cable end 5-5mm		£2.49
UG23	Free cable end 11mm		£1.48

VHF ANTENNAS

HIDAKA VHF ANTENNA			
LT606	50-500MHz log	£75.95	R £1.50

JAYBEAM 4 METRE			
4Y/4M	Yagi, 4 element	£14.95	SR £1.50
PMH2/4M	Harness, 2 way	£10.60	SP £1.25

JAYBEAM 2 METRE			
HO/2M	Halo, head only	£3.70	SP £0.55
HM/2M	Halo, with mast	£4.40	SP £0.65
UGP/2M	Ground plane	£8.15	SP £1.50
C5/2M	Colinear vert.	£34.80	SR £1.50
LR1/2M	Colinear	£19.60	SR £1.50
5Y/2M	Yagi, 5 element	£8.90	SR £1.50
8Y/2M	Yagi, 8 element	£11.50	SR £1.50
10Y/2M	Long Yagi 10 ele	£24.70	SR £1.50
14Y/2M	Long Yagi 14 ele	£31.30	SR £1.50
D5/2M	Yagi, 5 over 5	£15.90	SR £1.50
DB/2M	Yagi, 8 over 8	£21.60	SR £1.50
PBM10/2M	10 Ele parabeam	£29.20	SR £1.50
PBM/14/2M	14 Ele parabeam	£35.50	SR £1.50
Q4/2M	Quad, 4 element	£18.70	SR £1.50
Q6/2M	Quad, 6 element	£24.80	SR £1.50
5XY/2M	Yagi, 5 ele cros	£18.00	SR £1.50
8XY/2M	Yagi, 8 ele cros	£22.50	SR £1.50
10XY/2M	Yagi, 10 ele cros	£29.80	SR £1.50
PMH2/C	Harness, circular	£5.90	SP £0.45
PMH2/2M	Harness, 2 way	£7.80	SP £0.75
PMH2/2ML	Harness, 2 way	£8.80	SP £1.00
PMH4/2M	Harness, 4 way	£18.70	SP £1.50

JAYBEAM 2M/70CM			
X6/2M/X12/70	6 Ele 2, 12, 70	£33.50	SR £1.50

JAYBEAM 70CM			
C8/70	Colinear, vert.	£39.50	SR £1.50
DB/70	Yagi, 8 over 8	£17.80	SR £1.50
PBM18/70	18 Ele parabeam	£21.50	SR £1.50
MBM48/70	Multi, 48 Ele	£24.50	SR £1.50
MBM88/70	Multi, 88 Ele	£32.60	SR £1.50
8XY/70	Yagi, 8 Ele X	£27.00	SR £1.50
12XY/70	Yagi, 12 Ele X	£33.50	SR £1.50
PMH2/70	Harness 2 way	£6.75	SR £0.65
PMH4/70	Harness 4 way	£14.30	SP £1.25

JAYBEAM 1296MHz			
D15/23	Yagi, 15 over 15	£26.90	SR £1.50

SMC VHF ANTENNA			
GP2U	Ground plane	£4.35	SP £1.00

SMC-HS VHF ANTENNA			
SMCGDX1	80-480MHz	T.O.S.	SR £1.50
SMCGDX2	50-480MHz	£41.70	SR £1.50
SMCVHFL	65-520MHz Rx	T.O.S.	SR £1.50
SMCPG144W	2m 6dB Colinear	£21.70	SR £1.50
SMCPG432X	70cm 7dB Colinear	£24.35	SR £1.50

ASCOT MOBILE ANTENNA			
See page 1012 for full details of all range.			
Please enquire for data on 1/2 & 1/2 types			

BANTEX MOBILE ANTENNA			
42SS	Ele stainless 42"	£1.75	SP £0.75
40GF	Ele glassfibre 40"	£3.65	SP £0.95
20SS	Ele stainless 20"	£1.40	SP £0.65
18GF	Ele glassfibre 18"	£2.75	SP £0.65
B5	Ele glass 2m	£7.65	SP £0.95
BGAS	Ele stain 2m	£7.00	SP £0.95
BGAGF	Ele glass 2m	£8.25	SP £0.95
B5U	Ele stain 70cm	£2.15	SP £0.65
UCL	Ele coln. 70cm	£6.85	SP £0.75
UDL	Ele coln. 70cm	£13.65	SP £0.75
BM	Base standard	£2.15	SP £0.35
BC	Base trunk lip	£7.00	SP £0.55
BMM	Base Magnetic	£12.35	SP £1.00

SMC-HS VHF MOBILE ANTENNA			
See page 1013 for details of standard range.			

SMC2M/PL			
SMC2M/PL	Helical 2m PL259	£3.00	SP £0.35
SMC2M/BNC	Helical 2m BNC	£3.85	SP £0.35
XM913M	Dustcap M SO329	£0.40	SP £0.35
SMC118M	2m 6dB Colinear	£24.45	SP £1.50
SMCSBD	Bumper Strap	£6.70	SP £0.75
SMCSOCAL	Cable Assembly	£3.35	SP £0.35

(S = Securicor (possible), R = Rail, P = Post)

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



S.M.C. (Jack Tweedy) LTD
Roger Baines, G3YBO
79 Chatsworth Road
Chesterfield, Derbyshire
Chesterfield (0246) 34982
9-5; Tuesday-Saturday

NORTHERN (Leeds) BRANCH
Colin Thomas G3PSM
257 Otley Road,
Leeds 16, Yorkshire.
Leeds (0532) 782326
9-5.30 Monday-Saturday



ASCOT

FIVE-EIGHTS ANTENNA SMC's SIX POINT GUIDE!

1 PICK THE BASE BASE TRANSFORMERS

Screw on 'quick disconnect' type

- * 130-175MHz
- * 3dB Gain
- * 5MHz Band
- * 1-5:1 max
- * 100W Rated
- * 50 ohm nom.
- * A100 nylon
- * Chrome plated
- * Stainless spring
- * Beryllium Cu.



STANDARD
(440) £3.50



SWIVEL
(330) £4.45



SPRUNG
(341) £6.65

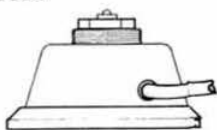
2 CHOOSE THE MOUNT

BASE CONNECTORS

All c/w 4.5m coax



STANDARD
(085) £2.80



MAGNETIC
(092) £3.95



FIBRE-GLASS
(085LR) £3.35

all fit
the above

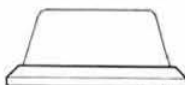
3 ADD AN ACCESSORY

MOUNTS AND COVERS

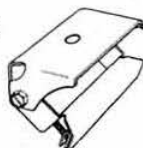
universal type fitting the standard cable assembly



Blank-off
(031) £0.80



Boot-lip
(093) £2.90



Gutter clip
(069) £4.75

4 SELECT THE WHIP

STAINLESS STEEL GROUND TAPERED

(067) 127cms long £1.95

5 ADD THE CARRIAGE

Mail order is offered direct from SMC HQ and the Branches.
Carriage £1.00 complete antennas or £0.50 for accessories any quantity.

6 ADD THE VAT+15%

An illustrated leaflet on the full range of $\frac{1}{4}$ and $\frac{1}{2}$ antennas is available

SOUTH MIDLANDS COMMUNICATIONS LTD

OSBORNE ROAD, TOTTEN
SOUTHAMPTON SO4 4DN



Telex: 477351 SMCMM G
Tel: Totton (0703) 867333



HANSEN

IN-LINE WATTMETERS RMS METERS AND REFLECTOMETERS

FS300 £35



LEVEL RESPONSE, LARGE,
POWER & SWR
FS300H 1-8-30MHz 20, 200, 1kW, FSD
FS300V 50-150MHz 20, 200W FSD
Power $\pm 10\%$ FSD SWR 1:1-3:1 $\pm 10\%$
Size: $8 \times 4 \times 5\frac{1}{2}$ "

FS300M £27



LEVEL RESPONSE, POWER & SWR
FS301M 1-8-30MHz 20, 200W FSD
FS301MH 1-8-30MHz 200, 2kW FSD
FS302M 50-150MHz 20, 200W FSD
Power $\pm 10\%$ FSD SWR 1:1-3:1 $\pm 3\%$
Size: $6\frac{1}{2} \times 2\frac{1}{2} \times 4\frac{1}{2}$ "

FS711 £28



REMOTE INDICATOR, POWER &
SWR
FS711H 1-8-30MHz 20 & 200W FSD
FS711V 50-150MHz 20 & 200W FSD
FS711U 430-440MHz 5 & 20W FSD
Power $\pm 10\%$ FSD, SWR 1:1-3:1 $\pm 3\%$
Size: coupler $3\frac{1}{2} \times 2\frac{1}{2} \times 1\frac{1}{2}$ ",
Indicator $5 \times 2\frac{1}{2} \times 1\frac{1}{2}$ "

FS7 £31



VHF/UHF WATTMETER & SWR
BRIDGE
FS7 145MHz & 432MHz 5, 20, 200W
FSD
Power RMS $\pm 10\%$ FSD SWR 1:1-3:1
Power Max: 144MHz, 200W,
432MHz 20W
Size: $6\frac{1}{2} \times 2\frac{1}{2} \times 4\frac{1}{2}$ ". 'N' type sockets

SWR3S £20



WIDE RANGE POWER & SWR
METER
SWR3S 3-5-150MHz 20 & 200W FSD
Power RMS $\pm 10\%$ FSD, SWR 1:1-3:1
Power Max: 200W 3-5-30MHz,
50W 50-150MHz
Size: $6 \times 2\frac{1}{2} \times 2\frac{1}{2}$ ". Antenna/dummy
load switch

SWR50B £20



TWIN METER, RELATIVE POWER
& SWR
SWR50B 3-5-150MHz Scaled to 1kW
Power RMS $\pm 20\%$ FSD, SWR 1:1-3:1
Power Max: HF 1kW 1:1, 300W 3:1,
50W VHF
Size: $6 \times 2\frac{1}{2} \times 2\frac{1}{2}$ ". 'On the Air' LED

FS5E £28



INDEPENDENT TWIN METER
FS5E 3-5-150MHz 20 & 200 & 1kW
FSD
Power RMS $\pm 10\%$ FSD, SWR 1:1-5:1
Power Max: 1kW 3-5-30MHz, 50W
50-150MHz
Size: $7 \times 3 \times 3\frac{1}{2}$ ". 'On the Air' LED

Available from reputable amateur radio dealers throughout Britain.
Mail Order (£0.75 post and packing)—Direct from S.M.C. or any
branch. The range encompasses peak reading wattmeters and
automatic SWR types.

NB All prices exclude VAT at 15% but include post and packing

SOUTH MIDLANDS COMMUNICATIONS LTD

OSBORNE ROAD, TOTTEN
SOUTHAMPTON SO4 4DN



Telex: 477351 SMCMM G
Tel: Totton (0703) 867333



VERSATOWER

TELESCOPIC & TILTOVER RADIO TOWERS

Twelve years of continuous development has produced a range of over 50 models, all of which conform to the current B.S.S., requiring *minimum* designed wind speeds of 85mph and up to 117mph.

Before purchasing a Tower, we strongly recommend consulting one of our engineers for advice regarding the most suitable combination for an installation. *It would be incorrect to nominate a specific headload as this is dependent upon load distribution, geographical location and siting.*

25-120ft, post, base plate, wall, fixed base or mobile (on high-speed trailer) versions.

Price of towers are for the complete package—tower sections, mounts, telescopic and luffing gear, guys, head unit and winches. AS APPROPRIATE FOR ANY PARTICULAR MODEL

The sample of prices exclude VAT and delivery

STANDARD 13M20 SERIES

Post Mounting 13M20		
P25 25' Tower	£236.20	
P40 40' Tower	£323.60	
P60 60' Tower	£392.70	

Fixed Base 13M20		
FB25 25' Tower	£175.60	
FB40 40' Tower	£262.40	
FB60 60' Tower	£332.20	

Socket Types 13M20		
SP25 25' Tower	£274.60	
SP40 40' Tower	£361.50	
SP60 60' Tower	£431.30	

Base plate 13M20		
BP25 25' Tower	£276.00	
BP40 40' Tower	£361.90	
BP60 60' Tower	£431.20	

Wall Mounting 13M20		
W25 25' Tower	£190.20	
W40 40' Tower	£277.00	
W60 60' Tower	£346.80	

HEAVY DUTY 16M20 SERIES

Post Mounting 16M20		
P40 40' Tower	£476.60	
P60 60' Tower	£541.10	

Fixed Base 16M20		
FB40 40' Tower	£382.20	
FB60 60' Tower	£446.70	

Socket Types 16M20		
SP40 40' Tower	£528.50	
SP60 60' Tower	£582.70	

Base plate 16M20		
BP40 40' Tower	£496.30	
BP60 60' Tower	£560.70	

Wall Mounting 16M20		
W40 40' Tower	£390.30	
W60 60' Tower	£449.50	

80-85-100-120' and MOBILE PRICES ON APPLICATION

NEW '30ft': 10ft SECTIONS

P30 £249
BP30 £296.50

BP = Baseplate mount
P = Post mounting

+ VAT 15%
+ Carriage

Capable of supporting a HF beam or several VHF Ants. The head unit accepts 2" tube and provides for a rotator. Operation is easy with single winch system.

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OSBORNE ROAD, TOTTEN
SOUTHAMPTON SO4 4DN



Telex: 477351 SMCOMM G
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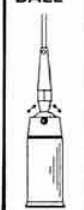
SMC-HS

INTERCHANGEABLE ELEMENT MOBILE ANTENNAS

SMC HS Mobile antennas, tabulated below, features an in-built PL259M connector which mates with the SO239M of the cable assembly (fits a 1/2" hole in car body or the cast chromed gutter mount) or the magnetic base (recommended for smaller antennas only). This arrangement is ideal for easy removal (element change, car wash and anti-vandal), tests and portable operation.

MODEL	BAND	GAIN	TYPE	POWER	LENGTH	PRICE
20SE	14MHz		(1/2)	100W	1.72m	£12.00
15SE	21MHz		(1/2)	130W	1.72m	£10.00
10SE	28MHz		(1/2)	100W	1.27m	£10.00
4E	70MHz	0dB	1/2	150W	1.03m	£6.50
2NE	144MHz	3dB	1/2	150W	1.30m	£5.50
78F	144MHz	4.5dB	1/2	100W	1.75m	£10.00
78B	144MHz	4.5dB	1/2	150W	1.72m	£11.00
258	432MHz	5.5dB	2 x 1/2	100W	0.94m	£10.00
358	432MHz	6.3dB	3 x 1/2	100W	1.36m	£12.50

SMC78B 'BALL'



BASE COIL



BASE COIL 'FOLDED' STATE



All models have a locking fold-over joint except the SMC78B which has an in-built ball (in case the cable assembly is fitted askew).

CABLE ASSEMBLY



SMCSOCA

C/w 4M RG58 & PL259 plug
SMCSOCA... £3.00

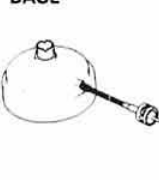
GUTTER MOUNTING



SMCGCD

Adjustable, cast, chrome
SMCGCD... £3.00

MAGNETIC BASE



SMCSOMM

c/w 4M RG58 & PL259 plug
SMCSOMM... £6.50

Carriage, £1.00 complete antennas, or £0.50 for accessories—any quantity

NB: Prices do NOT include VAT (15%)

SOUTH MIDLANDS COMMUNICATIONS LTD

OSBORNE ROAD, TOTTEN
SOUTHAMPTON SO4 4DN



Telex: 477351 SMCOMM G
Tel: Totton (0703) 867333

KDK KYOKUTO

KYOKUTO DENSHI COMPANY LIMITED

KDK 2025 2m SYNTHESIZED 25w TRANSCEIVER



- ★ Custom designed microprocessor control
- ★ 25kHz and 12.5kHz synthesizer steps!!
- ★ 'Instant QSY', 10 times rate button
- ★ 25 Watts of reliable RF output
- ★ Band scan between any 'easy set' limits
- ★ 10 write-in non-volatile memory channels
- ★ Memory scanning with hold facility
- ★ Standard $\pm 600\text{kHz}$ or any repeater split

The KDK FM2025E is a 12V dc two-metre FM transceiver for mobile or base station use. Although feature packed, operational ease is assured by use of a "custom microprocessor."

Digital frequency synthesis provides full band coverage in 12.5kHz or 25kHz steps. "Single knob" frequency selection is by an optically coupled encoder. A dialling speed switch (increases tuning steps) facilitates rapid QSY's.

A 10 slot memory with Ni-Cad back-up, provides 10 duplex (plus $\pm 600\text{kHz}$ shift) and/or 5 semi-duplex channels, making the 2025 as easy to use mobile as a crystal controlled transceiver. One memory is semi-dedicated to "priority" and programmable when the 2025 is dial controlled.

The 2025 embodies the best non-lockout scanner. It scans occupied or empty channels and a flick switch enables immediate transmission. The scanner works on the memories and across any selected portion of the band (scan limits are defined by two of the memories).

Dual gate UHF MOSFETS in the RF and mixer provide superior intermodulation performance with high sensitivity maintained over the band by auto-varicap tuning. A monolithic crystal filter in the first IF and a 15 pole ceramic filter in the second provides excellent selectivity.

The single conversion transmitter uses a balanced mixer and a VCO on the signal frequency (directly modulated for superb FM) and a hybrid power module for 25W (or 3W) RF. The PA is impervious to breakdowns under infinite VSWR.

Necessary control function instructions are programmed into the microprocessor itself. But by re-arranging a diode matrix, the lower frequency transceive limit, the high frequency receive limit and the high frequency transmit limit may be altered to allow for changes of band plan or location.

Switchable auto-tone-burst, RF attenuator, squelch, microphone, microphone clip, power lead, mounting bracket, handbook are, of course, part of the package.

NEW LOW PRICE £225.00 INC. VAT!!

INCLUDING VAT AND SECURICOR DELIVERY

Direct from the Importers or from any of those dealers listed below:

AMATEUR RADIO EXCHANGE, 2 Northfield Road, London, W13	D. P. HOBBS, 13 Benedicts Street, Norwich	RADIO SHACK LTD, 188 Broadhurst Gardens, London NW6 3AY	AMATEUR ELECTRONICS LTD, 508-514 Alum Rock Road, Birmingham 8
AMATEUR RADIO SHOP, 4 Cross Church Street, Huddersfield HD1 3PT	L. HARDIE, 542 George Street, Aberdeen	REG WARD & CO LTD, George Street, Aldershot	AMCOMM, 194A Northolt Road, South Harrow
J. BIRKETT, 25 The Strait, Lincoln	HOLDINGS LIMITED, Mincing Lane, Blackburn BB2 2AF	SMC (JACK TWEEDY) LTD, 150 Horncastle Road, Woodhall Spa	B. BAMBER ELECTRONICS, 5 Station Road, Littleport
BREDHURST ELECTRONICS, Handcross, West Sussex	LEYS AND DUNCAN, 19 Low Street, Banff	SMC (JACK TWEEDY) LTD, 79 Chatsworth Road, Chesterfield	GAREX ELECTRONICS, 7 Norvic Road, Marsworth
C. B. ELECTRONICS, 771 Ormskirk Road, Wigan	LOWE ELECTRONICS, Chesterfield Road, Matlock	SMC (NORTHERN) LTD, 257 Otley Road, Leeds 16	SMC LTD, Osborne Road, Totton



SOUTH MIDLANDS COMMUNICATIONS LTD

S M HOUSE, OSBORNE ROAD
TOTTEN, SOUTHAMPTON
HAMPSHIRE SO4 4DN

TELEPHONE: TOTTEN (0703) 862333
CABLE: 'AERIAL' SOUTHAMPTON
TELEX: 477351 SMCMM G

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RADIO SOCIETY OF GREAT BRITAIN

35 Doughty Street, London WC1N 2AE

Telephone 01-837 8688

Founded 1913

Incorporated 1926

Member society, International

Amateur Radio Union

PATRON: HRH The Prince Philip, Duke of Edinburgh, KG

The national society representing all UK radio amateurs

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the general manager, from whom full details of Society services may also be obtained.

GENERAL MANAGER AND SECRETARY

D. A. Evans, G3OUF

EDITOR

A. W. Hutchinson

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Zone C: Regions 7, 8, 16 and 19
Zone D: Regions 6, 9, 17 and 20
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Have you been stopped by the police?

In the April issue of *Radio Communication* the RSGB asked for information from any member who had been stopped by the police on suspicion of carrying illegal cb equipment. The police are empowered to stop vehicles for a number of different authorities and agencies: in the case of illegal cb equipment the Home Office/Post Office have an interest in the illegal operation of the equipment, and the Customs & Excise in its illegal importation into the UK. A great deal of correspondence was generated as a result of that notice and the Society is now in a better position to appreciate what is happening around the country.

Some years ago the Society anticipated that the use of illegal cb equipment would have several effects upon amateur radio, and one of these is that the police are stopping vehicles with unusual antennas because they suspect that illegal cb equipment may be installed. In general the police are not able to tell the difference between a member of the general public using illegal cb equipment and a licensed radio amateur. As a result radio amateurs are being stopped and, in many cases, have to explain on the spot what amateur radio is all about in order to convince the officers that the equipment installed in and operated from their vehicles is legitimate.

While most RSGB members have been able to satisfy the police quickly by producing some form of acceptable documentation, the main problem with regard to producing the actual licence, or a photocopy of it, is that it is an unimpressive looking document. Many members have commented that police officers found it difficult to believe that this was a properly issued licence. It was for that reason, and the fact that the licence is not easily carried, that the Society introduced its own identity card scheme, with Home Office approval, during 1978. Approximately 1,600 of these cards have been issued to members around the country and many have reported their usefulness. The objective of the identity card is to provide a convenient document which will establish the person as (a) a member of the Society, and (b) the holder of an amateur transmitting licence on the date of issue. The member's photograph and signature on the card provide a better form of identification than the actual transmitting licence itself.

If a police officer who does know what amateur radio is stops a member, it will probably be sufficient if the amateur can produce either his/her licence, or a photocopy of its front page, or an RSGB identity card. A copy of the latest RSGB *Call Book* containing the amateur's name and address might also help, as might an RSGB membership certificate or RSGB membership card. If the police officer is not familiar with amateur radio it will be necessary to give a more basic explanation. This has taken many forms, from producing a copy of the Society's publication *A Guide to Amateur Radio* or production of the latest issue of *Radio Communication*, to demonstrating the equipment on the air. While any documentation carried should help the situation, a police officer not familiar with amateur radio will clearly not appreciate that such documentation exists.

There is another factor which aggravates this situation. A number of licensed radio amateurs have been successfully prosecuted for using illegal cb equipment. A licensed radio amateur using illegal cb equipment can be prosecuted under the terms of his/her amateur radio licence and this could result in the loss of the licence. The radio amateurs who have been successfully prosecuted for using illegal cb equipment have done a great disservice to their fellow amateurs, to the extent that if an amateur is stopped by the police and can produce his/her licence, it is no *absolute guarantee* that he/she is not using illegal cb equipment. However, if the licence, or a photostat copy of its front page, or an RSGB identity card can be produced, the amateur will usually be able to satisfy the police on the spot that he/she is a legitimate radio amateur.

It is clear that many courses of action are open to the Society in order to further improve the chances of a licensed radio amateur being able to establish his/her status quickly to the police if necessary. Such options include (a) a wider education of the police forces of the UK in general with regard to amateur radio, (b) providing the police with copies of the RSGB *Call Book* so that the identity of most radio amateurs could be established via the police communications system, and (c) providing a service to the police from RSGB headquarters' computerized records of all licensed radio amateurs in the UK. All these options are being discussed with a view to making it easier for radio amateurs to establish their status quickly. In this context it is regretted that the Home Office has not yet computerized amateur radio licensing and therefore is unable at the present time to provide a service to the police such as the motor vehicle registration system for car identification.

As long as citizens band radio remains illegal in the UK the activities of members of the general public will continue to have this effect upon amateur radio. The Society advises all members to co-operate fully with the police if stopped, and to have some form of identification available, which should enable them to proceed on their journeys with the minimum of delay. Other approaches to this problem are medium to long term, but in the short term any member of the Society may ask a police officer to telephone the Society to confirm his/her identity. Such telephone enquiries should go to the general manager, assistant general manager or membership services officer. The Society's telephone number appears on all membership cards.

"Open Channel"

The government green paper dealing with a system of personal short-range radio communications was published on 5 August 1980 under the title of "Open Channel". This discussion document sets out the government reasoning on this subject and asks for comments by 30 November 1980.

The document was introduced at a press conference by the Right Hon Timothy Raison, MP, Minister of State for Home Affairs.

The green paper played down the social uses [ie traffic accident and other emergency situations] of such a service and implied that the main reason for its introduction was individual and personal enjoyment. The document contains the statement that "If an individual wishes to use sophisticated equipment to communicate over long ranges and make international contacts, he should become a licensed radio amateur by taking the appropriate examination". Considerable space is devoted to the minimization of interference to other users of the radio

RSGB PRESIDENT 1981

At its meeting on 31 May 1980, Council unanimously elected Mr Basil O'Brien, G2AMV, as RSGB President for 1981.

Mr O'Brien has been a member of Council since January 1977, having previously been regional representative for Region 1 for many years, and is this year's executive vice-president. He is currently chairman of the Membership & Representation Committee, and a member of the Finance & Staff Committee.

spectrum, and this factor has obviously weighed heavily in the choice of frequency.

In recent months there have been discussions within CEPT—the Western European organization for telecommunications—and it has emerged that there are several administrations which favour a frequency much higher than the commonly-used 27MHz. The government has therefore opted for a band of frequencies just above 928MHz, and concludes that 40 25kHz channels would probably be necessary. Other possibilities which were examined and discarded were bands in the region of 225 and 450MHz. The document does not categorically state the recommended mode, but in view of the potential advantages regarding interference it would appear that fm is intended. A formal type-approval system was not envisaged, but it was intended that sets would have to be manufactured to a laid-down specification.

The government has specifically stated that the importation, sale and advertising of 27MHz equipment will be made illegal. Let us hope that this very necessary step will be introduced without further delay.

Copies of the 14-page discussion document are available from the Officer in Charge, Home Office, Supply & Transport Branch, Royston Road, Caxton, Cambridge CB2 8PN.

Comments on the subject should be addressed to the Radio Regulatory Department, Home Office, Waterloo Bridge House, Waterloo Road, London SE1 8UA.

The RSGB, by its Telecommunications Liaison Committee, will be formulating a reply for endorsement by Council and submission to the Home Office. In the meantime all aspects of "Open Channel" are being closely monitored.

RSGB Woburn Rally

Good weather, a considerable increase in marquee space with over 50 trade stands (a substantial increase over last year), and a very satisfactory attendance resulted in another successful event. Most of the regular visitors were to be seen, with a healthy contingent of newcomers—some with glossy call signs.

The RSGB president, Peter Balestrini, G3BPT, who for many years has been a stalwart of the Rally & Exhibition Committee, was present, as were other Council and committee members.

The flea market again proved a winner, with all tables in action for most of the time.

Among the many items of interest were new scanning receivers and a range of pre-1900 telegraph gear in mint condition with beautifully made morse keys offered at less than the price of current production practice keys.

RAE courses

Details of the following courses were received too late for inclusion in the lists published in the August and September issues. Although courses will have already started it is often possible to join them a week or two late.

Bangor, Co Down. Bangor Technical College, Classes, Tuesday, and Thursday evenings, commencing 16 September. Enrolment from 3 September. Class tutor, C. A. Billington, G13WSS. Further details can be obtained from the college or G13WSS, QTHR, tel Holywood 4277.

Brixton. Brixton College, Ferndale Road, London SW4 6SB. Wednesdays, 6.30-9pm from 17 September. Enrolment, 8-11 September. Details from Robert Reid, G4GTO, at the college, tel 01-737 2323.

Heckmondwike. Heckmondwike Grammar School. Commencing 15 September, Mondays, 7-9pm. Fee: £14. Details from Mr W. M. Bell, tel Heckmondwike 405725 or the Further Education Office, tel Cleckheaton 870125.

St Austell. Mid-Cornwall College of Further Education, Palace Road, St Austell, Cornwall PL25 4BW. Tuesdays 7-9pm, commencing 30 September. Further information from G4DND, QTHR, tel St Columb 880479.

Southall. Southall College of Technology, Beaconsfield Road, Southall, Middlesex UB1 1DP. Tuesdays, term commencing 10 September. Enrolment, 10-12 September, day and evening, and also 15-19 September. Details from the college, tel 01-574 3448.

Morpeth. The King Edward VI School, Morpeth, Northumberland NE61 1DN. Mondays, commencing 15 September, but late enrolments welcome. Fee: £16. Details from I. R. Webley, Deputy Head (Community), at the school, tel Morpeth 55415.

We have been advised that Ifield School, Crawley, will serve as an examination centre for the December RAE. Prospective candidates should send an sae to Mr R. Scrivens, c/o Community Tutor, Ifield School, Lady Margaret Road, Crawley, Sussex RH11 0DB, for an application form and further details. Closing date for entries will be 22 October.

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The G4BWE

speech processor

by STEPHEN PRICE, G4BWE*

Introduction

The desire to strengthen one's signal as received at distant points is a fundamental aspiration among radio amateurs, and the means by which a transmitting system may be made "louder" are many and varied. For instance, replacing a simple dipole antenna with a multi-element beam enables a greater proportion of the transmitter's energy to be directed towards the receiving station, thus increasing effective radiated power (erp). Also, the power of the transmitter itself may be boosted by the addition of further output stages; eg a linear amplifier for ssb. However, the examples quoted are both rather expensive and in many cases present severe practical problems.

Another method of attaining an increase in signal power involves the use of speech processing systems, and by far the most popular technique currently employed is rf clipping. In consequence, a number of rf clipper designs have been presented in recent years, and it is now an established fact that speech processing can yield a valuable improvement in the readability of telephony signals when received under adverse conditions. While not wishing to challenge the efficiency of rf

clippers when they are operated correctly, the author feels that alternative methods of speech processing should be seriously investigated, and the purpose of this article is to describe a speech processor that utilizes audio limiting rather than rf clipping.

Design philosophy

In a typical rf clipper the microphone signal is first amplified and then filtered to restrict its bandwidth, the -3dB points usually being set at 300Hz and $3,000\text{Hz}$. The filtered speech waveform is fed to a balanced mixer, and an hf local oscillator signal mixes with the audio, thus producing double sideband. A 2.7kHz bandpass filter (often of the ceramic type for reasons of economy) follows the mixer, and the resultant ssb signal is presented to a pair of silicon clipping diodes. The diodes are connected in parallel (anode to cathode, cathode to anode) and are placed so that they lie across the signal path. These diodes form the heart of the processing system. Low level components of the speech signal are passed without attenuation, but when the peak amplitude rises above approximately 600mV , the diodes begin to conduct, thus shunting, or "clipping", the signal and preventing any further increase in level. The clipped signal is finally fed to a second balanced mixer and mixed with the local oscillator output once more, thus recovering the processed audio.

The effect of clipping is to greatly restrict the dynamics of speech, each syllable being held at more or less the same amplitude, and therefore generating greater average "talk power". It is, of course, possible to build a much simpler processor of the type described above by using a circuit which clips the audio signal directly. However, clipping is an inherently non-linear function and therefore generates many harmonic and intermodulation products. In an audio clipper a large proportion of the resultant distortion products fall within the voice band (300Hz – 3kHz) and in consequence cannot be eliminated by filtering.

The superiority of the rf clipping system lies in the fact that although the same non-linearity exists, the majority of distortion products fall outside the voice-band and are easily filtered.

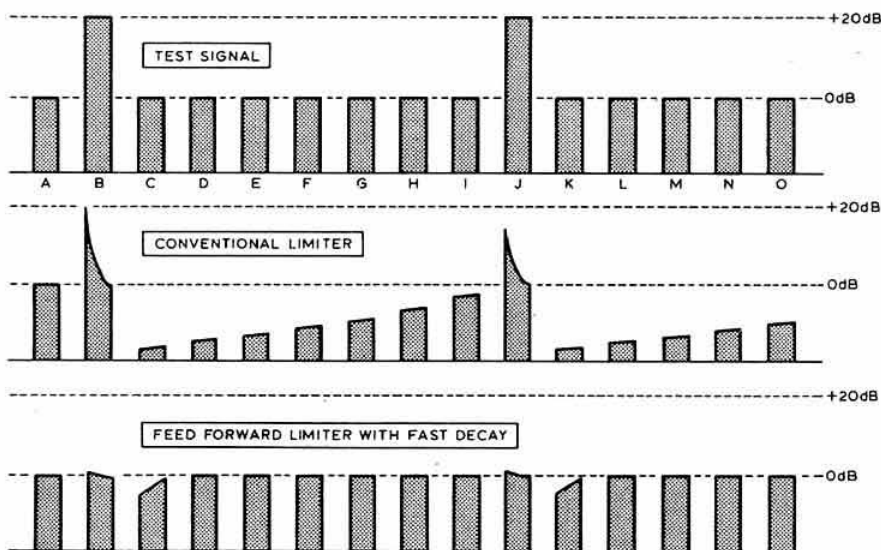


Fig 1. A comparison between the characteristics of a conventional limiter and a feed forward limiter with fast decay

Another method of restricting the dynamic range of speech involves the application of linear gain control to perform a compression or limiting function. In an audio limiter the output from an amplifier is rectified and then integrated by a CR network so as to produce a control voltage. As the control voltage is directly proportional to the intensity of the audio input it may be employed to operate a voltage-controlled attenuator (or amplifier) inserted somewhere in the signal chain, thus modifying the dynamic range of the input signal. In systems of this nature it is common practice to place the voltage controlled attenuator so that it precedes the control voltage generator, thereby obtaining a loop function.

A radio receiver agc system has the operating principle just outlined, and therefore provides a useful analogy. The receiver's agc control voltage is generated by rectifying and then integrating the product or envelope detector output. At an earlier point in the receiver's signal chain there are rf/i.f. amplifiers having a variable amplification factor, and these stages are controlled by the agc voltage. As the strength of received signals increases, so does the agc voltage, and the gain of the rf/i.f. amplifiers is progressively reduced, thus holding the receiver's output at an almost constant level despite large variations in signal voltage at the antenna.

A critical performance factor in any limiting system is the speed with which the control loop is able to react when there are sudden changes in input level. The "attack time" is the first parameter that must be considered, as it is this time constant which determines how quickly the system gain can be reduced in response to a rapid increase in input level. Conversely, "decay time" (otherwise termed "recovery time") is the period required to restore maximum gain after the input level has fallen below the limiting threshold.

When an audio limiter is used in conjunction with a tape recorder the prime objective will be to prevent tape overload due to peaks in the programme exceeding the maximum allowable recording level. This is a typical limiter application and it requires a design possessing the fastest possible attack time, for if the signal amplitude were to rise faster than the rate of attenuation, overshoot would inevitably occur. The attack time required in a conventional limiter design is therefore around 500 μ s, but even such a short time constant will not always prevent momentary overload during transients (ie at the onset of a cymbal crash during an orchestral crescendo) and clipping diodes are often employed to provide a back-up.

The decay time, however, is an entirely different consideration, particularly in a limiter intended for music signals. Decay time constants of around 1s are common, the limiter being allowed to recover gain only gradually following a transient. The use of a short decay time constant in such a limiter would result in subjectively noticeable amplitude modulation effects, often referred to as "pumping" or "breathing" by sound engineers. Returning to the receiver agc system discussed earlier, it is interesting to note that for ssb reception a long decay time constant is also used. This prevents any significant gain recovery during short breaks in speech, and therefore avoids annoying bursts of background noise "filling in" the pauses between words.

If a limiter is to be of any use as a speech processor it must possess a high degree of agility in the manipulation of voice amplitude. Clipping is a successful system by virtue of the fact that level changes are responded to instantaneously. It takes far less than 1 μ s for a silicon junction diode to begin conducting once the voltage appearing across the device exceeds 600mV, and only the same period for the diode to cease passing current

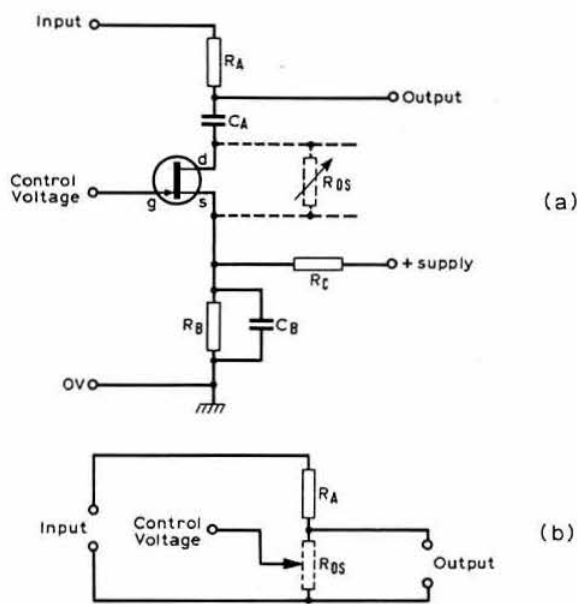


Fig 2. (a) A fet voltage controlled attenuator. (b) Showing how the fet forms one half of a potential divider in conjunction with R_A

when the potential drops below the 600mV threshold. Therefore, an audio limiter which is to be employed for speech processing must have both a fast attack and decay time.

To illustrate the necessity for a rapid decay, let us imagine the consequence of trying to accomplish speech processing using a limiter with a 1s decay time constant, ie the design already discussed. Individual words, which may take no more than 0.5s to pronounce, each contain a number of separate and easily distinguished components such as letter sounds and syllables. Certain speech elements, the letters "s" and "i" in the word "six" for instance, have a greater than average amplitude. Therefore, when "six" is spoken into the microphone the limiter is immediately presented with a high level input and its gain quickly drops in response. The beginning of the "x" sound, however, has a much lower amplitude but, because of the limiter's long decay constant, gain is not significantly increased until after the word has finished, and part of the "x" sound is inevitably lost.

The speech processor to be described employs a limiter with a decay time constant of only 18ms.

Whereas the limiters employed in recording studios and in broadcasting are normally adjusted to have limiting thresholds well above the average signal level encountered, and therefore only operate on the occasional transient, an effective speech processing limiter is required to work almost continuously. This necessitates a low threshold level, the aim being to compress the dynamic range of speech considerably. If one attempts to combine a low operating threshold with fast decay time in a conventional limiter design, it is obvious that the problems of overshoot discussed earlier will be greatly magnified. Ideally, what is required is a system which provides zero attack time and yet, in the process of instantly "chopping" the signal amplitude, does not generate any of the harmonic and intermodulation distortion associated with audio clippers. Obviously any attempt to build such a limiter will prove fruitless. An

Components list

R1,4,14, 15, 18	47k Ω	C1,15,17, 25	47nF
R2,37	1k Ω	C2,4,9,10, 16,18	1 μ F*
R3,23	39k Ω	C3	820pF
R5	120k Ω	C5,6,22, 28,30	100nF
R6,16,26	2.2k Ω	C7	680pF
R7	3.9k Ω	C8	220pF
R8	4.7k Ω	C12,32	10 μ F*
R9,13	10k Ω	C13	470nF*
R10	560 Ω	C14,27,29, 31	100 μ F 25V
R11,12	100k Ω	C19	220 μ F 25V
R17	18k Ω	C20	1nF
R19	100 Ω	C21	10nF
R20,34	8.2k Ω	C23	47 μ F 25V
R21,22,35	3.3k Ω	C24	10nF 1kV
R24,25,28, 30	1M Ω	C26	2,200 μ F 35V
R27	1.5k Ω	*Tantalum electrolytic 35V	
R31,32	6.8k Ω	TR1,2	2N3819 (see text)
R33	1.8k Ω	TR3	BC307
R36	330 Ω	TR4,5	BD131
R38,39,40	2.2k Ω 0.5W	D1,2	OA81
All 0.25W 5% except R38,39,40		D3,4	1N4148
RV1	1k Ω	IC1,3,4,5	741
RV2	470 Ω skeleton preset	IC2	MN3002 (see text)
RV3	22 Ω skeleton preset	IC6	555
RV4	10k Ω		
All carbon track linear type			
ZD1	20V 400mW		
ZD2	16V 400mW		
LED1	TIL209		
BR1	1A 50piv bridge rectifier		
S1	DPDT toggle		
S2	DPST mains		
F1	1A anti-surge		
T1	220-240V primary, 20V secondary 300mA		
RFC and additional capacitors as required for rf filtering			

alternative approach is to envisage a limiter design endowed with the ability to anticipate sudden increases in level. Such a limiter would be capable of applying the requisite gain reduction over a finite period preceding the transient's arrival, thus avoiding both overshoot and distortion.

During the past decade a bewildering array of specialized integrated circuits has emerged, the majority falling into two well-defined categories; namely digital and analogue. There is, however, a family of ics known as "charge coupled devices" which are characterized by the fact that they are neither entirely analogue nor entirely digital animals. One such ccd, the analogue shift register, or "bucket brigade device" may be employed to delay the passage of audio frequency signals by periods in excess of 1ms.

The analogue shift register consists of a long chain of fixed capacitors which are fabricated "on chip". Voltages appearing at the device input are made to charge the first capacitor in the chain during each clock half-cycle. These voltages, which represent the instantaneous level of the input during any one clock period, are passed along the chain from one capacitor to the next and finally emerge at the device output. The time delay thus obtained depends on two factors: first, the number of capacitors, ie how many stages the shift register has, and second, the clock frequency.

A ccd delay ic may be used to great advantage within an audio limiter because when it is inserted into the systems signal chain it can enable the control voltage to "catch up" with the signal, thereby preventing overshoot. The "feed-forward" limiter thus produced operates by developing its control

voltage from a point in the signal chain prior to the delay device. This control voltage, when applied to a voltage-controlled attenuator that follows the delay device, is able to affect gain reduction immediately prior to a transient's emergence from the ccd. The feed-forward limiter cannot, of course, prevent overshoot if the delay time is less than the chosen attack time. Therefore, the author's processor employs a delay of 4ms in conjunction with a relatively graceful attack of 1.5ms.

To summarize the ideas put forward, Fig 1 gives a diagrammatic representation of how both a conventional limiter and a feed forward limiter with fast decay can be expected to react when presented with a test signal (the illustration presents the test signal as it might appear on an oscilloscope or chart recorder after rectification). The signal can be assumed to consist of isolated tonebursts, most of which have an amplitude exactly equal to the limiting threshold, which is assigned a level of 0dB for convenience. Two of the tonebursts, labelled B and J, are 20dB louder than threshold and therefore force the limiter into operation. The conventional limiter is incapable of reacting quickly enough to prevent considerable overshoot on the leading edges of bursts B and J. Also, the long decay time results in unavoidable attenuation of bursts C-I and K-O. In contrast, the feed forward limiter handles peaks B and J without overshoot and a fast decay time ensures that only bursts C and K suffer any attenuation.

It should be pointed out that the diagram deliberately emphasizes the problem of overshoot in the conventional limiter by depicting tonebursts which have zero rise times (ie vertical leading edges).

Voltage-controlled attenuator (vca)

The gain-control element employed in most present-day limiter designs consists of a fet operated as a voltage-controlled attenuator. Fig 2(a) shows a skeleton diagram of such an attenuator, and Fig 2(b) illustrates more clearly how the fet is used in conjunction with a fixed resistor, R_A , to form a voltage-controlled potential divider.

Resistors R_C and R_B bias the fet source at a few volts positive of ground. The attenuator operates by virtue of the fact that as the fet gate voltage is increased the resistance between its source and drain falls dramatically. In practice the minimum and maximum values of source/drain resistance that can be achieved by varying the gate voltage are around 400 Ω and 10M Ω respectively. Therefore, if R_A is made 47k Ω the attenuator will have a control range in excess of 40dB.

Capacitor C_A provides dc blocking and C_B decouples the source bias resistor R_B . A conventional limiter would normally employ only one vca, but the processor described here utilizes two. The reason for this extravagance is explained in the circuit description that follows.

Circuit description

Fig 3 shows the main circuit diagram of the limiter, and this should be studied in conjunction with the block diagram given in Fig 4.

The microphone signal is routed via bypass switch $S1a$ to a voltage amplifier comprising IC1 and associated components. $R1$ couples the non-inverting input of IC1 to a ripple-free bias supply consisting of $R31$, $R32$ and $C19$. The voltage gain of the first stage is set at 40 by the negative feedback divider $R2/R3$. $C2$ ensures unity gain at dc while also providing 1f roll-off (the -3dB point is 300Hz), and $C3$ gives hf roll-off above a few

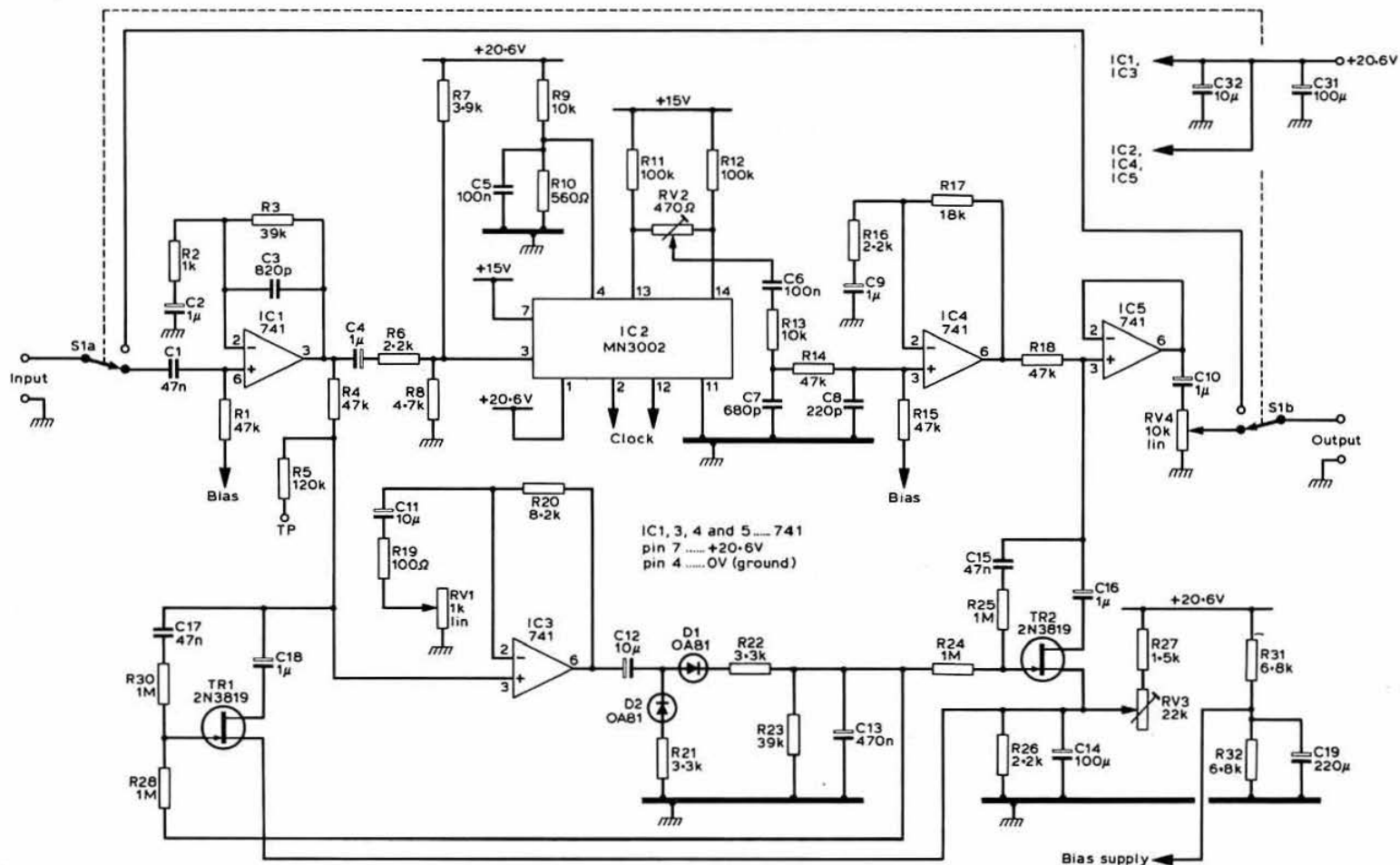


Fig 3. Signal and control stages of the speech processor

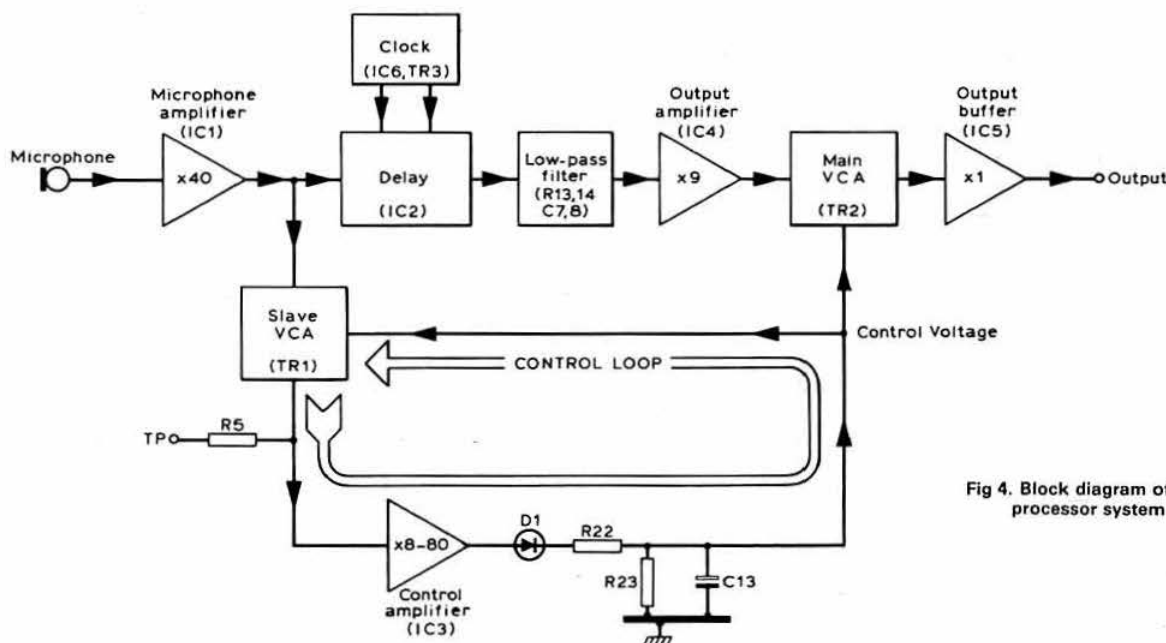


Fig 4. Block diagram of the processor system

kilohertz. It should be noted that the processor is designed for use with either a crystal microphone or a high-impedance (50k Ω) moving coil unit. Constructors wishing to use a 600 Ω mc or a low-output electret microphone must be prepared to employ either a matching transformer or preamplifier circuit ahead of IC1. At the output of IC1 the signal branches into two distinct paths. Ignoring for a while the signal chain, let us first examine the limiter control circuitry. R4, TR1 and C18 form part of the first vca, and the signal is passed through this vca before being presented to the control amplifier IC3. The control amplifier gain is determined by R20, R19, RV1 and can be varied over the range 8-80. The output of IC3 is rectified by D1, and the resultant positive-going voltage charges C13 via R22. R21 provides a discharge path for the coupling capacitor C12, and D2 is incorporated to prevent R21 loading the output of IC3 during positive cycles of the speech waveform.

Components R22, R23 and C13 form the control voltage integrator. As C13 charges through R22, it is the value of this resistor which determines the attack time constant (1.5ms). R23, by providing a discharge path for C13, sets the decay time (18ms). The control voltage thus developed feeds TR1 and TR2, which are identical vcas. The vca utilizing TR1 maintains a control loop function around IC3 (see block diagram). TR1 is necessary because the limiter could not operate correctly if the delay device formed part of the control loop, ie the control voltage would also be delayed, thus defeating the design objective. TR1 is therefore a "slave" vca which enables an accurate and undelayed control voltage to be developed for the main vca, TR2.

Returning to the output of IC1, it will be seen that amplified audio is also fed via C4 and R6 to the delay device. IC2 is a type MN3002, 512-stage "bucket brigade" analogue shift register utilizing p-channel mos technology. Readers who have difficulty in obtaining the MN3002, which is only available from the Tandy Corporation in the UK, may wish to investigate the possibility of using the Reticon SAD1024. This device is an

n-channel "bucket brigade" delay ic capable of operating from a single 15V supply rail, and is available from a number of UK distributors. It should be stressed, however, that the SAD1024 is not a pin-for-pin equivalent, and certain circuit modifications will be necessary.

Fig 5 shows the clock oscillator circuit which is designed to produce a two-phase square-wave output having a mark-space ratio approaching 1:1. The timing network consisting of R33, R34 and C20 sets the output frequency at 65kHz, thus causing IC2 to delay the audio by 4ms.

The delayed audio appears at pins 13 and 14 of IC2 and is summed by a preset potentiometer, RV2. Adjustment of RV2 facilitates cancellation of clock ripple, any residual 65kHz being further attenuated by R13, C7, R14 and C8 which form a two-section low-pass filter. IC4 provides voltage gain and acts as a buffer to drive the main vca, which comprises R18, TR2 plus associated components.

The limited signal finally passes through IC5, which is operated as a unity gain buffer. IC5 presents a high impedance to the main vca output, thus avoiding excessive loading of the vca. IC4 is biased via R15 and IC5 is in turn biased from the

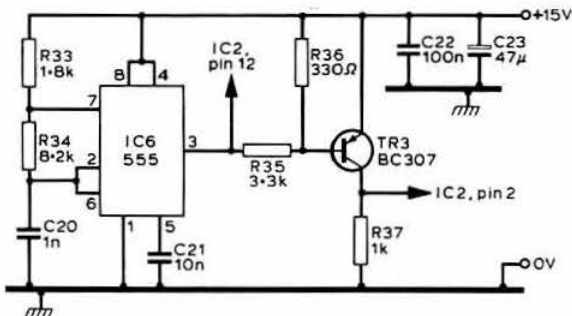
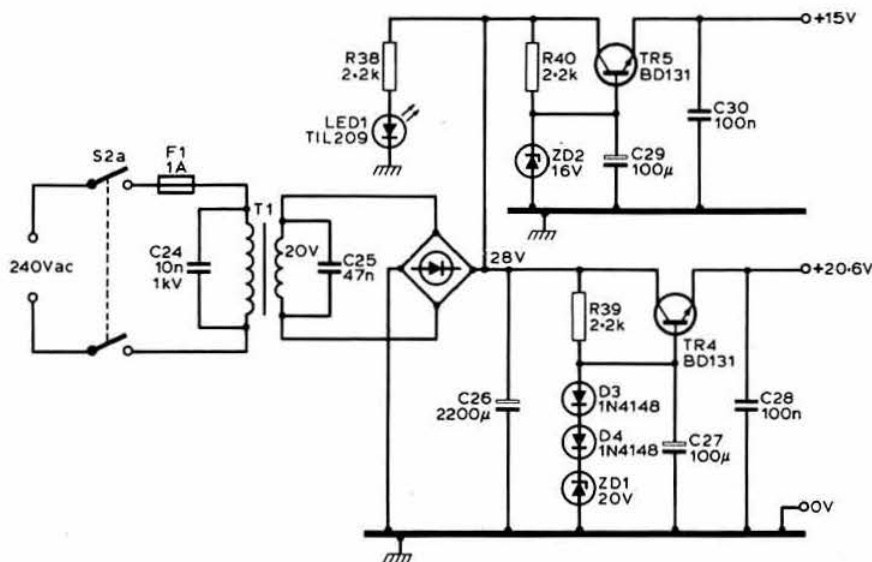


Fig 5. The two-phase 65kHz clock oscillator

Fig 6. The two-rail mains power supply



output of IC4. RV4 provides control of output level and S1b completes the bypass arrangement.

The source voltage for both TR1 and TR2 is set by adjustment of the preset potentiometer RV3. Components C15, R25 and R24 enable a proportion of the signal to modulate the gate voltage of TR2. This technique linearizes TR2 and reduces considerably harmonic distortion. It is, perhaps, not essential to also eliminate the distortion generated by the slave vca, TR1. However, it was felt advantageous, if only for testing purposes, to ensure a conformity between the two vcas. C17, R28 and R30 are therefore employed to linearize TR1 in the same fashion.

Fig 6 shows the circuit diagram of the mains power supply. Two positive rails are required at 15V and 20.6V, regulated. TR5, the series pass transistor for the +15V rail will require a small heatsink, but TR4 can safely be left "naked". LED1 was incorporated as an on/off indicator.

Construction and operation

The prototype speech processor was constructed using standard 0.1in matrix Veroboard. All the circuitry shown in Fig 3 and the clock oscillator components (Fig 5) may be conveniently accommodated on a single board measuring approximately 6.5 by 4.5in. The mains power supply components, except S2, C24, F1, T1 and LED1, are mounted on a separate board of size 2.5 by 2in. The unit must be built into a metal housing for reasons of screening, and an aluminium Verocase was employed by the author. RV1, RV4, S1, S2 and LED1 are panel mounted.

It is essential that precautions are taken in order to ensure immunity from the strong rf fields in which the processor will be expected to operate. Fig 7 shows a filter suitable for use with high-impedance microphones. The rfc and both capacitors should be mounted on the microphone jack socket itself. Although certain de-coupling and filtering components are shown in the circuit diagrams, individual constructors may find it necessary to supplement these as follows:

(1) Small ceramic capacitors (eg 120pF) may be connected across switch and potentiometer contacts.

(2) A 1,000pF capacitor may be placed across the processor output.

(3) Miniature coaxial cable should be employed for all signal lines.

(4) Ferrite beads may be threaded on to flying leads.

(5) A secondary screen consisting of thin aluminium sheet, suspended 0.5in above the main circuit board and securely connected to ground was found to be effective.

The finished processor does not require a lengthy or complex setting-up procedure, and although test equipment such as an oscilloscope, signal generator and ac millivoltmeter would be useful, such items are not in any way prerequisite. Indeed, all the constructor really needs to provide is his voice, a microphone, a multimeter and some means of monitoring the audio. Most amateurs will either possess, or have access to, a stereo cassette deck complete with twin vu meters and headphone output jack. Monitoring with headphones having good acoustic isolation (ie the "closed" hi-fi type) is to be recommended, as this technique avoids the generation of feedback howl when testing with a microphone.

In order for the processor to function correctly it is necessary to ensure that both vcas exhibit the same operating characteristics. This requirement is met by matching TR1 and TR2 using the following procedure: RV3 is first adjusted to give a reading of 5 to 5.5V at the positive end of C14. The processor is then operated as a conventional limiter by taking an output from the open end of R5, which is a test point, and feeding the limited signal to the tape deck line input. Initially, RV1 should be adjusted so that IC3 gives a voltage gain of approximately 25V (ie RV1 = 200Ω). A number of fets are then

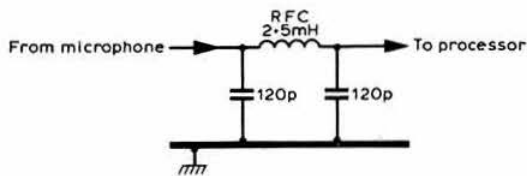


Fig 7. A suitable input filter

tested in the TR1 position, the objective being to select a pair of devices that both provide good limiting characteristics and appear to operate in roughly the same manner irrespective of input level. The limiter control range may be checked by speaking at a constant level and gently moving the microphone back and forth so that it travels between 2in and 1ft from the operator's mouth. A variation in average level of about 3dB should result from the preceding test, whereas if the microphone is coupled directly to the tape deck, variations of around 20dB will be registered on the machine's vu meters.

Finally, the limiter is tested with both slave and main vcas operating. If TR1 and TR2 are well matched, the processor will provide an adequately limited output. However, the distortion that is clearly heard when monitoring from the test point (R5) should not be present.

To assist in the setting-up procedure TR1 and TR2 were mounted at either side of a single eight-pin dil socket. The ics were also mounted in sockets. RV1 was made a panel operated control on the prototype, but experience has shown that the gain of IC3 rarely requires adjustment. The only other panel controls are RV4 (output level) S1 (bypass) and S2 (on/off).

Refinements

The intelligibility of processed speech may often be improved by attenuating unwanted low frequencies. If the value of C2 (see Fig 3) is made 220nF, the -3dB lf response of the

microphone amplifier is raised to around 1kHz. The high-pass filter so fabricated can be made switchable by wiring an 820nF capacitor, in series with a single-pole switch, across the 220nF capacitor, thus making it possible to select either "bass cut" or "flat" response, as desired.

Another useful addition would be a meter to indicate the control voltage present across C13. Such a facility may be provided by wiring a 100 or 200 μ A moving coil meter in series with R23.

The type 2N3819 fet was chosen for the vcas because it is cheap and readily available. Half-a-dozen such devices may be purchased for an outlay of under £2, and the four fets remaining after selection of TR1 and TR2 may be put to good use in other projects. However, it is possible to purchase a matched pair of fets fabricated within a single encapsulation, and constructors may wish to consider the use of such a device.

In conclusion, it is hoped that this article will at least stimulate further investigation into alternative speech processing techniques so that in future years the rf clipper will have some healthy competition.

Bibliography

"High Quality Compressor/Limiter" by D. R. G. Self, BA. *Wireless World* December 1975, pp 587-90. Reprinted in *High Fidelity Designs* (a *Wireless World* publication) IPC Business Press, 1977. □

NEW PRODUCTS

Siliconix push-pull rf power fets

RF designers will be interested in the first rf push-pull power devices just introduced by Siliconix for broad-band applications from 2 to 200MHz. According to Siliconix, the new rf devices combine the well-known advantages of push-pull operation, such as even-order harmonic suppression, with the proven advantages of vmos devices, such as high power at high efficiency, low noise figures, no thermal runaway, no current hogging when paralleled, the ability to withstand infinite vswr, and greatly simplified designs. The DV28120S (DV11120) delivers 120W minimum and the DV2880D (DV1111) 80W; also available is the DV2840D (DV1110) 40W driver. All these devices deliver rated output at 28V and provide a minimum power gain of 10dB at 175MHz. They can each be operated in Class A, B or C and are well suited for a variety of broadband rf amplifier applications.

The most obvious advantage of the push-pull package is the reduced amplifier size and the ability to directly connect impedance matching transformers to the devices. These new push-pull transistors are easily broadbanded within the vhf bands. The lower frequency limit is governed only by the transformer design. Because the transconductance is virtually constant over wide frequency excursions, the input loading requirement also remains relatively constant within the hf region. Thus the input vswr is quite stable over an unusually broad bandwidth. The inherently small feedback within the vmos device, when compared with similar bipolar devices, translates

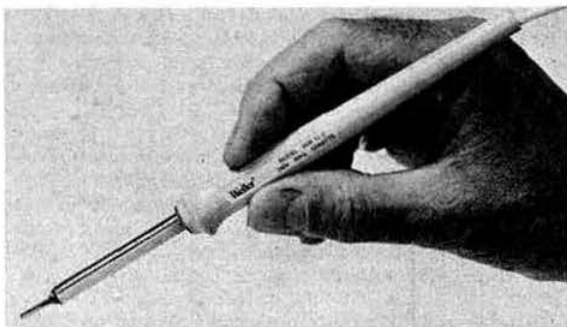
into another benefit; that is, the input impedance remains virtually independent of reflective load impedance so that it is governed by the input matching circuit.

Further information from Siliconix Ltd, Morriston, Swansea SA6 6NE. Tel (0792) 74681.

Weller WM12D mini iron

The new Weller WM12D mini iron is designed to meet the needs of the engineer soldering the latest components and ics into tightly-packed printed circuit boards. The 12W 240V iron is extremely light and easy to use. The cool handle and stainless steel shaft are designed to the same standards as the industrial Weller irons. A range of slide-in miniature tips is also available.

The iron costs £4.50 + VAT, and is available ex-stock from Toolrange Ltd, Upton Road, Reading RG3 2JA. Tel (0734) 29446 or 22245.



Weller WM12D mini iron

A 34ft vertical antenna for 7 and 14MHz

by S. WILSON, TEng (CEI), MITE, G3VMW*

THE author's present location on a housing estate is ringed by houses within a radius of 30yd which means that beams are really out of the question because of their size. His requirement was for an antenna which would radiate efficiently to dx, particularly on 14MHz, and which would achieve some reduction in European QRM on 7MHz to improve dx on that band.

Theory of operation

The antenna described is essentially a low-angle radiator on both bands, and its electrical length approaches 200° on 14MHz and 100° on 7MHz. It is extremely effective on 14MHz as it is somewhere between $\lambda/2$ and $5\lambda/8$ in length, this being the optimum for low-angle radiation.

The reason for a reasonably short physical length is twofold:

1. The length to diameter ratio of the conductor.
2. The end loading effect of the base insulators.

The polar diagrams of various vertical antenna lengths are shown in Fig 1, and it can be seen from these that at less than $3\lambda/4$ there is a marked lack of high-angle lobes.

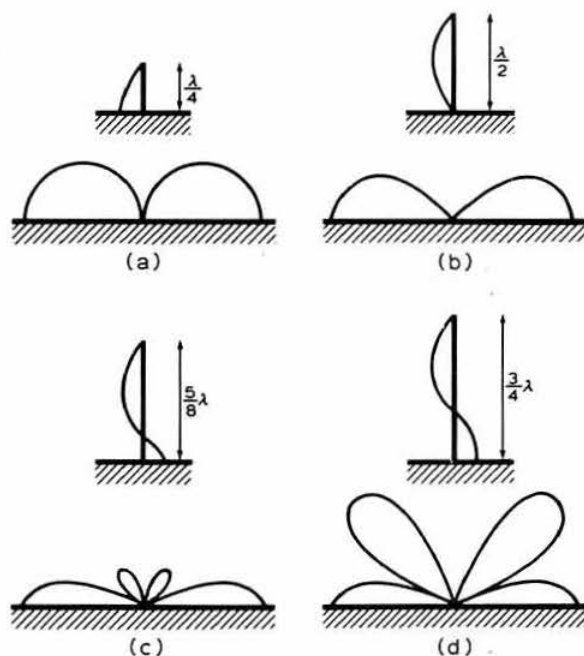


Fig 1. Polar diagrams

*1 Grange Close, Grange Park, Skelton, York YO3 6YR

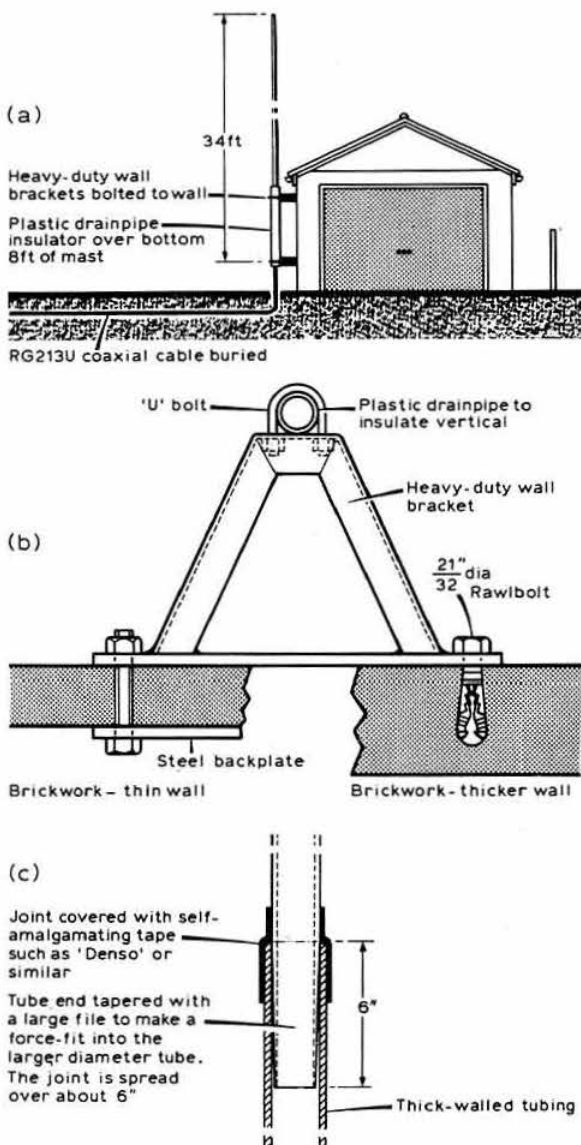


Fig 2. (a) Construction. (b) Mounting details showing either Rawlbolt or backplate. (c) Jointing detail—aluminium tubes

Construction

The antenna was constructed from three pieces of thick walled aluminium tubing, of $1\frac{1}{4}$, $1\frac{1}{2}$ and 1in diameter. The diameters are such that the tubes will not slide into each other, and this forms the basis of the method used to join them. A taper joint was used as shown in Fig 2. This was achieved by filing one end of the tubing to a taper and then forcing the pieces together. To do this, the far end of tubing was supported against a solid object, in the author's case the garage wall; the taper joint was offered up and the near end of tubing was hammered with a wooden mallet until the joint was solid. When both joints were complete each was wrapped in "Denso"-type self-amalgamating tape to keep the weather out. The top was also

sealed to prevent water filling the structure. The taper joint produced is strong both electrically and mechanically, requiring no additional fixing bolts etc.

Mounting

The antenna can be mounted on a wooden post or, as in the author's case, up against the wall of a brick garage. Two heavy-duty antenna brackets were "Rawlbolted" 6ft apart to the garage wall, but if the wall is not thick enough it is suggested that a back plate and large nuts and bolts be used instead. These options are shown in Fig 2.

The bottom 8ft of the conductor is covered in either plastic drainpipe or glassfibre to serve two purposes:

1. It insulates the antenna from the U-bolts used to fix the conductor to the wall brackets.
2. It keeps rf off tiny fingers.

The antenna is free standing and does not require guying, since in high winds it acts like a whip antenna. During the last three winters there has been no wind damage to the antenna and it remains pencil straight.

Matching

As previously mentioned, the antenna is of the order of 200° on 14MHz and 100° on 7MHz, in both cases it looks like a complex impedance with reactance.

On 7MHz the impedance seems to be approximately $50 + 45j$, and as the reactive component is inductive it can be neutralized by a simple capacitive reactance. This is achieved by a series capacitor, which leaves a good match to 50 Ω feeder. On 14MHz the antenna presents a very high impedance, probably of the order of 3k Ω .

There are several ways of producing a match to 50 Ω feeder, and one of the most elegant and efficient is the resonant $\lambda/4$ transformer, which is a slight variation of the stub match. On 14MHz $\lambda/4$ of RG213U is of the order of 134in, assuming a velocity factor of 0.66. The stub is short circuited at the far end and the transmitter feeder is just tapped in at the correct point to give a good match. This point was actually 29in from the shorted end (Fig 3). It is important not to roll up the transformer, which is better laid out in a straight line.

The tuned circuit arrangement in Fig 4 has also been used and works well. The series capacitor for 7MHz has no effect on 14MHz, but for 7MHz operation the 29in shorting piece must be removed. A relay could be placed at this point to allow

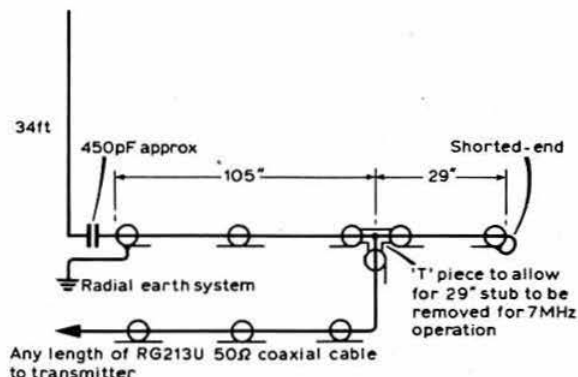


Fig 3. Tuning arrangements

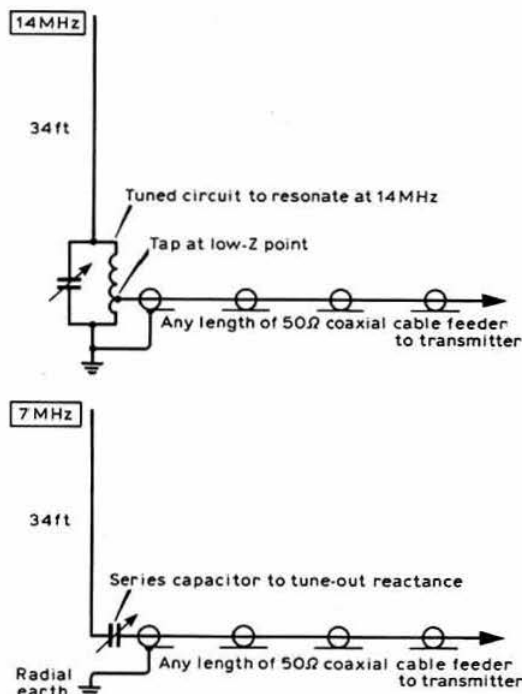


Fig 4. Alternative feed arrangement

remote switching. The author merely unscrews the shorting piece from the T-piece.

On both bands the antenna is broadband, due to the length-to-diameter ratio of the conductor which prevents a large change in reactance for a change in frequency.

SWR figures

14.025MHz	1.1 to 1	7.025MHz	1.2 to 1
14.225MHz	1.2 to 1	7.075MHz	1.2 to 1
14.325MHz	1.4 to 1		

Radial system

It cannot be stressed enough how important radials are to the effective and correct operation of a vertical antenna system. A 3ft earth spike alone is useless; it may seem to be a good match but all one is doing is warming the ground with rf.

A minimum of 20 radials is suggested, more if possible, and the lengths are not important. The author has about 50, varying in length from 35 to 11ft, laid out in a circular pattern and soldered to an 8ft earth spike at the base of the antenna. They are simple to fit; just slit the lawn with an edging spade and tuck them in. Once they are buried they do not show and this when combined with the slim vertical radiator makes an effective and neighbour-acceptable antenna.

Results

The results on 7MHz have been outstanding, over 130 countries have been worked plus 46 USA states in the last two years. In comparison to a W3DZZ trap dipole at 35ft, there is a marked reduction in European QRM, particularly G signals on dx copy. There is no reduction in dx signals, in fact the author gets consistent reports of an improvement of 6 to 10dB to the USA

over the trap dipole. It can be concluded that for inter-G QSOs the vertical is not too good but for dx work it is much better.

On 14MHz the results have been excellent. A comparison with a friend using a dipole at 35ft showed the vertical had the edge by 3dB into VK5. The author has worked over 150 countries on 14MHz with this antenna and finds that the vertical outperforms his W3DZZ trap dipole by a considerable margin. This is probably because the W3DZZ is very much a compromise on 14MHz with high swr. □

Correction of Oscar 8 orbital data by doppler shift measurements

by R. W. L. LIMBEAR, G3RWL*

DUE to several reasons, some sources of orbital data for AMSAT Oscar satellites have not been reliable so the author decided to make his own predictions for Oscar 8. Exceptional accuracy was not required, 1min in time and 1° of longitude either way being near enough.

If the time of closest approach (tca) can be noted, reasonably accurate corrections to published orbital data can be determined. A relatively easy method of finding tca is by measuring the doppler shift of the satellite's 435MHz beacon. Doppler shift

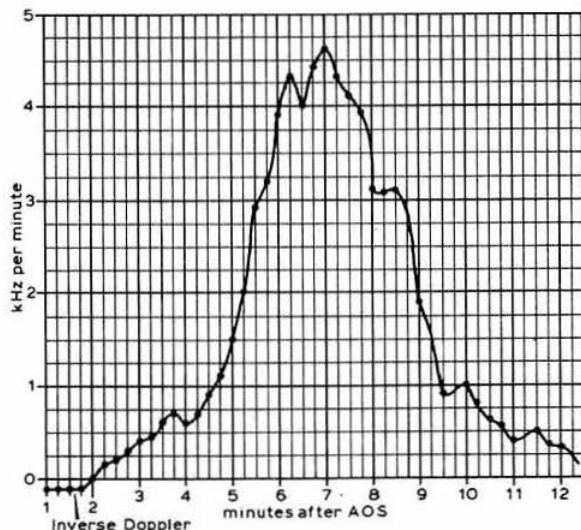


Fig 1. Rate of change of doppler shift. Oscar 8 orbit number 8,086 on 6 October 1979. Measurements made on 435.1MHz beacon. AOS 0917.34 utc questionable, los 0932.12utc definite

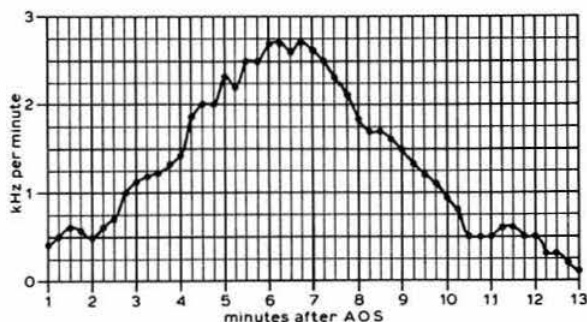


Fig 2. Rate of change of doppler shift. Oscar 8 orbit number 7,487 on 24 August 1979. Measurements made on 435.1MHz beacon. AOS 1049.07utc questionable, los 1102.05utc definite

depends on relative velocity and, from the point of view of an observer on the ground, the relative velocity decreases to zero when the satellite is closest, ie at tca.

The equipment used for measuring the shift consisted of a clock and the station receiver, an R4B, with a 435MHz converter. It should be noted that the frequency measurements are relative only, so, while reasonable frequency stability is needed, accurate calibration is not.

At about the time that acquisition of signal (aos) is expected, the observer starts listening for the satellite beacon transmission and, when it is detected, time and frequency are noted. The signal is then followed, and the tuning adjusted to keep the cw note at the same pitch. Measurements of frequency are then taken every 15s and the results noted until loss of signal (los) is experienced. Measurements on the author's R4B could be expected to be within 100Hz and he just guessed, from looking at the dial, the decimal figure to write after the kilohertz value.

After los the measurements can be plotted graphically by noting the difference between readings taken 1min apart, and it can be seen from the graphs (Figs 1 and 2) that the curve showing the rate of change of frequency (ie the speed at which the author had to move the tuning dial) tells the story. If the occasional measurement is missed, due to QSB or other causes, it merely results in less points plotted on the graph and does not really affect the whole.

Obviously the closer the orbit to the observer the greater the amount of doppler shift that will be noticed, so the best orbit to measure is the one that passes closest to overhead. The graph is not a smooth curve, there are foot-hills and valleys on the slopes and peak of the mountain but the reason for these is not known; one suggestion indicated that they could be due to atmospheric refraction but a closer study of these phenomena is needed.

Once the graph has been plotted the time of the peak is easily seen and noted. Then one calculates, from existing orbital predictions, the time that tca should have occurred and adjusts the equator crossing (eqx) time accordingly. The new eqx longitude needs a small calculation: the earth rotates on its axis at a rate of about 0.25°/min, so for every minute "late" one needs to add this amount to the predicted longitude of the satellite's eqx; therefore for every 4min of error one adds 1° to the existing predictions. The time and longitude corrections can be noted for future use with published predictions and, depending on conditions affecting the orbit, will probably remain usable for one to two months. □

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An introduction to gasfets

by J. R. COCKRILL, G4CZB*

REGULAR readers of this journal and other amateur publications will have noticed several recent references to the gasfet (Gallium arsenide (GaAs) field effect transistor). Although their use in amateur radio is in its infancy due to cost, it is envisaged that like silicon the cost per unit will eventually fall to a level where more use can be made in amateur applications. In receivers where very low noise figures are essential, eg eme, these devices offer the greatest potential. The purpose of this article is to describe briefly the theory of operation and the typical performance realized.

A fet is basically a semiconductor layer, the resistance of which is controlled by applying a field perpendicular to the direction of the current flow (Fig 1). As the current is carried by one type of carrier only, the electron, it is known as a unipolar device, as distinct from the conventional transistor, which is a bipolar device. These carriers drift along under the action of an electric field which is established by ohmic contacts at each end of the layer known as the "source" and "drain". The field is controlled by a transverse electric field from the reverse biasing of a metal-semiconductor (Schottky barrier) junction which forms the "gate". A practical device will have several gates in parallel across the same semiconductor layer, and thus multiple sources and drains.

The GaAs material quality is of utmost importance in the fabrication of the fet. Semiconductor layers (the epitaxial layer) less than one micron thick are required, together with a high resistivity buffer layer between the GaAs substrate and the epitaxial layer. This buffer layer, which is 3-4 microns thick, is required to prevent impurities in the substrate material from diffusing into the epitaxial layer and degrading its electrical characteristics. The high resistance of the buffer region also ensures that the device will have a sharp pinch-off, which is essential for low noise operation.

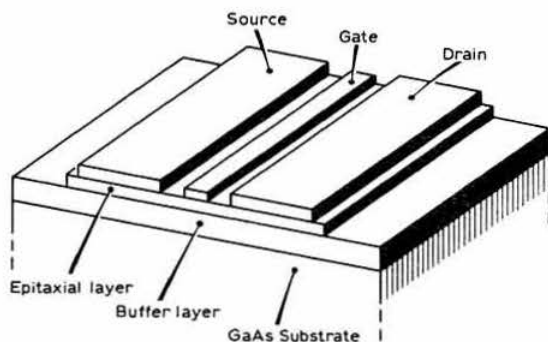


Fig 1. Construction of a gasfet

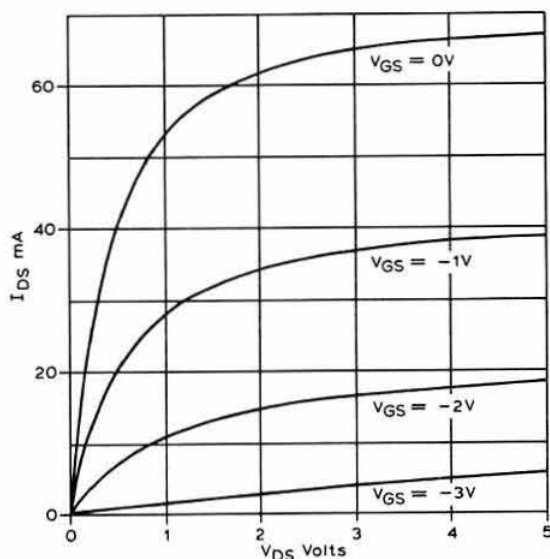


Fig 2. Typical dc characteristics of a gasfet

The electrical characteristic of greatest importance is the electron mobility; ie the speed at which the electrons pass from source to drain under the influence of the applied electric field. This electron mobility, which is much higher in GaAs than in silicon, gives rise to shorter transit times and hence a better performance than silicon at high frequencies. Cut-off frequencies obtained are approximately twice that of similar devices fabricated on silicon epitaxial material. Present-day high-performance low-noise devices use source-drain spacings of five microns and gate lengths of 0.5 microns. The gate length of a gasfet is considered to be the dimension parallel with the electron flow. Thus a typical device may have a gate length of 0.5 microns and a gate width of 150 microns.

The gasfet is an n-channel depletion mode device, and the typical dc characteristics are shown in Fig 2. As can be seen, these devices are operated at low drain bias volts (3-5V) and saturated drain currents of a few tens of milliamps. The maximum transconductance occurs at zero gate bias, and hence for maximum gain only one positive bias supply is needed. For optimum noise performance the gate should be negatively biased to reduce I_{DS} to about 10mA. The value of gate bias that causes the channel depletion region to extend to the buffer layer and reduce the channel current to zero is defined as the pinch-off voltage, V_p .

The gain and noise figure (nf) of a typical low-noise device (a Plessey GAT5) is shown in Fig 3. The curved line shows noise figure with respect to frequency, and the straight line the gain obtained when tuned and biased for best noise figure. Usable gain and noise figures are achieved up to 20GHz, the cut-off frequency being around 60GHz. The curves have been extrapolated to the lower frequencies using data obtained from amateur experimental work. The author has constructed a 2.3GHz preamplifier with 1.2dB nf and 16dB gain. Noise figures of around 0.7dB at 432MHz have been consistently reported with this and similar devices. It should be pointed out that at frequencies below 2GHz this device has such a high intrinsic gain that some gain dumping may be required to ensure

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VOX for the FT7 and FT7B

by ROBERT BASTOW, G3BAC*

The FT7 has proved to be a popular hf transceiver for mobile or fixed station use, either barefoot or driving a linear. In the author's opinion the only important facility lacking is vox, and a study of the circuit showed a possible way of using the cw keying relay system for the purpose.

This proposal was put by letter to Yaesu who commented that it appeared satisfactory but that their experience had shown vox to be unsuitable for mobile working due to the many noises (horns etc) present. Driving in the UK one rarely hears a car horn, and thus vox can be used at a suitable audio gain.

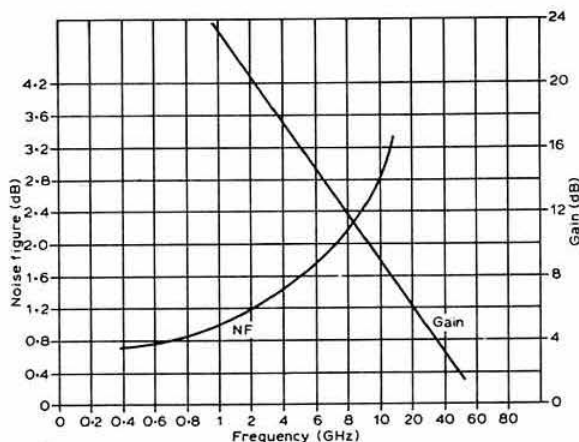


Fig 3. Gain and noise figures of a typical low-noise device

an unconditionally stable amplifier. Therefore the actual gain achieved is often lower than that predicted by the graph, and varies according to the circuit configuration in use.

A gasfet amplifier can be constructed using conventional amateur techniques and simple equipment for aligning such an amplifier. The technique found to be most successful up to 1.3GHz is to use a tuned line on the input and an RC network at the drain. Good stability has been achieved with optimum nf obtained by adjusting the input tapping point. High quality components must of course be used, particularly on the input matching. At higher frequencies, since only narrow bandwidths are required for amateur applications, microstrip circuits tuned with discs have been found to give satisfactory results.

The devices are also used in power amplifiers. The structure is basically the same as that of a low-noise device, but the physical geometry and epitaxial layer are optimized for power handling. Present-day performance is around 1-2W at 10GHz, and they are beginning to replace low-power travelling wave tube (tw) amplifiers.

Gasfets are designed to have high reliability with respect to long lifetime and resistance to burn out, since among their applications are use in orbital satellite transmitters and receivers, and in radar receivers where close proximity to megawatt magnetrons is frequently encountered. One significant failure mode has been discovered, in that, due to the small dimensions of the device, very high electric fields can be generated when short-duration voltage spikes occur. This type of transient pulse is often not suppressed by mains-derived power supplies, and can cause irreversible breakdown. It is therefore essential when using a mains psu to incorporate protection. A low voltage zener diode is usually sufficient when using laboratory-type power supplies.

Although the cost of these devices precludes their general use at present in the amateur field, it is expected that within a very few years the improvement in semiconductor technology will bring prices to reasonable levels. The proposed use of orbital satellite transmitters for broadcasting domestic tv will lead to a requirement for low-cost gasfet preamplifiers, with the inevitable spin-off into the amateur fraternity. The future impact of the gasfet on amateur microwave communications will be as important and far reaching as that of the Gunn diode.

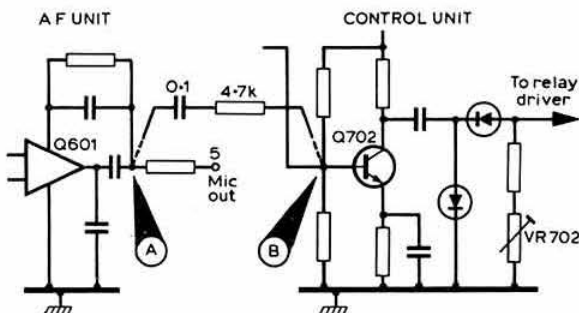


Fig. 1. Circuit diagram showing modification

The values of capacitor and resistor used to carry the audio from the microphone amplifier Q601 to the cw semi-break-in amplifier Q702 were determined by experiment to give satisfactory vox gain, increased gain can be obtained with a lower value of resistor. The vox delay is varied by VR702, and the correct setting will be found to be similar to that used for cw break-in. The modification does not interfere with cw operation.

Remove the top cover and pull out the control unit board (No PB1622) located immediately behind the S-meter. Solder a 3in length of wire to point B (see Fig 2). Re-insert the board and locate the wire around the right-hand side of the board and into the next compartment.

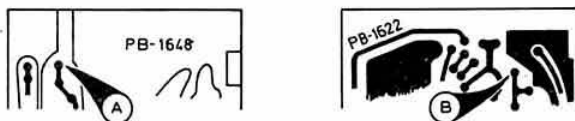


Fig. 2. Location of points A and B on circuit boards

Pull out af unit board (No PB-1648) and solder one end of a 100nF (0.1μF) disc capacitor to point A (see Fig 2). Re-insert the board and solder the previously installed wire to the capacitor through a 4.7kΩ 0.25W resistor.

Adjust the vox delay to a suitable value by means of VR702. No anti-trip is provided, but trouble with feedback from the speaker can be eliminated by the use of headphones or a low impedance earphone. The author prefers a single headphone and boom microphone for mobile working.

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An electro-acoustic cw filter

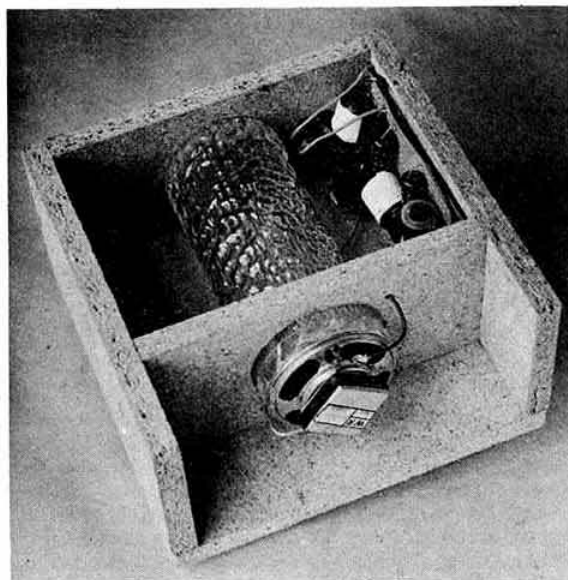
by J. B. HEATON, G8JFY, and
R. V. HEATON, G3JIS*

Introduction

Experiments with hi-fi loudspeaker enclosures of the bass reflex type (Helmholtz resonator) led the authors to consider whether use could be made of a pipe resonator to produce a filter for use on cw signals. It was hoped that the following objectives would be achieved:

- (a) good selectivity;
- (b) easy installation of the loudspeaker;
- (c) hum and hiss would be heavily attenuated;
- (d) relatively low cost.

The form of the resonator is given in Fig 1. Its action is similar to the organ pipe or Swanee Whistle, in which an air blast directed against a sharp edge causes turbulence which excites the column of air of length l . When the column of air is sufficiently excited, an audible tone is produced. The standing wave has a node (high pressure point) at the sealed end, and the antinode (low pressure point) at the excited end. When the pressure wave launched at the open end reaches the sealed end, a 180° phase reversal takes place. Thus when this wave returns



Construction of the filter

to the open end it is in phase with the next wave being launched. This condition is satisfied when the length of the pipe l is acoustically an odd number of quarters of a wavelength long, ie: $l = h \lambda / 4$, where λ = wavelength at the frequency of operation and $n = 1, 3, 5$, etc.

The relationship between the resonant frequency of the resonator and its physical dimensions is given by:

$$f_0 = \frac{V_0}{4(l + 0.3d)} \sqrt{1 + \frac{\theta}{273}} \quad (1)$$

where f_0 = resonant frequency in hertz
 V_0 = velocity of sound in metres/s
 l = length of resonator in metres
 d = diameter of resonator in metres
 θ = temperature in $^\circ\text{K}$

For typical values for V_0 of 340m/s, $\theta = 293^\circ\text{K}$, this equation becomes:

$$f_0 = \frac{122.4}{(l + 0.3d)}$$

Thus for $l = 0.13\text{m}$ and $d = 0.06\text{m}$

$$f_0 = \frac{122.4}{(0.13 + 0.3 \times 0.06)} = 827\text{Hz}$$

As noted earlier, the resonator will also resonate at odd harmonics. For example, a filter for 800Hz will also resonate at frequencies of approximately 2,400 and 4,000Hz. It is necessary, therefore, to prevent signals of harmonic frequencies from reaching the resonator.

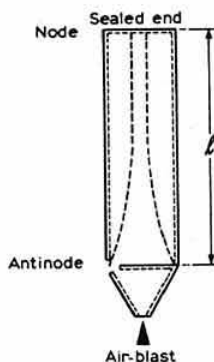


Fig 1. Principle of the resonator

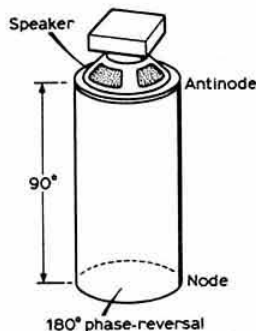


Fig 2. Basic form of the acoustic filter

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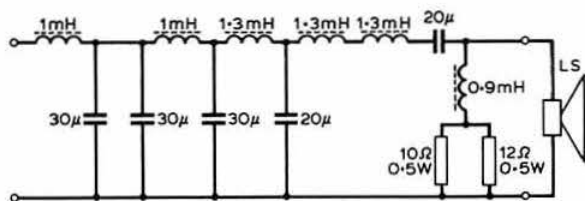


Fig 3. Input circuitry to the loudspeaker

Practical design

The form of the prototype filter is shown in Fig 2. It consists of a speaker 60mm in diameter which was taped to the open end of a glass resonator. The latter was a Ravenhead tumbler 130mm long and 60mm diameter, although small coffee jars have also been used satisfactorily. The mounting of the loudspeaker and resonator is shown in the photograph.

The final feed circuit is shown in Fig 3. The conductors L1-L3 and capacitors C1-C4 form a low-pass filter. The series resonant circuit L4, L5 and C5 is resonant at 700Hz and is intended to assist in the extension of the bandwidth above 650Hz to counter the roll-off of the low-pass sections and for C5 to attenuate the passage of the low frequencies to the voice coil. The function of the network L6, R1 and R2 is to damp the free-air resonance of the loudspeaker, but to reduce the damping as the frequency rises to that of the pipe resonance.

The feed circuit is made up from audio frequency components designed for cross-over networks, the inductors having low resistance and the capacitors being non-polarized. They may be obtained from Wilmslow Audio, Swan Works, Bank Square, Wilmslow, Cheshire. The inductors should be well spaced or mounted at right angles to each other to minimize their coupling.

Performance

The performance of the filter is shown in Fig 4. The filter has a 6dB bandwidth from 350 to 900Hz. Ultimate rejection is greater than 50dB at 2,100Hz. The low frequency output is less than the voltage across the speaker would suggest as there is an acoustic roll-off of 6dB per octave below the free-air resonance of the loudspeaker due to the inability of small speakers to couple effectively with the air at low frequencies.

In listening tests, the unit performs well. It is almost uncanny to tune across the marker signal with the S-meter reading up to S9 + 30dB and to hear the beat note become virtually inaudible.

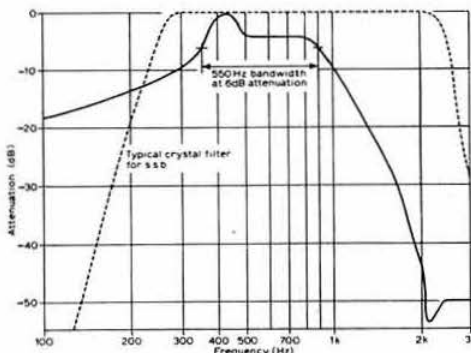


Fig 4. Performance of the filter

Many receivers have wide-bandwidth audio stages. The steep roll-off of the audio filter attenuates both hiss and hum from all sources including the audio stages themselves.

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oscar news

Phase 3B appeal

The West German construction group led by Dr Karl Meinzer, DJ4ZC, has been negotiating with the European Space Agency and it appears that a further launch opportunity will be available in early 1982. If a satellite is to be constructed, tested and accepted for a launch at that date then there is considerable urgency for the necessary funds to be available. It has been estimated that a total of £80,000 will be required, half of which should be raised in Europe. Some donations have already been made, including contributions from IARU Region 1 and AMSAT-UK, and all those who would like to contribute to the building of the next satellite are asked to send their contribution, as soon as possible, to the secretary of AMSAT-UK, whose address appears below. All contributions will be paid to the construction group without deduction for any administration.

Orbital calendars

Calendars containing orbital details of the two Oscar satellites and two weather satellites for the last three months of the year are available price £1.27p post paid from the secretary of AMSAT-UK: Ron J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ.

French satellite project

Radio amateurs from the National Centre of Space Studies (CNES) and from the Aerospace Industry of France have formed an organization known as the Radio Amateur Club de l'Espace. The purpose of this club is to construct and launch a communications satellite. The activity will be known as the project ARSENE (Ariane-Radio amateur Satellite pour l'Enseignement de l'Espace). The club will seek the co-operation of REF (the French national society), high schools and industry. The directors of CNES have agreed to support the project in principle but will not enter into any financial commitment; assistance from CNES will be available in other ways.

It is anticipated that the weight of the satellite will be about 100kg. The on-board equipment will comprise two transponders, a beacon and telemetry devices. It is intended that the transponders will be wideband equipments using the spread spectrum technique. Operation using the 1.3 and 2.4GHz bands is envisaged. The beacon will operate in one of these bands, or on a higher frequency.

technical topics

Pat Hawker, G3VA

SEVERAL letters over the past few months have underlined a problem that faces those who wish to construct some of their own equipment but would not regard themselves as closely in touch with all the many developments in electronics. It is that of keeping abreast of new types of common components and understanding the often subtle differences between them. It is not only the newcomer who seeks guidance on the truly enormous variety of modern components, yet many of the established handbooks give rather scant information on why particular types of components are specified. After all, a capacitor is a capacitor is a capacitor—or is it? Even detailed component lists can be a source of frustration when it is found that specified types are not in the junk box nor readily available, and one is left wondering just how safe it would be to substitute another type.

This month, therefore, I have tried to put together just a few brief notes on resistors and capacitors, though this is a subject that needs treating in detail—as, for example, in a series of articles by Harold Peters in *Television* (June, July, September 1980) from which a certain amount of my information has been gleaned. In a world of polyethylene terephthalate, polycarbonate, polyester, tantalum etc we cannot all be industrial chemists. We often just want to build a piece of equipment that will work as intended—and keep working.

Resistors

The once-ubiquitous **carbon-composition** resistor is today almost obsolete, having been largely superseded by the **carbon-film** resistor. The film type tends to be smaller, more stable and more readily manufactured to rather closer tolerance. The old high-value carbon-composition resistor, though reliable, when expected to carry a continuous direct current had a tendency for the resistance to increase greatly in use, bringing about gradual deterioration in performance of the equipment.

Carbon-film resistors still retain some of the problems associated with the use of carbon: they have significant negative temperature coefficient (about -300 parts per million/ $^{\circ}\text{C}$); they can be "noisy", particularly when of high ohmic value; and they are subject to flash-over where there are high voltages across the component. Carbon-film resistors with ohmic values up to hundreds of megohms are available.

So, in turn, carbon-film resistors are tending to give way to **metal-film** types, particularly where higher wattage dissipation is involved. Their use has become normal for wattage ratings of 0.5W to 3W . Temperature-coefficient is positive, about $300\text{ppm}/^{\circ}\text{C}$. In low-wattage applications, they offer little real advantage over carbon-film types, but may be specified where it is felt more convenient to use a single type of component. Generally it will be safe to use carbon-film or even carbon-composition types provided that they are of correct wattage rating and of suitable physical size.

For high-wattage, **wire-wound** types are still often necessary; it should be appreciated that unless of a specially-wound form, such resistors are very inductive.

An earlier form of carbon-film resistor was the **cracked-carbon**; these used to be described as **high-stab** resistors. **Metal-oxide** (eg tin oxide) resistors are often used in professional equipment.

Fixed capacitors

Capacitors present an altogether more difficult problem than resistors; there now seem to be umpteen types, some intended for specific requirements. The suitability of a capacitor for any given application needs to be judged both on basic characteristics and its physical construction: the material separating the plates governs not only the value of the capacitance (dielectric constant) but also its efficiency at different frequencies (power factor); together with the surrounding package it will also affect the dc insulation resistance. The form of construction and the length of the leads govern its "self-inductance", and hence the way the capacitor performs at high frequency. Because of all these variations, basic types of capacitors cannot usually be readily classified as being suitable up to some specific frequency. For example, a capacitor plus a given length of lead may form a series-resonant arrangement which can make it very effective as a bypass capacitor at a frequency higher than might otherwise be the case (see, for example, *VHF-UHF Manual*). Certain forms of construction enable components to cope well with heavy pulses of rf current and thus make them more suitable for use in electrical-interference suppression applications, etc. Then again, it must always be remembered that the dc voltage rating of a capacitor represents some three times or so the corresponding ac rating (a minimum dc rating of about $1,000\text{V}$ dc is needed for use with 240V ac mains, although it is preferable to use a capacitor specifically rated for ac).

So in practice many different types are now offered: some may be required to provide a very high capacitance in a small volume; others to form effective bypass capacitors up to the microwave region; still others to maintain stability of capacitance over a long period, or alternatively to change value according to a specific temperature coefficient in order to permit them to be used as temperature compensators in tuned circuits etc.

Then there are the confusingly large number of plastics materials, some known by trade names. The following notes are therefore far from complete, and it will often be advisable to check catalogues etc to discover the characteristics of particular types.

Electrolytic capacitors are now available up to extremely high values (the Americans have even marketed 100F units!) but still tend to permit significant dc leakage current to flow through them. They have a pronounced dislike for high temperatures or high ripple currents, and have limited shelf-life (after being out of service for a considerable period they may need to be "reformed" by initially connecting them across their nominal voltage via a series resistor); they are "polarized" and must therefore always be connected with regard to polarity. Miniature etched-foil electrolytics are today the most widely used form. They are often very inefficient at rf, and suitable rf bypass capacitors may need to be connected across them. Computer-grade electrolytics tend to have lower leakage current and will permit larger pulses of current to flow in and out of the unit.

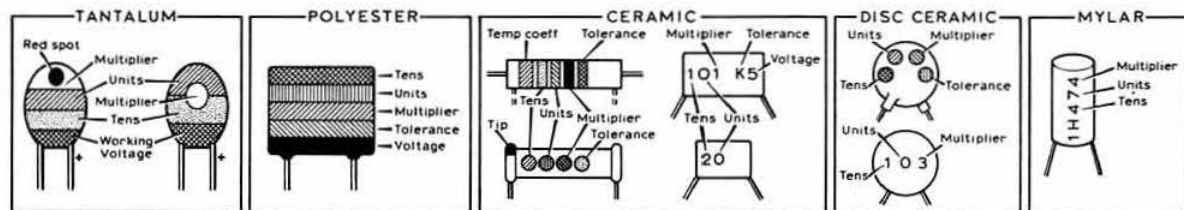


Fig 1. Some of the many colour coding systems found on UK, American and Japanese fixed capacitors. Unfortunately other (or no) markings may also be encountered.

Colour	Significant figure (1st, 2nd)	Decimal multiplier (M)	Tolerance (T) (per cent)	Temp coeff (TC) (parts/10 ⁶ /°C)	Voltage (V) (tantalum cap)	Voltage (V) (polyester cap)
Black	0	1	±20	0	10	—
Brown	1	10	±1	-30	—	100
Red	2	100	±2	-80	—	250
Orange	3	1,000	±3	-150	—	—
Yellow	4	10,000	+100, -0	-220	6.3	400
Green	5	100,000	±5	-330	16	—
Blue	6	1,000,000	±6	-470	20	—
Violet	7	10,000,000	—	-750	—	—
Grey	8	100,000,000	—	+30	25	—
White	9	1,000,000,000	±10	+100 to -750	3	—
Gold	—	—	±5	—	—	—
Silver	—	—	±10	—	—	—
Pink	—	—	—	—	35	—
No colour	—	—	±20	—	—	—

Units used are ohms for resistors, picofarads for ceramic and polyester capacitors, and microfarads for tantalum capacitors.

Tantalum electrolytics tend to cost more but can be much smaller, usually last longer, have much lower leakage currents, and work better at higher frequencies. If a tantalum type is specified it is advisable to use one. Values are often colour-coded, using the standard colour code and reading downwards from the top of the compact package. Large numbers of tantalum electrolytics are now in use for domestic equipment etc.

The old general-purpose af and low rf **waxed-paper** tubular packages, which often lost much of their initial dc insulation resistance after a few months' use, have been superseded by **metallized-foil** or, for more critical applications, **metallized-film** capacitors. Paper containers have given way to plastics, ie **polyester** sealed packages, including polyethylene terephthalate (petp) and polycarbonate. Plastic-film petp capacitors are generally satisfactory for standard applications, polycarbonate types for high-voltage applications. Both foil and paper capacitors may be housed in tough thermosetting resins in the general category of polyester units. Metallized-film polyester types are of smaller size than foil or paper types. Polystyrene capacitors are often used where good stability is required at medium frequencies (eg for i.f. transformers, oscillator circuits, filters etc). Metallized paper capacitors are used where high values need to be combined with stability, and are available up to tens of microfarads. It should be noted that thermoplastic materials and polyester foil capacitors should not be expected to withstand excessive heat during soldering (polystyrene types may be changed downwards in value). Heat-induced faults can appear as "intermittents". The common Mullard C280 polyester capacitors are metallized petp foil capacitors with standard colour coding.

Plastic film capacitors have very thin layers of metal deposited on the dielectric film. They can be self-healing after an insulation breakdown, and can be significantly smaller in size than foil types of equivalent rating.

Polystyrene is one of the relatively few plastics used as a dielectric and needs to be hermetically sealed. Larger values

may be in rectangular metal boxes, while smaller values are in metal tubes with ptf insulation. Polystyrene capacitors have low temperature coefficients and may be specified where good temperature stability is needed at high frequencies.

An increasing problem is the many different ways of indicating the values: Fig 1 shows some British and Japanese codings.

For high-stability applications at hf and vhf (eg where the capacitor forms part of a tuned circuit but is not required to provide temperature compensation), **silver-mica** capacitors are generally specified, and these are available to fairly precise tolerances. There are also various **disc** types of mica capacitors useful for interference suppression, decoupling etc. Mica capacitors are also still useful where high rf currents are involved in transmitting applications.

For many rf applications **ceramic** dielectric capacitors are very widely used, available as "high-K" or more often as "low-K" devices with specific temperature coefficients. Tolerances are usually greater than for silver-mica units. Low-K types are used for temperature compensation of tuned circuits. High-K units are useful for rf bypassing, are available in various disc, tubular, feedthrough forms, and can generally be used up to about 1GHz since they can have low series inductance. But always remember that a straight 1in length of 23swg wire used as a connecting wire represents a reactance of about 16Ω even at 100MHz! Ceramic capacitors suitable for use to above 10GHz are available.

Finally one must have some sympathy for the chap who complained that none of his suppliers stocks "nF" values: so a reminder that it will not make much difference to use a 0.001μF or even a 1,000pF value instead of 1nF, or 0.1μF instead of 100nF—or vice versa! But note that some designers tend, if only subconsciously, to link a "1,000pF" capacitor with its rf capabilities, but 0.001μF or 1nF types with their performance at af.

From these notes it will be seen that the question of whether

it is safe to substitute a different type of capacitor, if one is available of roughly the same value, can only be decided with reference to the actual circuit application of the component: does this call for a precise value and close tolerance? How important is stability and/or its temperature coefficient? Is the voltage rating adequate? Does it have to cope with signals at 50Hz, af, i.f., hf, vhf or uhf? Is it physically the right size? Very often in such applications as bypassing, inter-stage coupling etc it is permissible to use substitutes: the key factor, as in so many things, is to know what you are doing!

Negative resistance oscillator?

Back in 1961 an unusual wide-range, negative-resistance oscillator using two bipolar transistors, claimed to produce near sine-wave output, was described in *Radio Electronics* and has subsequently appeared in all editions of *Amateur Radio Techniques*: Fig 2(a). Little "feedback" had been received, however, until D. Tranmer, G3NJT, recently reported looking into the possibilities of further simplifying and developing this form of oscillator. He has found that a number of the components can be discarded to form what he admits is the curious circuit arrangement shown in Fig 2(b). He writes:

"This is certainly a strange oscillator and I would be interested in learning more about the theory of operation. With a 7mH inductor (L) and no capacitor (C) it oscillates around 200kHz; yet with two 100µF electrolytic capacitors across L it was still oscillating at around 150Hz! The only change that was necessary was a slight rise in supply voltage. With the 220Ω emitter resistor, oscillation began with a supply potential of only 0.1V; even with the extremely low LC ratio, only about 1V was needed.

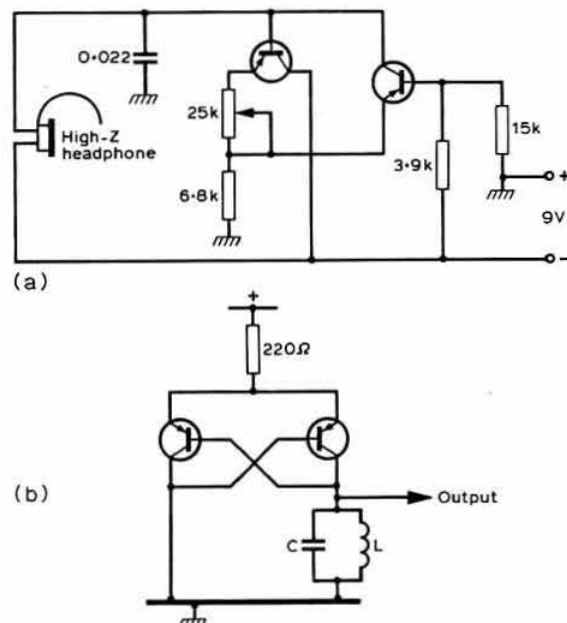


Fig 2. (a) 1961 version of wide-range negative-resistance oscillator with headphone "inductor". (b) G3NJT's version that he finds oscillates readily between 150Hz and 5MHz with near sine-wave output

"Virtually any type of transistor will work; although silicon types require a minimum of 0.5V supply. Higher voltage supplies can be used by increasing the value of the emitter resistor or by using a potential divider (ie potentiometer to vary the supply). Maximum output is about 200mV peak, but least distortion is obtained if this is held down to about 50mV.

"The best wave shapes are obtained with low LC ratios, and iron-cored inductors seem to produce more distortion than a ferrite pot-core or air-cored coils. The highest frequency obtained (without trying) was about 5MHz, though I have not investigated what happens above this frequency.

"The 200kHz output was checked on a spectrum analyser and the second harmonic was about -44dB. I suspect that it would have been even better when padded down to a lower frequency, but this would have been outside the range of the analyser.

"As to possible applications, such an oscillator should make a clean test-tone oscillator or, by adding an rf detector, a cw or side-tone monitor. Some thought is also being given to making a swept oscillator using a capacitance multiplier (op-amp) circuit. It can also provide a filter by reducing the supply or emitter resistor to a point just below oscillation, and then introducing a signal into the tuned circuit; some amplification will be obtained. Conversely, if the supply is replaced by a square-wave input at the resonant frequency, a sine-wave output can be taken at the fundamental frequency. A chopped two-tone oscillator could be made by making a similar npn circuit in parallel at another frequency and then driving both oscillators with a low frequency square-wave signal, swinging positive and negative. I feel it might also form the basis of a Q-multiplier."

In this form there would seem to be at least some resemblance to the Kalitron form of hf/vhf oscillator, which is in turn a form of multivibrator.

Solid-state reliability?

At the moment there is a noticeable trend towards all-solid-state hf transceivers of medium-power rating, while for a number of years the valve has all but disappeared from factory-made vhf equipment. On hf this is being brought about partly by the convenience of "broad-band" final stages (which can be switched from band to band without any adjustment of a pi-network tuner), partly by the compact size of some rigs, partly by the feeling that thermionic devices are doomed to obsolescence within the lifetime of new rigs, and partly by the belief that since transistors have no inherent failure mechanisms akin to the gradual loss of cathode emission, solid-state equipment provides far higher reliability. It is this final point that deserves a little investigation, though I am not trying to echo that old jibe that if the transistor had been invented first, the thermionic valve would now be hailed as the answer to all our problems!

There is no doubt that solid-state transmitters can provide a very high order of reliability over extended periods of time: this can be seen in some (though not all) professional applications of solid-state equipment. But only, it would seem, where careful thought has been given to the frailties of transistors, and the necessary precautions taken.

As Mike Perry, PA3ASC/G4HWZ, reminds us (see later), solid-state devices do not die of old age: they are "killed". The trouble is that it is still very easy to commit "transistor murder": you can do it simply by running a solid-state pa into a poorly matched load. More often overlooked is that you can

also do it by: (a) not expecting a 12V car electrics system to develop more than about 14 to 15V; (b) letting a short-circuited "pass" transistor in a series-regulated power supply put excess volts across an expensive piece of equipment; (c) forgetting that an antenna system (like the human body) can develop high static charges and currents from lightning, even in the absence of a direct "strike".

Ham Radio Horizons has recently published owners' reports on two popular all-solid-state equipment: Ten-Tec Tritons and Atlas 210/215X models, representing the experiences of over 300 owners (over 200 Tritons, over 100 Atlas rigs). Both are (or in the case of Atlas were) well-liked equipments. Yet one notes that the Triton owners reported 19 pass transistors and 10 final amplifier transistors as having failed; and of 110 Atlas owners, 19 experienced "final transistor failure". Interestingly enough, these figures are roughly comparable with the 15 pa valves that another owners' report showed had failed in 186 FT101 equipments—and, of course, most people would accept that a valve replacement is usually a simpler and cheaper task.

Where solid-state really does seem to score is in the absence of "ageing" and "drift" which still tend to require thermionic equipment occasionally to be readjusted, realigned, or to become less "linear" with failing emission, etc. What we are trying to emphasize is that to achieve reliability "as good" with solid-state as with many valves really does require more care: care in design; care in installation; and care in operation. Of course if the original designer has incorporated all possible forms of protection, the second two requirements may be less important.

But there is a further problem: the more complex equipment becomes, the more amateurs have to depend upon the manufacturer, the dealer and the standard of after-sales service.

Solid-state: a case study (1)

Mike Perry, PA3ASC/G4HWZ, writing from Holland, relates the following experiences:

"I am highly sceptical about the tendency for semiconductor devices to follow a 'bathtub' reliability curve, due to wear-out phenomena in later life [note: surely it is *equipment* that follows such a curve *not* the transistors-G3VA]. Most semiconductor reliability data are derived from accelerated life tests at high temperatures which are not characteristic of service in the field. Provided a device is well passivated—and most silicon devices are, well packaged in a leak-proof enclosure and not overstressed in manufacture or service, it should last a very long time. This implies that *transistors and other solid-state devices do not wear out like mechanical parts or valves: they are 'killed'*."

"Of course manufacturing defects which are created during processing and assembly of the device will inevitably cause trouble sooner or later, and there is no substitute for good quality control. But whether 'infant mortality' is weeded out prior to assembly into equipment by burn-in procedures, or after assembly under warranty is a matter of the equipment manufacturer's business philosophy. The latter course is cheaper for the manufacturer and tends to place the problem of quality control into the lap of the local dealer, from whom the rig will be bought."

"I encountered this warranty approach when I bought a brand-new solid-state 100W rig with a full quota of digital techniques. I collected it in person from the dealer in an

unopened box. The rig worked fine until a cw filter was installed. Thereafter no rf output could be obtained on transmit with cw narrowband. I traced the fault to the 9MHz i.f. carrier oscillator which had not been set to the correct frequency. I borrowed a frequency-counter and found that this oscillator could *not* be adjusted to the correct frequency because the potentiometer in question ran out of range. Further inspection of the rig discovered a solder bridge in the potential divider chain (which served a varactor diode); this short-circuited one of the resistors. When this bridge was removed, the oscillator could still not be pulled onto frequency because the offset was now too large in the opposite direction. My cure was to change a resistor. Not difficult but the experience points to rather poor quality control and a basically poorly tolerated design."

"I believe that as the market for amateur radio gear continues to expand and as rigs become more and more complicated, the quality of service and manufacture could approach that which, unfortunately, is associated with automobiles. We are also likely to see the growth of dealerships where the ability to operate cash registers is valued more than that needed to use high-cost test equipment of the standard required to test fully a modern synthesized, all-mode, all-singing-and-dancing rig."

In this case G4HWZ was himself able to overcome the equipment fault; similarly it was shown last year that the relatively poor dynamic range of the vast majority of FT101 receivers could be overcome by a simple alteration to the biasing of one stage. But many of those buying these rigs have neither the test equipment nor the experience to track down such faults, and will depend increasingly upon the after-sales service of dealers who may be many miles away.

Solid-state: a case study (2)

Another aspect of equipment reliability is illuminated in a letter from Richard Limebear, G3RWL. He writes:

"Panel lights are not the only things to blow in mobile rigs (TT June/July, p649). To-date I have lost two pa transistors at £20 per go in my IC240. The prime cause of this can often be the voltage of the vehicle electrical system. While the engine is not running, the rigs see only the 12V car battery . . . fine. With the engine running, and the charging system working, the supply voltage rises above this: 13.5V is not unusual and this is getting close to the 14V or so that most rig manufacturers specify as the absolute-maximum figure. But some vehicles can go appreciably higher, *even with the charging system properly adjusted*."

"The problem then is to keep the volts on the rig at an acceptable level. Voltage regulators that drop only 1V or so are rare. A dropper resistor is no good with changes of current from 200mA to several amperes (ie currents on 'receive' and 'transmit') unless relay switching is used."

"To get round this problem, I make use of a phenomenon that many people seem to forget: a silicon diode drops about 0.5V across its junction. I mounted 30A diodes in a box with heat-sinks and use a (meaty) switch to short-circuit them when the engine is not running; in practice, one diode was enough in my case and I seldom remember to switch it out since the rig does not seem to mind running on the slightly lower battery voltage."

"No more bulbs blowing, no more £20 pa transistor replacements (I hope), no messing about with car voltage regulators (which most of us do not understand) and all for the price of a diode, a box and an hour or so of labour."

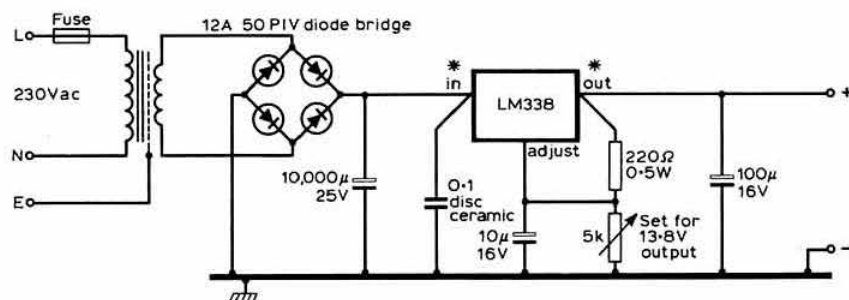


Fig 3. ZL1AXX's power supply unit with heavy-duty LM338 ic regulator. Transformer should be carefully chosen not to provide excessive voltage in order to limit power loss in regulator (see text). The 0.1µF input bypass capacitor and the 220Ω resistor should be wired directly to the input and output terminals of the LM338

More on heavy-duty power supplies

For a 13.8V, 5A supply, Bob Smith, ZL1AXX (*Break-in May 1980*, pp180-1) uses an LM338 ic regulator, packaged in a steel T03 case, which can supply in excess of 5A dc over a 1.2V to 32V range: Fig 3. This regulator has a time dependent current limiting feature, which is one way of saying that it should prove capable of supplying output currents up to 12A for short periods, thus lessening the problems encountered with conventional foldback limiting regulators working into highly capacitive loads, or loads having heavy transients. However, the device does require a voltage differential of about 3V at 5A.

In this connection ZL1AXX draws timely attention to the relatively low power efficiency (typically 40 to 60 per cent overall) of regulated low-voltage, high-current power supplies: losses, appearing mostly as unwanted heat, occur in the power transformer, diode bridge, filter components and regulator. Provision needs to be made for the safe dissipation of this heat, which can be quite substantial. ZL1AXX notes that few articles draw attention to the importance of not using a power transformer that puts excessive voltage across the regulator (ie not much higher than that needed to provide the required voltage differential), since this will greatly increase the power dissipated in the regulator. In a small enclosure it can be difficult to get rid of this extra heat.

He also provides some useful guidance about the choice of filter capacitors and diodes in these power supplies, as follows:

"The rms ripple current in a filter capacitor is generally two or three times the dc load current: try to obtain capacitors of good quality and of known ripple current ratings. Capacitor failure is generally the number one cause of psu failures. Cheap electrolytics may not last long. As a general rule a filter capacitor value of 2,000µF/A of dc output is reasonable for intermittent amateur use.

"The same rule of thumb of two to three times dc output current also applies to the rms current through the diode rectifiers, and diode peak current is many times the dc output

current. For full-wave centre-tapped or full-wave bridge configurations, use diodes with an average current rating of at least and preferably twice the dc output.

"That transformer you found in your junk box should have a continuous volt/amp rating of at least 1.8 times the continuous dc output rating.

"As a guide to the minimum dc voltage rating of an input filter capacitor, take the unloaded (open circuit) transformer secondary rms voltage at the highest mains input voltage and multiply by 1.414 times.

"Remember that electrolytic capacitors function much longer in a reasonably low ambient temperature. Do not mount your capacitors on top of the heatsink, or in an enclosure where the ambient temperature is likely to become excessive."

The design shown in Fig 3 is intended to provide 5A continuous output at 13.8V or 7.5A at a duty cycle determined by the size of the heatsinking and enclosure used. By using two LM338 devices and a simple op-amp, it is possible to obtain a continuous output of 10A with suitable component ratings (see handbooks such as the *Motorola Silicon Rectifier Handbook*, or the *Voltage Regulator Handbooks* published by Motorola and National Semiconductors).

The LM338 should be mounted on a black anodized finned aluminium extrusion at least 4in long. Clean the anodizing from the heatsink with fine steel wool over the interface area. The LM338 must be insulated from the heatsink and silicone (thermal) grease is required. Mount the heatsink with fins vertical for optimum cooling.

High current, small heatsink psu

Before you mutter "not another!" it is worth considering the design used for some time by Giles Humpston, G4GYO, that overcomes the problem, already noted, of the large power loss in many regulators, due to the need for a high input/output voltage differential.

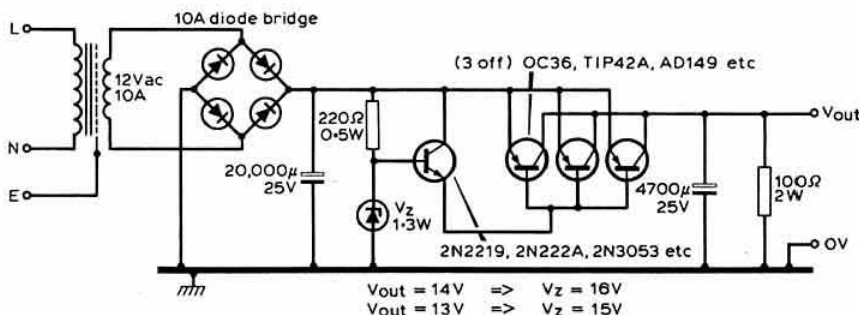


Fig 4. G4GYO's "small heat sink" psu. With a suitable transformer, the regulator need dissipate only 5W at 10A output

Heart of his psu (Fig 4) is a 12V, 10A transformer: after rectification this provides 16V dc off-load, 14V at full load. With a load of under 0.5A, the regulator thus needs to drop only about 2.5V (ie power dissipation of 1.25W). As the load is increased, input voltage drops and the regulator turns harder on, but still dissipates only about 5W at 10A: a piece of 4 by 1½in aluminium sheet keeps the pass transistors tepid.

To maintain the necessary minimum load, a 100Ω resistor is permanently connected across the output; a large reservoir capacitor is needed since above about 8A the regulator loses some of its ripple-removal abilities. Note that 2N3055 devices could not be made to work satisfactorily in this regulator since they require a voltage differential of at least 2V. The zener diode should be selected to provide an output voltage of 13.5V.

Power supply follow-up

In *TT* June/July p641, D. R. Coomber, G8UYZ (not G8UYR), provided some suggestions for psu capable of 6 to 10A output. As a result he received a number of enquiries and comments, and he has put together the following additional notes:

(a) The 0.15Ω resistors are primarily needed to even up or equalize the currents in the paralleled 2N3055 transistors. Values of 0.1Ω would be valid, but care should be taken when the psu is intended to supply *lower* output (less than 3A or so). For higher currents the resistors can be in the form of a couple of feet of 16swg enamelled copper wire (75.2yds/Ω) which can be wound on a piece of ferrite rod to form chokes that will also assist in vhf interference suppression etc.

(b) For outputs of up to 20A, four 2N3055 devices can be used, provided that equalizing resistors are used as in (a). Transistors type 2N3771 (200W) can be used with good saving in heat sinks.

(c) RF suppression in the form of 0.1μF capacitors may usefully be placed on the + and - inputs of the 741 op-amp, base of the BC109 and output socket. The chokes in (a) may also prove useful in difficult cases of instability.

(d) The transformer specified was simply the one available, having been obtained from the local surplus shop for a few pounds. The 15V secondary represents the minimum on-load

voltage that can easily be used; 18 or 24V is possible, but the higher the voltage differential across the 2N3055s the larger the heat sink required (see ZL1AXX's comments above).

(e) For lower currents a BDY50 may be used; a BC108 or BC107 substituted for the BC109 and a BFY51 for the BFY52 (in practice any near equivalent of the two transistors may be used, provided the total gain requirement is taken into account).

(f) For added internal safety a 10kΩ resistor may be inserted in the negative input to the 741 to limit current in the event of a severe over-voltage fault.

(g) G8TEN has suggested that emitter equalizing resistors can be calculated from $R(\Omega) = 0.5N/I$ where N is the number of transistors and I is current in amperes. This would give 0.1Ω in my case, but the 0.15Ω resistors were available.

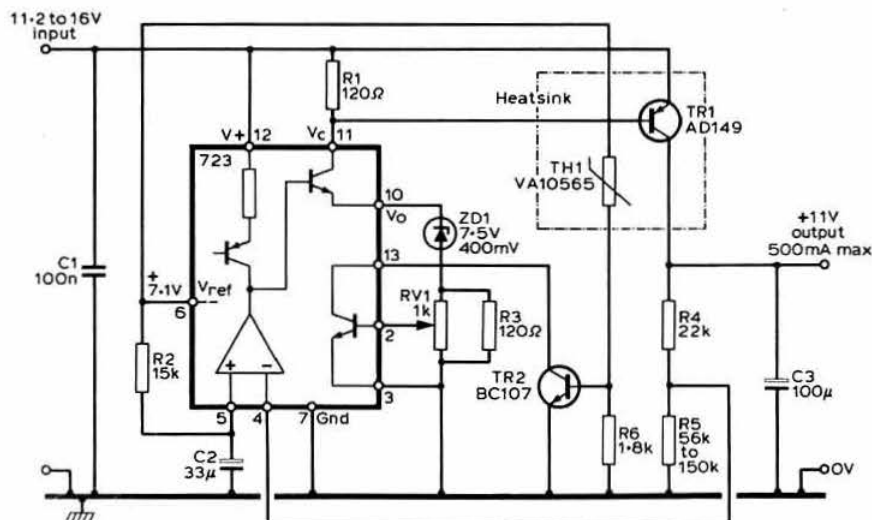
Low-differential mobile regulator

During recent months *TT* has included many ideas on power supplies for the domestic operation of mobile fm transceivers, but rather less on the subject of systems suitable for mobile operation. Peter Lee, G3SPL, has sent along some useful ideas on a power supply intended to give a stabilized voltage to a synthesized fm transceiver (not including the high-consumption stages such as the rf power amplifier and the audio output stage). To obtain the required "speed" from the cmos logic, he finds a voltage of at least 10V (at up to 0.5A) is needed. Since the vehicle's battery voltage can be as low as 11V, this rules out the use of a conventional voltage regulator which will have a voltage differential (difference between input and output voltage) of at least 2V (see discussion on this in *TT* June/July, pp647-8). G3SPL writes:

"By using a pnp pass transistor driven towards saturation, the differential can be reduced to the $V_{ce(sat)}$ characteristic of the transistor, and for germanium devices this can be as low as 100mV. The design shown in Fig 5 gives a +11V supply at 500mA maximum, from a battery supply between 11.2 and 16V."

"The arrangement uses a 723 ic providing the reference voltage, error amplifier and driver stages. The AD149 germanium pass transistor is driven from the V_c output of the ic. In conventional 723 circuits using pnp pass transistors, the

Fig 5. G3SPL's 11V, 500mA regulated power supply for mobile fm transceiver designed to function on battery voltages down to about 11.2V. Component notes: TR1 germanium device (eg AD149); TR2 non-critical (eg BC107); C1 100nF 25V wkg; C2 33μF 10V wkg; C3 100μF 16V wkg. All resistors 0.125W, 10 per cent tolerance; R4 metal oxide type; R5 56kΩ in parallel with 150kΩ, metal oxide (select for required output voltage); ZD1 BZY88 C7V5 (400mW zener); Th1 VA10565 rod-type thermistor (see text); heatsink 8°C/W TO3-type for TR1



driver emitter (V_o) is returned to the stabilized output line; this, however, results in the driver transistor being deprived of operating voltage, as the input-output differential drops below 2V.

"By returning the driver emitter to a zener stabilized voltage at least 2V below the output rail, sufficient voltage exists across the driver transistor to keep TR1 supplied with base drive, even under low input-voltage conditions.

"Overload protection, however, is not easy with this type of circuit. A sensing resistor in series with the load would drop up to 0.6V. In my arrangement, protection against short-circuit load conditions is provided by limiting the maximum base current into the pass transistor, by monitoring the voltage across R3 (via RV1) with the chip's current-sensing transistor.

"Under short-circuit conditions, TR1 dissipates about 16W (current 1A), and would require an uneconomically large heat-sink, since normally dissipation is below 2.5W. A thermal limiter is therefore incorporated. A thermistor (47k Ω resistance at 25°C) is fixed with epoxy adhesive to the heatsink close to TR1. Together with R6 they form a potential divider across V_{ref} . As the temperature of the heatsink rises, V_{be} of TR2 rises. As it approaches 600mV, TR2 turns on and shuts down the output driver on the chip. The value of R6 is chosen so that the maximum heatsink temperature is limited to about +55°C.

"Stability is ensured by shunting the load with the large 100 μ F capacitor. Output voltage is set by selecting the value of R5. RV1 is set to give a short-circuit current of about 1A (starting with the slider towards the ZD1 end). Owing to leakage in TR1, the output voltage rises under low load; should this be a problem, a suitable dummy load resistance can be used to ensure that there is always sufficient current being drawn, even when the actual load is off. The value of R3 may need to be reduced to 82 Ω if a low-gain device is used for TR1.

"The circuit shown in Fig 5 operates satisfactorily up to +35°C ambient temperature, using a heatsink of 8°C/w thermal resistance. The output remains steady at 11V until the input voltage drops below 11.1V."

Follow-up forum

Several readers, including G6JJ and GW8FXM, have pointed out that Teflon and pte adhesive tapes (TT June/July p649 as protection against ice forming on beam elements) are available from UK builders merchants, d-i-y shops etc as plumbing requisites. Brian Castle, G4DYF, reports that lin tape with silicone adhesive backing, which should be unaffected by sunlight and ultra-violet, is made by the 3M company as Teflon film tape No 5480. The smallest quantity supplied direct by the company is a 36yd roll (a club purchase?) at £36 (discounts for larger quantities): details from Martin Cook, Marketing Supervisor, Industrial Tapes Group, 3M House, PO Box 1, Bracknell, Berkshire RG12 1JU (tel 0344 26726).

Sean Carvin, EI2CR/VK2DJU, believes, from enquiries made on behalf of a relative, that it is highly unlikely that amateur transmissions would interfere with a modern pacemaker (TT June/July). He draws attention to a detailed article by Peter Deutsch, VK3YVH, "Pacemakers and rfi—is there a problem?" (*Amateur Radio Action*, Vol 2, No 12, pp15-18) which also came to this conclusion; the article suggests that the main emc problem would be from low-frequency pulse-type radiations or high-power microwave sources, though I wonder if, say, 3.5MHz cw could be considered as a pulse-type radiation?

The notes on safe climbing (TT June/July) have produced several comments: G3KPO suggests borrowing, from a sailing friend, a yachtsman's safety harness. These are adjustable and will accommodate even portly figures. The short safety line can be clipped on to any convenient holding, letting the climber work in safety, relative comfort, with both hands free.

H. J. Wilmshurst, BRS41526, draws attention to the industrial safety harnesses available from "Safety Equipment Centres" in various parts of the UK (Mail order address SEC House, 33-37 Elm Road, New Malden, Surrey) at around £20, basically similar to the type constructed by G4CAF.

C. B. Raithby, G8GI, has a solid-leather, PO-type climbing belt used only once by a friend to avoid falling into a grain drier: £10 plus postage to first-comer.

NEW PRODUCT

Blu-Mol hole saw kit

The Blu-Mol hole saw kit is ideal for producing precise holes in metal, wood and plastic. A molybdenum high-speed cutting edge on the hole saws is welded to a shatter-proof steel carrier, and the 1.125in depth of cut and knock-out slots permit easy core removal from even the deepest materials. The kit contains 0.875, 1.0, 1.125, 1.25 and 1.5in hole saws, 0.25in round-shanked mandrel, pilot drill and adapter in a sturdy plastic case, complete with full instructions.

The Blu-Mol hole saw kit costs £18.50 + VAT, and is available ex-stock from Toolrange Ltd, Upton Road, Reading RG3 2JA. Tel (0734) 29446 or 22245.



Blu-Mol hole saw kit

microwaves

Charles Suckling, G3WDG*

Ten years of *Microwaves*

Ten years ago this month, the "1,000MHz and up" column, the first of its kind in the world, began in *Radio Communication*. It has always been a mixture of operating news and technical items, which reflects the character of the microwave bands, where the two things are inseparable.

In its early days this column, contributed by Dain Evans, G3RPE, provided the only source of how-to-build-it information on microwaves, as well as much useful information on operating techniques, such as how to plot paths, calculate equipment performance, point antennas accurately, etc.

When one looks back, it is surprising how many technical items first published in the column have now become classic designs. To name but a few: the 10GHz self-calibrating wavemeter, the G8APP Gunn oscillator, the G4ALN dish feed, the G3JVL loop-Yagi antenna and 10GHz narrow-band cw/ssb transverter, and the G4BEL 1.3GHz preamplifier. These designs have been successfully duplicated by many amateurs and are in constant use in many stations.

Recently in this column a lot of attention has been given to equipment for 24GHz, and this band is becoming increasingly popular. Looking to the future, much more information is needed on equipment for 2.3, 3.4 and 5.6GHz, as these bands have received too little attention over the past few years. A column always relies heavily on its correspondents, so please keep the news and technical items coming in!

SK2GJ 1.3GHz eme progress

SM2BYA reports that work is progressing on the SK2GJ 1.3GHz eme system, which will use the EISCAT 32m dish sited at Kiruna in north Sweden. The first period of operation is likely to be towards the end of October, but only with low power (30 to 40W output). Even with this power they should be detectable by anyone with a good tropo system. It is hoped to have higher power (200W) available for one, possibly two, test periods in November.

The intended operating schedule is as follows: operation will be from moonrise at Kiruna, to moonset; the periods around moonrise and moonset will be reserved for tests with stations without elevation capability; ssb operation will be around transit (midway between moonrise and moonset), and cw will be used for the rest of the time. It is intended to transmit on 1,296.000MHz, listening between 1,296.050 and 1,296.070MHz for replies. Anyone unsure of their calibration is advised to transmit 55 to 65kHz higher than their apparent downlink frequency.

The reporting system will be a mixture of the RST system, and the TMO system (described in the Space Communication section of the *VHF/UHF Manual*). An "M" report is the minimum necessary for a valid contact on 1.3GHz eme. The writer will be pleased to advise anyone who is unfamiliar with

the TMO system. The RST system will be used whenever signal strengths are good enough.

Further details about operating times will be given nearer the time on GB2RS news.

The "first contact beyond" awards

In response to several enquiries the vhf awards manager has come up with information about the special microwave distance awards which are available for first contacts made beyond certain distances on the microwave bands. These are:

- 1.3GHz for the first contact made beyond 600km (19 issued to date);
- 2.3GHz for the first contact made beyond 500km (only two so far);
- 3.4GHz for the first contact made beyond 400km (first claim awaited);
- 5.6GHz for the first contact made beyond 300km (again no claims as yet);
- 10GHz for the first contact made beyond 150km (46 issued to date).

All that is required in order to secure one of these awards is to send vhf awards manager G5UM a QSL confirming the contact beyond the specified distance, taking care that the distance in kilometres is clearly shown on the card.

First microwave award to go abroad

Many readers may not be aware that all RSGB microwave awards are available to members abroad. The first member to take advantage of this is Bob Atkins, KA1GT (ex-G8EKB), of Yale, Connecticut, USA, who recently gained the 1.3/5 QTH Squares Award. Since the existing QTH locator system does not (normally) extend as far as the USA, he had to divide the east coast up into 1° latitude by 2° longitude squares, to be compatible with the QTH locator system, to qualify! The five stations worked were K4QIF, W3HQT, WA2FUZ, WA1VUW and W1JR.

KA1GT has just been appointed as the new microwave columnist for *QST*, which we hope will not take up too much of his operating time!

Metal supplies

One of the problems often facing the microwave constructor without a large junk box is that of obtaining supplies of suitable metal, eg brass and copper rod, sheet etc. GW4JJW has discovered a mail order firm which specializes in small orders of such materials. Their catalogue lists many useful items, and is available from K. R. Whiston Ltd, New Mills, Stockport SK12 4PT.

A new 10GHz world record

Summertime in Italy seems ideal for super-refraction propagation, as the old world record, gained there last summer, was broken on 12 July by 10SNY/7, 1W3EHQ/3 and 13SOY/3, with a contact of 757km. 10SNY/7 was located at Brindisi (IA30d) and 1W3EHQ/3 and 13SOY/3 were sited at Col Visentin (GG72j). As with the previous 633km record, one end of the path was located on a high mountain (1,650m asl), the other end being at sea level.

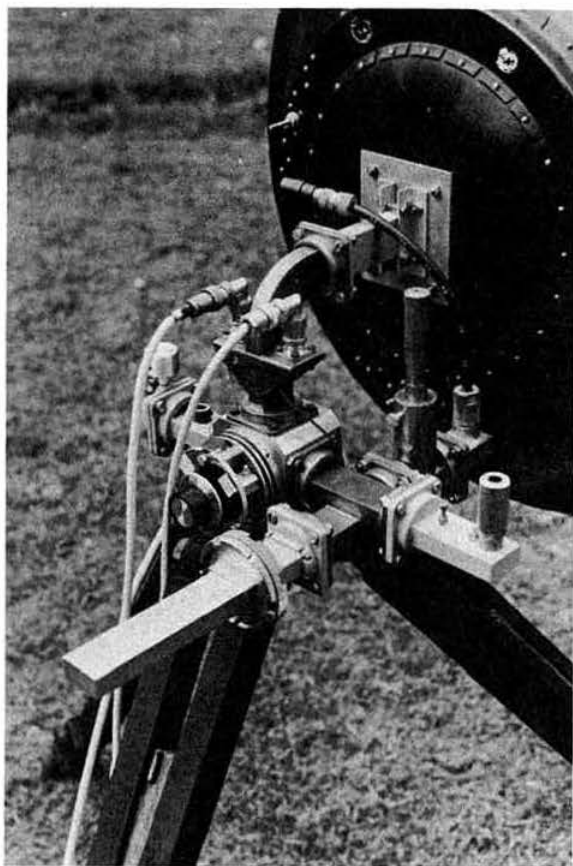
The contact was made at sunset, and the 10GHz opening took place for only 10min, and coincided with a deep fade in the 144MHz talkback. Reports exchanged were 5/5 and 5/8. The equipment in use consisted of Gunnplexers and 1m dishes at both ends.

Congratulations to all those involved in this excellent achievement—one wonders who is going to be the first to break 1,000km?

*31 Oakwood Road, Chandler's Ford, Hants SO5 1LW.

swl news

Bob Treacher, BRS32525 *



A view of G3YJH's 10GHz equipment showing the waveguide assembly. L to r: G3WDG/G3RPE in-line receive mixer, waveguide t/r switch, cross-coupler for power monitoring, and 20mW transmit Gunn oscillator. The coupled port of the directional coupler feeds power to a detector via a high-Q wavemeter. The remaining piece of waveguide is a matched load

Photo feature

G3YJH has sent photographs of his 10GHz equipment with which he has worked five QTH locator squares as well as achieving a microwave distance award.

As can be seen, the system is tripod-mounted. Earlier this year the point was made in this column that tripods must be securely guyed down if any sort of windy weather is expected, ie always! The writer has since heard of more than one set of equipment being lost or severely damaged this year during the cumulatives, due to tripods blowing over. Take care of your equipment—building something for a second time is much less fun!

Round table reminder

Two round tables are scheduled for October, at Martlesham Heath, and at Sheffield University. Full details of these meetings were given last month. A meeting is also scheduled for Winchester in November; further details next month or via GB2RS. □

144MHz tropo openings

There are several interesting reports of tropospheric conditions during late July and early August. On 22 July stations with strong signals were audible in southeast England from central and southern France; they included F6GRA (AG19j), F1DV (BG78a), F1FJJ/P (CG68e), F6GDX (AF17d), FIFEM/P (BF63f), F6GRC/P (CF74c) and F1DTC/P (CE37b).

After several evenings of fairly ordinary conditions, another tropo lift occurred on 27 July. EA1CV in XD square was reported at 1803, and EA1ED in VD square at 2214. In between, and later, stations on the western side of France were audible, including F6CCH (ZG11a), F6EER (ZF79d), F1BYM (ZE25f), F8RL (ZD43a) and F1CLT (AD69f).

A number of other interesting stations were also reported via tropo openings—EA3AQT (ZB11d), F1EQU/P (XH10d), F6ADE/P (BD35e) and C31VF (AC29f). All this adds up to a fairly good haul of dx for 144MHz tropo.

News from overseas

Tony, VS6EZ, is to reactivate his A4XGR call. He will use 21.150 and 28.490MHz from 0930 on most days, and will QSL every contact in his log; he will also confirm every correct swl report, but only on receipt of a card. His fine QSL card shows a Tristar jet, and the QSL information should be sent direct to PO Box 981, Muscat, Sultanate of Oman. For a direct QSL, G stations should enclose a 20p postal order rather than the three 10p ones. Tony normally expects from European stations. Cards will be despatched by air mail.

From David Chalmers, BRS14446, we hear that UA4 095 409 would be keen to correspond with any overseas swl. Vlad can be reached via Box 88, Moscow.

The mail

An absolute torrent of mail this time (obviously everyone is getting ready for the autumn dx season) including several letters from new reporters. Terry Burbidge, RS43435, in Hampshire, has been interested in amateur radio some 11 years. He uses a 9R59DE and has a manual for it if anyone should require a photostat. He also has a PR30 preselector into an end-fed wire. He is threatening a table entry, but must make it quickly because no new entries will be accepted which reach this QTH after 17 November. That keeps it fair on those who have been updating scores throughout the year. Terry mentions 5N0DOG, AH6AC/KH2, M1C and TL8CR, all on 14MHz.

David Burns, ARS38722, has been an RSGB member since 1977, but has been mainly involved with A-level examinations and has had little chance to concentrate on swling. He uses a Barlow Wadley XCR30 Mk2 receiver and an "active dipole" which is housed in the loft. He enclosed details of QSOs heard on 28MHz during August just to show that the band was offering encouragement for those prepared to stay faithful to it. He

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1980 hf countries table

Station	28	21	14	7	3-5	1-8	Total	Mode
RS42604	186	182	171	141	115	22	817	ssb
BRS8841	116	140	202	94	85	1	638	ssb/cw
BRS43475	118	153	192	86	74	10	633	ssb
BRS35943	97	97	93	76	85	5	453	ssb
ARS42503	55	123	125	98	50	0	451	ssb
BRS18529	46	94	148	69	56	15	428	ssb
ARS42591	47	79	122	28	64	0	340	ssb
BRS40705	97	91	76	40	23	0	327	ssb
BRS44395	41	124	78	44	27	9	323	cw
BRS41992	50	61	125	42	12	0	315	ssb
BRS20185	81	85	94	20	27	2	309	ssb/cw
BRS43273	96	75	74	26	13	0	284	ssb
BRS40293	52	85	90	30	23	0	280	ssb
BRS42559	39	70	89	33	21	5	257	ssb
BRS40634	31	101	68	20	17	0	237	ssb
ARS43261	54	50	75	20	18	0	217	ssb
BRS43135	24	48	74	22	30	9	207	ssb
BRS40814	42	21	57	26	15	4	165	ssb
ARS43457	20	45	57	21	7	1	151	ssb/a.m.
ARS43496	1	38	66	22	21	2	150	ssb

mentions HSIWR, P29NRL, VK6s, 5H3FW and 6W8IA. Also mentioned were several Central and South Americans logged on 7MHz around 0530. David also reports CS1BI, which was active from Berleuga Is, QSL via CTIXK.

John Goodrick, BRS44395, has been interested since 1963. He uses a DX300 and a Joystick, and listens primarily for cw QSOs. He has set himself a target for the year of countries heard and is anxiously awaiting better conditions. To answer one specific point, all times quoted in the journal are gmt, unless otherwise stated.

Peter Boyce, ARS43457, also enclosed a table entry. Using a JR310 receiver and a series of $\lambda/2$ dipoles for the hf bands and an SR9 for 144MHz, Peter has been enjoying his listening.

Phil Moreau, BRS43950, has been a member for only three months but he provided a useful list of "goodies" logged during that time. He uses a Trio R1000, with 70 and 144MHz converters into an eight-element Yagi at 25ft, while he uses a tribander on the hf bands. Phil reckons his best dx so far has been A35JL. He hopes to take the RAE in December.

Richard Lappin, BRS41172, used to be A5129 in the 'sixties and in the July 1979 issue of *Radio Communication* found himself on p640. Richard is a friend of Brian Russell, from whom we hear regularly, and hopes to renew old acquaintances soon. He currently has 257 countries confirmed, and so far has 97 confirmed for the IOTA Award. One award already on the shack wall is the V56 Firecracker Award.

John Chalmers, mentioned earlier, has been around since 1948. He lives in Dumfries and now uses an FR101D, while for 144MHz he has a TM56B fitted with all the popular channels and a preamp, which can prove extremely beneficial. The antenna set-up is a G2DYM trap dipole at 30ft for hf, plus an eight-element Yagi at 24ft for 144MHz. John mentioned that as GB3AS is now operational from the IBA site at Caldbeck in Cumbria, mobile activity on 144MHz in the area has increased. As with many repeaters, some fixed stations tend to hog the "boxes", which stops /M and /P stations gaining access to them. It must be remembered though that repeaters are there primarily for the use of these latter stations and priority should be given to them.

News too this time from several old faces. In particular, Neville Spry, BRS17567, who is now the proud holder of a Gw8 callsign. He gives his closing all-time countries total, which will be included in December (along with at least three more licensed members' scores—keep them coming). During his long period of swling, Neville only failed to hear one DXCC country, 70. We hope that he is as successful when he passes the morse test.

Chris McMahon, BRS40634, writes after a long absence with details of much good dx logged. He mentions the Japan DX Net which meets on Wednesdays on 21-230MHz at 1330. Confusion seems to have set in regarding the many USA prefixes. Chris mentions KX4, KB6 and KA7 as just three examples. These are all callsigns from mainland USA. The only ones in the "K" series of prefixes which are "exotic" are: KH1-0, KP1-4, KG4,6, KL7 and KV4.

Mike Patrick, ARS42591, is now G8WPP, but is still to continue QSLing the rare dx he hears on the hf bands. Mike has several queries regarding QSLing. Firstly, 4U1TU cards should go via IARC, Box 6, 1211 Geneva 20, Switzerland. Others mentioned are as follows: TJ1BB via F30A; FK8CR via W7OK and J3AH via W2GHK.

Harold Moss, BRS18529, Mark Mullins, RS42604, John Doughty, BRS40705, Dave Stewart, BRS40293 and Larry Hoults, BRS42559, all have little to report for a number of reasons, but the message from them all is that they are anxiously awaiting more favourable conditions in the autumn. However, Larry reports putting an rf preselector in front of the DX160, which has sharpened selectivity with a reduction in interference and an overall gain in signal strength. Roger Jones, BRS43135, reports W6HVM on 1-8MHz at 2255 on 6 May. Impossible you might say, but not when /MM 50 miles west of Lands End! Roger has recently replaced his DX160 with an FRG7000.

David Hawes, A9191, mentions the Round Table Net on 14-170MHz, which he says is well run by YO9WL (and others) and on which there is something for everybody. He reports some good dx in the shape of 9X5PP, FR0FLO, 600DX, VK9ZG and OJ0MA.

Robert Small, BRS8841, mentions PY0YCW, YB0WR, DF3NZ/ST and 3B9ZV on the lower frequency bands, and various "goodies" on 21 and 14MHz such as CE9AF, HK3BWO/HK0, UA1PAL, VP8ZR, CE9AF, KA6HIQ/KH3 and T2XYL. Robert now has 300 countries confirmed thanks to FR0ACC/G.

David Whitaker, BRS25429, ends this piece with the news that there may soon be another swl-only contest. More details when they are received. On the dx scene he too reports some good catches, in particular ZK1AC on 7MHz ssb, and 3D2CS, T3AT and W4PYH/KH8 on 21MHz.

Plenty of exotic QSL cards were mentioned by many reporters; a few of the best were FR0ACB/G; WA2FIJ/KH5K, KS6DV, KH6LW/KH7, SV11W/A (all five bands), TL8JM, VP5EE and YV4TI (both 1-8MHz ssb), VK9ZG, ZK1AC; ZL2UW/C, 3B6CD and 3B7CF.

Next deadline, for the December issue, is 20 October. ☐

The Radio Amateurs' Examination Manual

This is the standard study guide for all RAE candidates. Contents are: *Becoming a radio amateur; Electrical theory and calculations; Semiconductors; Radio receivers; Transmitters; Power supplies; Propagation and antennas; Transmitter interference; Measurements; Licence conditions; Operating practices and procedures; Tackling the Radio Amateurs' Examination; plus four appendices: Radio circuit symbols; Safety recommendations for the amateur radio station; Radio Amateurs' Examination syllabus and objectives; Practice multiple-choice RAE questions.*

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4-2-70

John Morris, G4ANB*

The Canaries worked on 144MHz

Some of the dx worked in the recent tropospheric openings is reported later, but the outstanding 144MHz contact during this period merits a section of its own. At 2230gmt on 6 August 1980 Roger Thorn, G3CHN, in Kingsbridge, south Devon (locator YK61b), worked EA8XS, in the Canary Islands (locator SO73d) by tropospheric propagation on 144MHz ssb. This contact is thought to be both a "first" from England to the Canary Islands, and at 2600km a new IARU Region 1 tropospheric dx record.

The contact has an interesting history. G3CHN was using 144MHz to guide a visiting French amateur friend through Plymouth, and was called by EA1TA in VD square, northwest Spain. The Spanish station mentioned that his near neighbour, EA1ED, was on the calling frequency, and so G3CHN went to work that station. During this contact he could hear a weak station calling at the end of his transmissions, but received only the letters "EA" before EA1ED began transmitting and blocked the weak signals. At the end of the contact, expecting to be called by a low-power Spanish station, G3CHN was surprised to hear a somewhat exasperated voice saying "This is EA8XS still on frequency"!

In evidence of the contact being by tropospheric ducting, rather than by sporadic-E, G3CHN reports that he later worked EA1ED again, who mentioned that he had earlier also worked EA8XS. F6ELQ, who is in northwest France, just to the south of G3CHN, was listening during the contact, but could hear only the English station.

Repeater news

The plan to move GB3WH (R4, near Abingdon) to Shotover Hill, near Oxford, has fallen through due to the refusal of planning permission. The repeater group is examining several alternative possibilities, and it is hoped that a new site can be selected and the move made as soon as possible. GB3TW (R5, Tyne and Wear) was taken out of service in early August due to an antenna fault. GB3HO (RB14, Horsham, Sussex) is now operational from its new site. GB3ST (RB2, Stoke-on-Trent) is running again after being put out of action by a lightning strike. GB3CK (RB0, Charing in Kent) has been taken off the air until further notice for a rebuild.

The Repeater Working Group is continuing with the task of collating proposals for vhf Phase 5 in preparation for submission to the Home Office, possibly in summer or autumn 1981. One of the recent proposals received is for a unit to cover North Yorkshire, possibly from a site near Northallerton. Channel R1 has been allocated and this vhf repeater will serve a large area which has no coverage at present. Proposals for two new uhf units, to be sited at Hornsea and Goole, both in Humberside, have been accepted by the Repeater Working Group. Channels and callsigns are being discussed with the proposing groups. A proposal to site a 432MHz repeater on a 180m asl site at Hazlemere in Buckinghamshire has been

rejected by the Repeater Working Group and VHF Committee because it would overlap with existing repeaters to a great degree, and there is no available channel for such a well-sited unit. The proposing group has been advised to site the repeater in High Wycombe, the area it is intended to cover, which would give a choice of available channels.

The Milton Keynes Repeater Group, which runs GB3MK on Ch RB0, hopes to hold an open evening in the autumn or early winter, with the object of forming a "user association" so that ideas and desires may be discussed and, if possible, implemented. Further details may be obtained from the MKRG secretary, G4BPX, QTHR.

70MHz crossband

Judging by recent correspondence, the fastest growing sport in amateur radio is 70MHz crossband working, thanks largely to the activities of Gordon Pheasant, G4BPY, in Walsall. Gordon makes a point of canvassing 70MHz during contacts on 28MHz, encouraging people to listen on what could be a very interesting band, and he has sent designs, circuits, and even complete 70-28MHz converters, to many stations abroad. Some of the fruits borne by these activities have been reported in 4-2-70 recently, and G4BPY advises 70MHz operators to have a spare receiver on 28-885MHz while on the air, especially during sporadic-E openings. As his letter comments, you never know who might be listening. Stations equipped to receive on 70MHz and prepared to run crossband include DK1PZ, DJ5BV, OE8NTK, SM6PU, SP2DX, SV1DH, 5B4AZ, 5B4BL and ZE2JV.

G4BPY has had several more contacts with SM6PU (GR27f) since his "first" on 10 June. On 7 July he worked DK1PZ (FL22h), using only 5W of rf. The crossband contact between G4IDG and OE8NTK on the same day was reported last month. The Austrian station was using a G4BPY-supplied converter which had arrived that same day. He rapidly set up an in-door ground-plane antenna, and was immediately able to make the crossband contact with G4IDG, as well as one with GW3MHW. Gordon missed OE8NTK on that occasion, and was very surprised when G4IDG told him about the crossband contact—and, one would imagine, slightly vexed at missing this "first". He finally made it with OE8NTK on 11 July, after G4ENB, receiving a 5/9 plus 30dB report.

Tests with 5B4AZ (QU51b) have so far been unsuccessful, apart from a dubious meteor ping. However, the 5B4CY beacon (also built by G4BPY) is now operational on 70.112MHz from the QTH of 5B4AZ. It runs 15W rf to a four-element beam between 1200 and 2200gmt. The antenna is presently aimed at the UK, but it may be moved for trans-equatorial tests later in the year. As soon as Gordon heard that the beacon was operational he turned on the 70MHz gear and immediately found 5B4CY's signals coming in. Unfortunately 5B4AZ could not be raised on 28-885MHz to make a crossband contact.

Not all 70MHz crossband is done using 28MHz for talkback, and Dennis Boniface, G4DSC, of Ripon, has made a contact which may well be the first of its kind. On 21 July he called DK1PZ on the 14MHz vhf net, and asked if the other station would be interested in a 144MHz meteor scatter sked. It happened that each station had already worked the other's QTH square, but during the QSO DK1PZ mentioned that he could receive on 70MHz. Dennis suggested that they try a crossband ms sked, using 70 and 144MHz. This was agreed and between 0800 and 1000gmt on 28 July G4DSC (Z063e), transmitting on 70-068MHz, completed a two-way ms contact with DK1PZ.

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(FL22h), who was transmitting on 144.068MHz. The QSO took 1h 50min to complete. DK1PZ received six bursts and 24 pings on 70MHz, the longest burst being 6s. On 144MHz G4DSC heard 15 bursts and 44 pings, the longest burst being 2s. Dennis was running only 25W to a four-element Yagi for the contact. DK1PZ used a home-brew converter and two-element antenna on 70MHz receive. Does any reader know of any previous 70 to 144MHz crossband ms contact?

Chris Tran, GM3WOJ, in Dumfries, has also been "having fun on 70MHz crossband". He too worked DK1PZ on 70MHz ms, but in this case the talkback frequency was 14.34MHz. Chris comments that 14MHz is much more reliable than 28MHz, although the higher band is useful as a sporadic-E indicator. A report from G4BPY practically completes the set of frequencies for use with 70MHz crossband. On 11 July at 1252gmt he made an ssb QSO by sporadic-E with ZB2BL, who was transmitting on 50MHz.

50MHz beacons

Trevor Brook, G3WBQ, has supplied details of some useful 50MHz beacons, together with their actual frequencies when last heard. The callsigns, keying modes and frequencies (MHz) are:

GB3SIX	F1	50-0200	ZS6DN	A1	50-0501
ZS6PW	A1	50-0320	ZS3E	A1	50-0713
ZB2VHF	A1	50-0350	IS7DJ	A1	50-3198
FY7THF	F1	50-0386	5B4CY	F1	50-4990
ZS5TR	A1	50-0500			

ZB2VHF was regularly audible during June and July by sporadic-E, and G3WBQ copied 5B4CY, probably by double-hop sporadic-E, for periods often several hours long from 11 to 14 July. The most interesting reception reports are for FY7THF, in French Guiana, 12,000km away. G4BPY copied it between 2045 and 2122gmt on 27 June, and from 1730 to 1950gmt on the following day, on both occasions peaking at S5. On 11 July SM6PU copied the beacon until 2245gmt, with signals peaking to S7. At the same time it was being copied by EI6AS in Dublin, but could not be heard by G5KW or G4BPY. On 13 July G3WBQ copied S7 signals for several periods between 2001 and 2235gmt. Both G4BPY and G3WBQ copied FY7THF on 14 July at various times between 2002 and 0100gmt. The exact propagation mode for these signals is not clear, but seems to be at least partially by sporadic-E. For the propagation to be by pure sporadic-E would require four hops.

No reception reports for GB3SIX on Anglesey have yet been received from distant stations, but several UK operators have heard it. Ray Evans, G4AGE, near Chesterfield, constructed a three-element beam for 50MHz and copied S2 signals from the beacon at 0528gmt on 30 July.

Shetland vhf

Arthur Tate, GM8TLO, has written to 4-2-70 from Lerwick, Shetland, describing his 144MHz dx activities from this northernmost part of the British Isles. On 19 May Arthur was able to access the West German repeater DB0XA (EN14f) at a distance of 925km. Later during the same day 21 West German stations were worked on ssb, including DJ3JP in Hanover (locator EM49h). As Arthur points out, the distance from Shetland to Hanover (about 1,100km) is rather greater than that from London to Prague (1,050km).

A glance at the map reveals the difficulties that exist in attracting the attention of 'mainland' stations on 144MHz, and Arthur exhorts operators to try pointing their beams north for the elusive ZT and ZU squares. If there is sufficient interest he

is also considering operating as GM8TLO/P from the small island of Foula in YU square. Readers aiming for the Worked All Europe Award of the DARC may like to note that Shetland counts as a separate country.

Meteor scatter

More and more operators are trying ms, and the August Perseids this year saw some very intense activity on 144MHz. At times the traffic around 144-200MHz, the random calling frequency for ssb ms approached that on the vhf net around 14.345MHz. Dennis Boniface, G4DSC (Z063e), made about 20 contacts during the shower, mostly on cw, including HG8ET (KG22j), OH3MS (!)(MV79e), OH7RJ (NW09f), UR2EQ (NT61c), SM2ILF (KY26e) and SM2JTT (JY square). A contact with the club station UK2BAB (MO19c) in Lithuania took Dennis to 38 countries worked on 144MHz, including 24 by ms. A sideband ms sked with F6EAS (ZI06d) failed in one sense, but succeeded in another when the two stations discovered that they could hear each other on tropo. The line-up at G4DSC consists of an FT221R with a Mutek front-end board, followed by a single 4CX250B linear feeding a 10-element Parabeam at 7m agl. Geoff Grayer, G3NAQ, in Newbury, commented on the strength of signals heard during the peak of the shower, in particular those from I4BXN. On ssb he worked YU2RGO. The Oxford University Radio Society expedition, GM3OUR/P, found many stations keen to work them from the rare ZR square during the RSGB Meteor Scatter Contest.

Transatlantic meteor scatter tests

Despite severe weather problems on both sides of the Atlantic the attempt to make transatlantic QSOs on 144MHz by extended ms gave some encouraging results but no complete contact. G4ANB, G4ASR, G4DEZ, G4DGU, G8AGU, G8KQB and swl Steve Lampard travelled to a north Devon clifftop near Hartland on 9 August, where they were joined by three local operators, Mike Paull, G4JKN, Simon Dabbs, G4GFN, and Graham Scott, G8MXE. Just before departing for the site, the bad news came that the antenna system of K1WHS, with whom 12h of skeds had been arranged, had been hit by lightning, severely damaging his equipment. This meant that the time for the test would be limited to a total of 24h, made up of four 6h long skeds with Andy McLellan, VE1ASJ, in Saint John, New Brunswick.

After a few false starts the 400m-long rhombic antenna was successfully erected on four 8m poles. Open wire feeder was used to transport rf, and the system was matched using a shorted stub. In the operating tent an FT225RD with a Mutek front-end board was used, with a Tempo 6N2 providing the power on transmit. VE1ASJ also used a 6N2, in his case driving an array of four 19-element Boomer Yagis.

The first test began at 0000gmt on 12 August, using 5min periods of cw at 600 letters/min under the callsign G4DGU/P on 144.6185MHz. During the next five hours three short and weak bursts, almost certainly from VE1ASJ, were heard in Devon, but none was strong enough for complete identification to be made from the slowed-down tape recording. The signals exhibited significant de-correlation, in a similar manner to those heard in 1979. VE1ASJ received two good bursts, and made a positive identification of the two callsigns being transmitted by G4DGU/P.

The second test started at 1200gmt on 12 August, but gave no results in either direction. The third test was due to start at

2300gmt on the same day. As the equipment was being prepared and checked before the sked, the generator coughed and spluttered to a halt. An hour's work in the dark moonless night revealed that it had succumbed to the heavy rain and driving wind prevailing over the past 24h. A telephone call was made to VE1ASJ to inform him of the problem and cancel the sked, during which he commented that "the meteors were really pinging" in Canada, and so perhaps the best chance of all was lost. Plans are now being formulated for a further series of tests during the August 1981 Perseids.

Aurora

Several weak auroral events were observed around the country during July and August. John Hoare, G8PKN, in Wantage, discovered Tone A signals on 144MHz on 25 July, and exchanged 5/2/A reports at 2333gmt with GM4AFF (YR70f). At 2355 he worked GM8TSI (YP16h), with 5/3/A reports being sent each way. The auroral signals disappeared for G8PKN at 0015gmt. G4DSC in Ripon received a telephone call on 16 August telling him that an aurora was in progress—while he was in the grips of a power cut. When the supply was restored he worked SM4IVE before conditions faded.

144 and 432MHz openings

Late July and early August brought several good tropospheric openings on 144 and 432MHz, with the bulk of the dx worked being to the south. On the lower band on 23 July, John Quarmby, G3XDY (AM76c), in Ipswich, made contact with several French stations in AF, AG, BG, CG and ZH locator squares, and also worked three of the same stations on 432MHz. On the following day he worked DF3XU (FN31a) on both bands. The best 432MHz dx on 22 July for John Tye, G4BYV, in Norfolk, was F1ANT/P (CE12g). He also heard F1EKQ, who was running only 10W from CF square.

On 27 July Geoff Grayer, G3NAQ, near Newbury, made his first 144MHz QSO with Andorra, in the shape of C31NT (AC39j), who was running only 3W from an IC202, but at 2,700m as! Geoff also worked EA1CV (XD square), EA1ED (VD59h) and many French stations in ZC, AD, BD, ZE, ZF, CF, ZG and AG squares on 144MHz. Several operators made contacts with stations in ZE, ZF, AF and AG squares on 432MHz. The higher band seems to have been more productive of dx on 28 July, when G4BYV, running 10W from a homebrew transverter to a 13-element K2RIW antenna worked F6CBC/P (ZD43a). G3XDY pointed his 21-element 432MHz Yagi eastwards to work DK5AI (FL33b) and DL7QY (FJ61e) on cw, and DF7VX (EL24c) on ssb.

Andorra was worked again on 9 August, when C31RN (AC29f) gave many UK stations their first contact with that country on 144MHz. The outstanding signal on the band in the evening came from the EA3AQT/EA3BBW expedition to the west of Saragossa (locator ZB11d), who worked many G and GW stations. Yet another Andorran callsign appeared on 144MHz during the morning of 10 August, when C31VF, whose home callsign is FIKCP, worked several stations in the London area.

During the opening on 22 July, Mike Dennison, G3XDV, in Kent, was monitoring some of the European 432MHz beacons, and at 1630gmt could hear HB9F on 432.982MHz, OZ2UHF on 432.445MHz (although this is nominally on 432.450MHz), and F6KKU/B on 431.995MHz. Mike comments that his beacon list does not show either the HB9 or the F6 beacon, and your scribe has no information either. Signals from F6KKU/B

peaked in the ESE direction from Kent, which puts it anywhere between Calais and the German border. Does any reader have information on these beacons?

Scandinavian activity contests

OH2BEW, the vhf manager of the Finnish national radio society SRAL, noted the mention of these contests in the June/July issue of *Radio Communication*, p661, and has kindly given more details. These events are national contests in Norway, Sweden, Denmark and Finland, and are synchronized to maximize activity. Many UA, UP, UQ and UR stations also appear. The contests are cumulative, the exact rules differing from country to country. In Finland the winner is the person making the largest total score over eight months, although the largest scores in each month are also published. OH2BEW comments that this is the most popular event on vhf and uhf in Finland, exceeding all international events in the number of Finnish entries. Many rare QTH locator squares are activated at these times. The contest exchange is simply RS(T) and QTH locator.

IARU Region 1 dx records

The publication in August of the IARU Region 1 vhf and uhf dx record table prompted several people to write to G5UM with details of 70MHz contacts. The comment regarding the lack of a sporadic-E entry for the band brought a letter from G5MR, near Canterbury, describing a QSO between himself and CN8MG in Casablanca. The contact took place on 25 May 1960, when G5MR was located at Hythe, on the Kent coast. Amplitude modulation was used, and 5/8 reports were sent each way over the 2,080km path. If any operator can claim to have exceeded this distance on 70MHz, he is asked to send the details to G5UM so that they may be added to the IARU official list.

Tom Harrison, GM3NHQ, of Broughty Ferry, Dundee, has sent details of an auroral contact on 70MHz between himself, operating as GM3NHQ/P, and GC3POL/P on 4 September 1966 during a contest. He does not claim a record for the 752km contact, commenting that "Fraser, GM3EGW, beat me to it by a few minutes!"

The 70MHz tropo record has been claimed by Andrew Givens, GM3YOR, of Kirkcaldy (locator YQ65f). On 22 August 1978 he made contact with GU3HFN (YJ48g) using ssb. The distance was 747km, which substantially exceeds the present 628km entry in the record table. Andrew has also sent details of a 768km contact with GJ3WMP/P (YJ60e) using ssb on 13 August 1978, but which has not yet been confirmed.

Information is sought about any records that may have been made during the expedition to Andorra during the 'sixties, although it is unlikely that they will exceed the 20-year-old contact by G5MR. Propagation mode, transmission mode and location must be given in any claim for entry into the record table, along the lines set out in August.

Awards

The latest recipient of the gold-leafed FMD Supreme Award is G8IFT of Birmingham, who received No 32 in the top category after submitting a 1,296MHz claim (No 22) to add to the two Senior Awards already held. John Woodham, G4IJW, ex G8BKR, of Bristol, is another operator nearing the Supreme Award. He has been awarded 432MHz Senior No 66 to add to the 144MHz Senior earned many years ago. 144MHz Senior No 152 has gone to Ken Willis, G8VR, of Dartford, who

managed to fit in some vhf operating between much shuttling back and forth across the Atlantic. The first 432MHz listener award for five years has gone to George Grzebiński, BRS41733, of west London. George listens regularly on all the vhf and uhf bands, and has added his voice to those requesting that the FMD awards should be continued in their present format, running in parallel with 4-2-70 Square series.

Graham Taylor, G8SZF, of Cannock, became the first in the G8S— series to receive a Squares Award in July when he claimed certificate No 21 for working 40 squares and 10 countries. He has also been awarded FMD 144MHz Standard No 550 for working nine countries and 40 counties since he was licensed in September 1979. The line-up at G8SZF consists of an IC245E followed by a linear and a 16-element Tonna, all at 200m asl. George expressed the wish to the vhf awards manager that some of the UK stations would be as prompt in confirming contact as some of the Continentals are. He has worked over 60 counties but is still awaiting many confirmations before he can claim the FMD Senior.

VHF in Region 3

Two correspondents, Greg Lovelock, G3III, and Mike Matthews, G3JFF, have very kindly provided clippings from the Australian magazine *Amateur Radio Action* which show contrasting views of amateur activity on vhf in southeast Asia and Australasia. The situation in Singapore seems to be very

difficult, as 50MHz is effectively wiped out by local television transmissions, while on 144MHz the allocation of only a few specified spot frequencies and a power limitation of 4W make all but local working impossible. Any tv means that the amateur must close down, and his equipment is confiscated until the problem is rectified. G3III comments that things have changed somewhat since his days as 9V1NT during 1966-9.

VHF has a small but enthusiastic following in Hong Kong, with five of the 100 or so amateurs in the colony equipped for 50MHz, and many more using 144MHz. Common operating frequencies on the lower band are 50.15 and 52.10MHz, with 21.15 and 28.49MHz being used for crossband contacts. The Hong Kong Amateur Radio Transmitting Society, which acts as both the local and national society, owns and runs a repeater on channel R0, with the predictable call sign of VS6HK. Access to the repeater is obtained by the unusual technique of transmitting 10s of carrier before speaking. As long as the repeater is kept in use it does not need repeated access delays. The single unit gives good coverage over most of Hong Kong.

The New Zealand dx record table provides some interesting comparisons with the IARU Region 1 table published in August. Propagation modes are not given, but excluding moonbounce the record on 144MHz stands at 3,195km for a contact between ZL2HP and VK5BC on 23 December 1965, and on 432MHz it is 2,148km for a contact between ZL1TAB and VK2BQJ on 9 January 1979.

Nugatory nets

(or: "Why not try callbook order?")

by JACK HUM, G5UM*

Said the man in the next conurbation: "Tell me how you lot over there conduct that 2m net of yours. We're having a bit of trouble with ours. I reckon you'd call it a nugatory net, the way it goes on."

If by this he meant "futile, inoperative, not valid" then he seemed to have a point, judging from the description which he proceeded to give of how his local net performed. Or rather, didn't perform.

"Don't you lot over there go round in callbook order, or something?" he went on to ask. And would we give further details.

We said, yes, we did. And we said, yes, we would. But we hastened to assure the man in the next conurbation that the concept of conducting a net in callbook order was so obvious and simple that really he need not sit there with pencil poised ready to take it all down over the air. He could be told in 2min.

This is how it works:

As the moment approaches for the local net to swing into action each participant watches for his radio-room clock to click up to the deadline—say, 2000 or whatever—and he then puts out a brief "CQ any local net members" call. Because others may be doing the same thing at the same time he keeps it brief. Then he listens. Others then check in on the designated frequency—say, 144.8MHz or whatever—and because they have been doing it for so long each takes a 10s pause to await other takers.

Within minutes half-a-dozen-plus locals are on frequency ready for the weekly get-together. Although they will have checked in at random times and in random order of call signs all will have arranged themselves in callbook order within a matter of minutes.

Half an hour later old Ethelbald checks in. Held up by road traffic on his way back from Cambridge 64 miles away he is anxious not to miss the weekly "prayer meeting" on 144.8. Switching on the home transceiver he hears a G4+3 talking on the net. He knows that a 10s checking-in pause will be made "for any other takers" and that this will be his cue to announce his arrival, for his call sign happens to be the next

in the accepted numerico-alphabetical order. The G4+3 takes the pause: at once Ethelbald flips the switch. He is in circulation.

"Circulation" is indeed the operative word for nets conducted in callbook order. The first man in may be a G2+3 of venerable years. And the tail-ender may be a G8 operator who is still at school. In between come a row of G3+3, G4+3, with perhaps a solitary G5 in the middle, plus a string of G8+3 men to follow. Sometimes a G4+2 pops up, or even a G8+2. They slot easily into the accepted sequence before the G4+3 and G8+3, exactly as callbook.

What has taken four paragraphs to describe in print took in fact 4min to describe over the air to the man in the next conurbation. His reaction was that it all seemed so simple and obvious that he wondered why his locals had not tried it for themselves long since.

"Another advantage of your system," he went on to muse, "is that if you get a new station checking in you have only to look him up in the callbook to find out where he is."

Very true: but when the man in the next conurbation confessed that his own copy of the *RSGB Amateur Radio Call Book* was dated 1973 it seemed that this particular ploy would hardly work. It would be difficult, we said, to "look him up to find out where he is" if the identity of the wanted station was among the several thousand not listed in his obsolete six-year-old copy.

"Was it really as many as several thousand?" he asked. If he had possessed the 1980 edition he could have found the answer himself: that no fewer than 2,990 additions and 4,010 deletions had been made during the course of the year. Had he ever considered that the *RSGB Amateur Radio Call Book* was the cheapest component (in terms of value for money) that he could buy at the ARRA Leicester exhibition? No, this had not occurred to him: and anyway he thought he would do without a 1981 edition, for he was saving up half a hundred pounds to buy an rf output meter. Strangely, it had not occurred to him either that he could make himself an rf output meter from a design in Chapter 10 of the *VHF/UHF Manual*, and save enough money to buy half a dozen callbooks if he wanted them (one for himself and the other five for Christmas presents).

By now our correspondent seemed wholly convinced that the *RSGB Amateur Radio Call Book* in truth was the cheapest component you could buy. Then he was seized with a bright thought:

"I've just realized," he said, "that you need the callbook for something else . . . to know where to turn the beam on to a weak signal. Look him up in the book, then twiddle the antenna in his direction!"

We hardly had the heart to venture the thought that this, too, was in the "simple and obvious" category. But then on the vhf/uhf bands you are learning all the time. □

* 27 Ingarsby Lane, Houghton on the Hill, Leicester LE7 9JJ.

the month on the air

John Allaway, G3FKM*

BULLETIN No 79 from ARRL HQ dated 27 July contains information that, consistent with the majority of more than 600 comments from members on the issue, the board of ARRL directed the filing of a petition to FCC requesting that the new 10MHz band be made available to General, Advanced and Extra Class licensees for cw and rtty operation only, with an input power limit of 250W.

It also lists a second item of great interest and concern to those living in other parts of the world. This is that the petition will also request that the 14MHz phone sub-band be increased by 50kHz, with an Extra Class sub-band of 14,150 to 14,175kHz, and an Advanced/Extra sub-band from 14,175 to 14,225kHz. It will also request that Extra Class voice operation be permitted between 7,075 and 7,100kHz without eliminating cw and rtty use by other licensees.

The second item is of course of concern to all amateurs outside the USA in that, if accepted, the amount of the 14MHz phone band free from USA signals will be halved, and about 40 per cent of IARU Region 1 phone band on 7MHz will be usable by our American friends.

Members views and comments would be very much welcomed as the RSGB may wish to make its views known at the appropriate time should this be seen to be necessary.

Mike Constable, G4FMC, reports the arrival of QSL cards for contacts with a station using his callsign on 3.5, 7 and 14MHz. It is three years since the genuine G4FMC operated on any band other than 144MHz.

Les Avery, G2FQP, reports that he has now completed over 2,000 QSOs with ZL3UY on 14,300MHz over a period of 17 years—is this a record? Les has a completely home-built station consisting of G2DAF receiver/transmitter/linear and a TH3 beam at 40ft.

Top band

Bob Parkes, VS5RP, advises that he will be active on 1.8MHz this "season". He intends to transmit on 1,805kHz and listen in the dx window—1,820–1,826kHz—for replies from Europe. His times on the band will be from 2130 to 2230 during October and early November. He may well be found before this time on 21,008, 7,003–7,008, or 3,506kHz. Bob is attempting to get a line over some 80ft high trees and when he does he will have a 600ft-long V beam.

The 1979/1980 No 2 edition of the *W1BB 160 Meter DX Bulletin* points out the problems of band planning on 1.8MHz and suggests that, for the time being, a "gentleman's agreement" might be followed whereby 1,800 to 1,810kHz would be reserved for cw only, 1,810 to 1,825kHz for ssb and cw, 1,825 to 1,830kHz cw only (the dx window), and the rest of the band

cw and ssb. The 1979 WARC has considerably modified 1.8MHz, and proper band planning will be possible in due course. W1BB also mentions that the logs belonging to the late ZE7JX are now with AA4V should anyone still be in need of a QSL card. Modesty seems to have prevented G3SZA and GD4BEG giving your scribe the information that they had worked 110 and 104 countries respectively by April 1980—both needed only a few QSLs in order to claim DXCC. The bulletin is free to anyone who sends a large sase or airmail postage to Stewart Perry, W1BB, 36 Pleasant St, Winthrop, Mass, 02152, USA.

News from overseas

G3TTH was told by VP8AI over the air that VP8JO appears to be an unlicensed station, and that VP8AI would appreciate information on beam headings from anyone who works him.

Alan Taylor, G3OSB, is at the moment (and until March 1982) at Betio on Tarawa Atoll, Kiribati, and has the callsign T3AT. Betio is just over two miles long and a few hundred yards wide, and his house is at the narrow end actually on the beach with waves at high tide about 20ft from his back door! It seems that there are two other amateurs also fairly active on the atoll: Willie, T3AC, and Wirram, T3AY. The only active amateur in the Line Is part of Kiribati (Fanning, Washington and Christmas Is) is T3LA, who is on the last mentioned. Alan himself is on all bands 3.5 to 28MHz, but concentrates mainly on trying to work into the UK on 14, 21 and 28MHz. This most often happens just before he leaves for work in the morning (between 1900 and 1945) on 21,250kHz. Sometimes he also operates on this frequency from 1030 to 1130 when conditions are often still good into Europe. At the time of writing Alan's equipment consisted of an FT200 with FL2000B linear and trap dipole at 100ft above ground. A beam at 80ft is planned for the near future. QSLs should be sent via G3XZF.

The 1980 SEANET Convention will be held in Manila from 27 to 29 November. There are indications that more than 200 non-DU amateurs will be present. Full information on reservations etc is available from Earl Hornbostel, Box 445, Greenhills Post Office, Metro Manila, Philippines 3113, by telegram to "Valex", Manila, Philippines, or telex to RCA (722) 27840 (Answerback FEW PH), Attn Earl Hornbostel. A fully-equipped hf station will be active during the convention and will use the callsign 4D1SEA. SEANET meets on 14,320kHz daily at 1200, and a second station will also be on this frequency at the same time in order to answer questions on the convention.

Eric Trebilcock, in a letter to your scribe, says that after managing the VK3 QSL Bureau for 20 years he relinquished the task on 1 September. His duties have been taken over by VK3BYK (see "QTH Corner"). Eric has been an active listener for 55 years and is now over 70 years old, but is still enjoying life and hopes that he may manage another visit to the UK in due course.

Anthony Green (ex-VS6EZ) is in Muscat and licensed as A4XGR. He will be using his old frequencies of 21,150 and 28,490kHz from 0930 on most days. He promises 100 per cent QSLing, but only on receipt of cards. Cards should be sent direct to the address in "QTH Corner", and a 20p postal order or three ircs enclosed for direct airmail reply.

G3PDL has passed along the news that Tommy Moyce, ZD8TM, will be operating from St Helena as ZD7WT on cw on all the hf bands until the end of this month. He will be looking particularly for QSOs with the UK.

*10 Knightlow Road, Birmingham B17 8QB.



A group of dx enthusiasts who visited Alexandra Palace last May (l to r): WB8ZJW (of the DX DX Net), GD4FWQ, G4GBV, G3ESY, G3MCS, G3VKW and G3GIQ. At front is GD4GWQ (wife of GD4FWQ)

Dxpeditions

The Noviomagum-DX Group has arranged another expedition—this time to Jersey. They will be active from 1200 22 October until 1200 26 October on all bands 1.8 to 28MHz using cw and ssb, and the callsigns will be GJ4IFE, GJ5DPU, GJ5DPV, GJ5DPW, GJ5DPX and GJ5DPY. All QSLs should be sent via PA0KHS (see "QTH Corner").

JA7SGV, JH7BBK and DU1JB are planning an extensive tour of the Pacific area, part of which should be completed by the time that this reaches readers. However, they are scheduled to be at Fiji from 7 to 11 October, Tonga from 11 to 18, Samoa from 18 to 23, Kiribati from 24 to 27, Tuvalu from 28 to 30, Nauru from 1 to 5 November, and Tokelau Is from 6 to 10 November. All-band cw and ssb operation is expected.

Bill Hatcher, KP4KK/DU2, is going to Macau from 23 to 30 October and will be on the air as CR9B on all bands—but especially 3.5 and 7MHz. He will be operating the equipment which was used by CR9A and which belongs to the IDXF.

Morris Johnson, KB4IT, will be visiting Brazil again this year and also making an expedition to Fernando de Noronha. He will be using the callsign PY0ZDX, and PY7OD (who will be with him) will be PY0OD. They will be on the island from 2 to 7 November on the usual dx frequencies on ssb and cw. Split frequency operation will be used initially. QSL PY0ZDX via WA4VDE and PY0OD via WA4MDS. QSLs for PY0ZDX will be provided by the International DX Association.

DX news

VKORD at Davis Base, Antarctica, is reported as often to be found on 14MHz ssb after 0900; 14,240, 14,280 and 14,310kHz have been mentioned as frequencies to check. VK2AGT (Lord Howe Is) is on the air most days from 0700 near 14,215 and 14,280kHz; he has also been reported on 28,500kHz.

T2AAA has been on 14,224kHz at 1000, and has now been joined on Tuvalu by Glenn, T2ADE, who has been reported on 14,228kHz at 1300. QSLs for both go via Weather Station, Tuvalu, Pacific Ocean. Ken, VK0KH, on Macquarie Is is active again and sometimes joins the P29JS net on 14,220kHz at 0800.

Graeme, VK4AGM, is aiming to make 50,000 contacts from VK9ZG before he leaves Willis Is at the end of the year. He has often been worked on frequencies 25kHz inside each band edge, and both 7,085 and 3,685kHz are mentioned as worth checking. The island may become difficult to work after Graeme leaves as the weather station is to be automated.

5NORBB was previously XV5AA, and according to the *Long Island DX Bulletin* he still has logs and will QSL contacts via PO Box 554, Lagos, Nigeria. The same source says that ZD9GH on Gough Is operates from 1700 to 1900 on 14,300kHz.

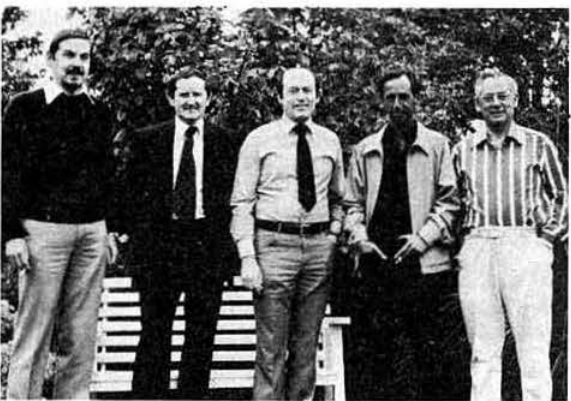
TL8CR will remain in the Central African Republic until the end of 1980, and he operates daily after 1000 on 21 and 28MHz ssb. TL8CN should be on the air by now, and TL8JM has been on 14MHz cw and ssb. TL8WH has also been worked on 14MHz.

After a long silence Qatar now seems to be a reasonably common country to hear on the hf bands. A7XGI has been very active on cw making contest type QSOs, and A7XD and A7XZ have been on 21 and 28MHz with A7XM worked from the UK on 14MHz ssb. The licensing situation seems unclear, and there are suggestions that A7XGI and A7XZ do not have authority. Confusion also applies to the United Arab Emirates, where A6XJC is active and is said to have received his licence on 11 July, whereas QSLs from A6XJA are believed to have been rejected by ARRL for DXCC credit.

QRP

The final activity weekend of 1980 to be held by the G-QRP Club will take place on 1/2 November (not on 3/4 November as previously listed in error). The annual Winter QRP Sports is being held from 26 to 31 December inclusive. During the activity weekend the following schedule is planned: 0900 to 1000, 14,060kHz; 1000 to 1100, 21,060kHz; 1100 to 1200, 7,030kHz; 1200 to 1300, 28,060kHz; 1300 to 1400, 14,060kHz; 1400 to 1500, 3,560kHz; 1500 to 1600, 7,030kHz; 1600 to 1730, 28,060kHz; 1730 to 2000, 21,060kHz; 2000 to 2100, 3,560kHz; and 2100 to 2300, 14,060kHz.

The G-QRP Club holds nets every Sunday from 1100 to 1230 on 7,030kHz, from 1400 to 1500 on 3,560kHz (cw), and from 1600 to 1700 on 7,090kHz (ssb).



At the QTH of G3ESY, Hereford, 6 July 1980. A get-together of some dxers—9X5PP and 3B8CJ were on holiday in England at the same time. L to r: 9X5PP (Peter), GW3MPB (Roy), G4CNY (Stuart), 3B8CJ (Jimmy) and G3ESY (Peter)

Revised licence regulations in the German Federal Republic

From 1 June 1980 a new class of licence has been made available in West Germany. It is designed to provide a transition from the Class C to the Class B and is called the Class A. Class C is vhf only, and the new Class A allows the use of the telegraphy modes (cw and rtty) in the sub-bands 3,520-3,600kHz and 21,090-21,150kHz, with a peak rf output of 150W, as well as all permitted modes on all frequencies above 28MHz. Class A stations will use the DH prefix followed by a single digit and three-letter suffix. The Class B licence allows all modes on all bands with peak rf output of 750W—except on the West German allocation 1,815 to 1,835kHz where the power output may not exceed 75W. The prefix blocks DF, DJ, DK and DL followed by a number and two-letter suffix are almost exhausted and will be followed by the DL prefix, single digit, and three-letter suffixes. The vhf-only Class C licence holders use the DA4, DB, DC, DD and DG prefixes. It is interesting to note that at the time of writing over 85 per cent of West German amateurs are members of their national society.

JOTA

A reminder that this year's Jamboree-on-the-Air takes place on the weekend of 18/19 October. This is not, of course, a contest, but it does provide many boys with their first contact with amateur radio. Last year 315 UK Scout stations were on the air.

Heard Island DX Association

Your scribe had the pleasure of a talk with Jim Smith, P29JS (known also as G3HSR a few years ago), just prior to his return to Papua New Guinea on 8 September after leave in the UK. It seems that he has received clearance for his proposed expedition to Heard Is from the Australian Dept of the Environment and from the department responsible for Antarctic affairs in Canberra. Much stress has been laid on the fact that the ecology of the island should not be disturbed. Permission has also been given for the party to use the existing huts, and a study of the wildlife will be made during their stay. A free place for a scientist with experience of such environments has been offered and will hopefully be filled.

The leader of the last group to visit the island has shown Jim films and pictures of the location, and has supplied much useful information. The journey will involve a total of 20 days travelling to and from the island, and a minimum of 10 days will be spent at VK0JS with a QSO target of up to 50,000 being aimed at. The callsigns of several well-known and experienced operators who are likely to take part were mentioned, but a final list will be published at a later date. Support is essential but need not be limited to money—eg articles could be supplied to magazines or supplies donated. Money is urgently required and should be sent to: Jim Smith, c/o PO Box 2053, Konedobu, Papua New Guinea. If the expedition does not take place donations will be refunded (if requested), or allocated to another expedition or charity.

Royal Marines

Dave Wilkes, RS44224, reports that the RM's old callsign G3KSB has been brought into action again—this time from G1. The station will be found near 14,300kHz on most evenings, and particularly likes to hear from RNARS and /MM callsigns.

Welcome

The following members from outside the UK joined the RSGB during July: CN8BD, DC1NW, DG3OY, DJ7PF, EI4CG, KA7Q, KB9KV, OZ1BJT, SM6CPI, TU2JD, W5UWB, W7CE, ZS6AKV, 5B4CW and 9M8PW. Listener new members included F. De Pineda and P. Sterrenburg (PA), M. Ramadier (F), W. S. Alexander (DL), J. D. Rochard (9Y), P. O'Farrelly (EI), V. C. Graham (ON), B. E. Key (EA8), and J. Dellow (ZS).

Contests

The OK DX Contest

0000 to 2400 9 November

1.8 to 28MHz; cw and phone but not crossmode. Exchange RS/T and two figures to indicate ITU zone (UK is 27). A station may be worked once on each band, and three points are scored for each complete QSO with a Czechoslovakian station, one for all others. The multiplier is the sum of ITU zones worked on each band. There are single-operator all-band, single-operator single-band, and multi-operator multi-band categories. Separate log must be kept for each band and should show date and time, station worked, numbers sent and received, points, and if multiplier. Entries should be accompanied by the declaration "The station was operated in accordance with the rules of the contest as well as all regulations established for amateur radio in my country, and my report is correct to the best of my belief". Post logs before 31 December to: CRC, PO Box 69, 113 27 Praha 1, Czechoslovakia. (Note that the "100 OK" and "S6S" awards may be applied for when submitting a log entry without sending QSL cards). In the 1979 contest G3ESF scored 53,640 points and G6NK 2,718 on all bands, and G4HLN 304 on 14MHz.

In the 1979 VK/ZL Oceania Contest (Phone) G3TTJ was third European with 8,816 points, and was followed by G3UVZ (3,400), GM4FDM (1,666) and G5MY (144). In the cw section G3ESF led with 1,311, G5MY scored 1,054, G3KSH 816, and G3PVA 468.

International Police Ass'n (IPA) Contest

0700-1000 and 1400-1800 8 November and

0700-1000 and 1400-1800 9 November

Work IPARC members. Exchange from non-members consists of RS/T plus serial QSO number (from 001), IPA members send the same preceded by IPA, and USA IPA members also indicate their state (eg IPA VA 59 001). QSOs on 3-5 and



Peter Zollmann, G4DSE, winner of the 1980 Bermuda Contest

QTH CORNER

A36EA via ZL1AMU (see ZK2EA).
A36TW via ZL1AZV (see ZK2TW).
A4XGR A. Green, PO Box 981, Muscat, Oman.
A6XJC M. J. Groote-tar Mors, v.d. Capellenstr 21, 7514 AW Enschede, Netherlands.
CR9B via WA3HUP, Mary Crider, RFD 2-Box 5-A, York Haven, Pa, 17370, USA.
D4CBS A. Mendes, 136 Chestnut St, New Bedford, Ma, 02740, USA.
FC0FOC via DJ3TF, W. Wessely, Max Referstr 6, 8450 Amberg, W. Germany.
FK8DH via DJ9ZB, F. Langner, C Kistnerstr 19, 7800 Freiburg Breisgau, W. Germany.
FO0LC via F6EOP, C. Ligot, 38 R Fernand-Segouin, 95400 Arnouville les Gonesse, France.
HK0AA via HK3BDD, Box 584, Bogota, Colombia.
HK0AB via I8XIU, A. Minervini, Via Autostrada 28, 80055 Portici, Italy.
IM0MIE PO Box 330, 6800 AH Arnhem, Netherlands.
PA QSL Bureau H. van Hensbergen, Smaragdstr 53, 6534 WN Nijmegen, Netherlands.
PA0KHS Mrs B. Gray, VK3BYK, 1 Amery St, Ashburton, 3147, Vic, Australia.
VK3 QSL Bureau 14 Beacon Oak Road, Tenterden, Kent.
VP1BEH via VP2MO, I. Hollatz, Woodlands, Montserrat, West Indies.
VP2MGT Box 925, Kuala Belait, Brunei.
V5SKF J. G. Ward, ZL2AQF, 18 Shakespeare Terrace, Napier, New Zealand.
ZK1CF J. R. Bright, ZL1AMU, 1 L Infantry Workshops, Military Camp, Papakura, New Zealand.
ZK2EA A. J. Ward, ZL1AZV, 141A Bleakhouse Road, Howick, New Zealand.
ZK2TW via K5BDX, D. Simmonds, 7836 Garza Road, Fort Worth, Texas, 76116, USA.
3B8DB via ZL1BIL, M. B. Edwards, Box 190, Te Aroha, New Zealand.
3B8ZV Four Winds, Male, Rep. of Maldives.
3B9ZV
8Q7AZ

RSGB QSL Bureau, G3DRN, 30 Bodnant Gardens, London SW20 0UD

7MHz count eight points, and on 14, 21 and 28MHz four points. The multiplier is total IPA countries and USA states worked per band added together. Stations may be worked once only on each band. Activity will be restricted to 3,575, 3,650, 7,025, 7,075, 14,075, 14,295, 21,075, 21,295, 28,075 and 28,650kHz (all ± 25 kHz). Post entries before 31 December to R. A. Ridley, G3UTX, 23 Greenacre, Worlebury, Weston-super-Mare, Avon BS22 9SL.

In the 20th All Asian DX Contest (CW section) G4DNV scored 80 points on 7MHz. In the all-band category G3FXB gained 73,576, G3ESF (23,862), G3DYY (score not correct in list received), GW3NYY (5,252), G6NKK (1,875), G2AJB (1,166) and G3MWZ (304). It is hoped to give more complete results later.

WADM DX Contest

1500 18 October to 1500 19 October

Phone and cw but not crossmode, 3.5 to 28MHz, but first 10 and last 25kHz of 3.5 and 14MHz must not be used. Same station may be worked once on each band and on each mode. Categories are single- and multi-operator and listener. Exchange RS/T and QSO number (from 001); Y stations will indicate their district by two figures. Districts are identified by last suffix letter. Logs must be posted within 30 days of the contest to Contest Bureau, RKDDR, Hosemannstr 14, DDR 1055 Berlin, German Democratic Republic.

First Alternative Energy Contest

0000 15 November to 2400 16 November

CW only, within 5kHz of the international QRP calling frequencies (3,560, 7,030, 14,060, 21,060 and 28,060kHz). Two sections: (a) those using natural energy generated power (sun, wind, water flow etc), and (b) all others. Power limit for all is 5W input. The antennas must not weigh more than 12kg in total, and must be capable of erection by not more than two

people. Each QSO counts one point and there is a multiplier of one for each of the first 10 countries worked. Logs should be sent before the end of November to Leonardo Boselli, I5NUO, v.D. Comparetti 26, I-50135 Firenze, Italy.

CQ WW DX Contests

A reminder that logs should now be sent to *CQ Amateur Radio Journal* (Att: Contest Committee), 76 N. Broadway, Hicksville, NY, 11801, USA. Be sure to clearly indicate "CW" or "Phone" on the envelope.

Band reports

A very comprehensive report from G8KG this month which reads as follows:

"With the data now available it seems fairly certain that Cycle 21 passed through its peak at just about the turn of the year. Subject to correction when the final Zurich numbers for 1980 are published, the smoothed monthly sunspot number for December 1979 was just over 165 while that for January 1980 was just slightly lower. This makes the present sunspot cycle the second highest on record. If one uses the 2,800MHz solar flux as a somewhat more objective base, the highest smoothed monthly values were for January and February 1980 and gave the smoothed peak of 200 sfu. This slightly later peak is not unexpected, since peaks in solar flux have tended to lag on peaks in sunspot activity by about 27 days.

"The smoothed curve could, of course, still turn out to be "double-humped" as has sometimes happened in the past. As regards current behaviour, there was a sharp trough in mean solar activity centred on the first week in August as previously active areas declined and were replaced by new activity towards the end of the month. Incidentally, similar sharp troughs in the 27-day mean sunspot number occurred at practically identical times in August 1978 and 1979 but, on current theories, this must be regarded as a coincidence.

"As might be expected the average solar flux for the first eight months of 1980 was higher than for the corresponding period in 1979—195 sfu compared with 182. At the end of August mean solar activity was rising very steeply but, since the overall trend is now probably downwards, it would be over-optimistic to expect this rise to lead to average levels this winter quite as high as those of a year ago. There is, however, a good chance that daily solar flux values will sometimes pass the 200 sfu mark and, based on last year's experience, this level of activity, coupled with a stable magnetic field (A index in single figures), is sufficient for good transatlantic communication on 50MHz during the seasonal peak from late October to mid-December, while marginal conditions to the nearest east coast stations have been observed with flux values around 150 or a little higher. There will probably be little difference in conditions on 21 and 28MHz this winter as compared with last year."

This month's contributors to this section included G2s BY, AMV, CDT and HKT, G4QK, G5JL, G3s AAE, GVV, IMW and KSH, GM3LYY, G3s NWG and PDL, GM3PPE, G3YRM, GM4CHX, G4s CNY, DSE, EHQ, GXL and JBH, G8WEE, RSs 1066, 17567, 25429 and 35928 and A9191—to whom, many thanks.

Stations listed in italics were using cw.

1.8MHz. 0000 0Y7ML 0100 ZD8TC. 0200 PY1RO, ZD8TC, ZS5WT. 2200 OH1MA/OH0, UB5NAR. 2300 OH3JR/OH0.

3.5MHz. 0000 LUSEIE, PY, ZD8TC. 4K1A. 0100 PY. 2200 USSR stations around 3.645kHz. 2300 C5ACO.

7MHz. 0000 ZS6AY. 0200 9K2DR. 0400 FM0FJF. 0500 CP6IM, HC1FF, VE7IG, ZK1AC. 0600 CM, HI, HK0AB, TI. 2000 JA6XMM. 2100

VK3MR, ZD8TC, 9H18B, 2200 C5AAP, LU, PY, SU1IM, ZP, SNORHK.
2300 UA1PAL, DL2GC/YV.

14MHz. 0600 J6LWZ, KC6DC, 0700 A35RF, FK8DD (QSL to WB3-JUK), HK0AB, KH6LW/KH7, VK9NS, VK9ZG, VK0KH, 0800 HK0AB, K4AAA, ZK1AC, ZK2EA, 1000 K5YY/K56, VS5MS, 3B8DB. 1100 FB8Z0, 1200 A7XM, 1400 ET3PG, 1600 YK1AA, 4U1TU, 600DX, 1900 EA9GH, 2000 CE9AF, FK8CR, HS5AI, VP8, ZL (via LP), 2100 ZL1AH, 2200 FP0FO (QSL to WA1IHN), HH2VP, TU4AW (QSL to K5TC).

21MHz. 0700 F08EW, HC8GI, KH6s, T3AT, 0800 FW8AC, KA6HI-Q/KH3, ZK1CF, 3B9ZV, 3D2SG, 600DX, 0900 T3AT, TA2TAT, UA1PAL, VK9NV, ZK2s EA, TW, 5W1BZ, 1000 F08FRV, FW8SC, H44HB, KC4USV, YJ8SR, 1100 A35EA, FK8BH, H44CF, P29NRL, ST2FF, TA1UA, VK9NV, ZK2TW, 1200 C31UI, CT8USA, EA9GT, FK8s, T3AC, VK9ZG, YJ8, 9N1MM, 1300 FR0FLO, P29s, YS10, 1400 VQ9NN, YB0ADT (QSL to VE7CBK), 9G1JX, 1500 F08FRV, SP2EFU/JW, VS5DD, 3B6CD, 1600 JT1AN, JT1AY, VS5SR, VQ9, VU, YB0AC, 1700 AH2E, C5ABK, W7LPP/DU2, EC9AQ, FR7BP, JA, OH0XZ, 4W1BM, 9M, 9V, 1800 CE9AF, D68GA, JE1GJO/JD1, KC6IN, KH6AP, N6HR/KX6, OABAA (Box 2492, Lima 100), OE5GML/YK, ZD7SD, 8Q7AZ, 1900 HS0HS, VP8SB, VS5PP, 2000 A7XD, KH6JL, OX3PT, VQ9JW, 3B8ZV, 2100 D68AP, HC8EE, H51ABD, TR8IG, 2200 BV2A, D68XX, HK0AB, HL2WM, TR8EE (QSL to DJ0VT), 2300 VP1CW, VS5RP.

28MHz. 0800 FW8SC, 9V1TA, 0900 W5JMM/SU, 1000 A7XA, CN8MC, S72SA, SV1KP/SV5 (Cos), UA1PAL, 1100 P29GC, VK6MV, 1200 H44SH, SU1IB, 5N8THG, 1500 J6LOU, 9X5PP, 1600 CE, CX, HR, LU, 9M2GZ, 1800 W5JMM/SU, 4S7RM, 1900 D68GA, HK0AB, W1-W4, W8-W9, ZP, 2000 FG7AS, 2100 D68XX, KV4CI, 2200 LU, PY, P21AP, W1-W4, W9.

Thanks also to the authors of the following for items extracted: *DX News Sheet* (Geoff Watts), *Long Skip* (VE3FRA), *DXpress* (PA0TO), *CQ Magazine* (W1WY), *the Ex-G Radio*

Club Magazine (W3HQO), the *DX Bulletin* (K1TN), and the *Long Island DX Bulletin* (W4UL/W2IYX).

Please send everything for the December issue to reach G3FKM no later than 28 October—and for January issue by 28 November. □

Propagation predictions

During October the F2 mufs reach their maximum value of the year, and they will be high enough for 28MHz to be open in all directions. Traffic with North America and Japan will be certain, especially during the latter half of the month. On favourable days (days with above-average mufs) traffic with western North America will also be possible. Short skip conditions (over about 800 to 1,800km) will only occur under exceptional circumstances during this month and in the coming winter season. The same applies to 21MHz; as on 28MHz all continents will be heard on 21MHz, even western North America. The 14MHz band offers good dx during the evening, and during daytime it will be open for dx as well as local European traffic.

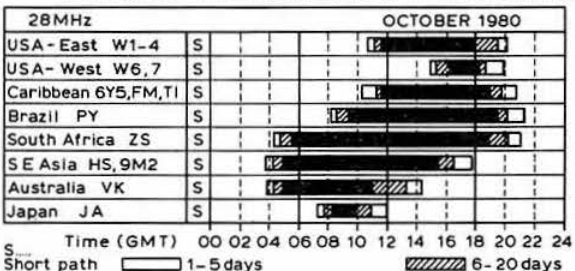
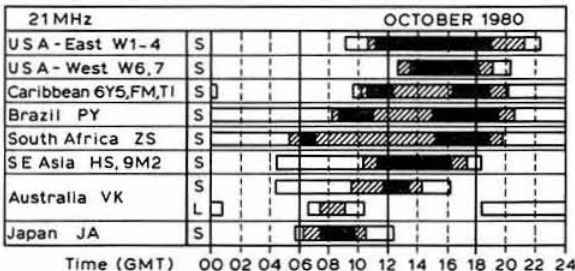
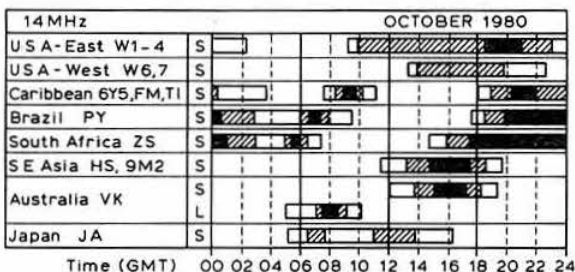
Distances covered will lengthen on 7 and 3-5MHz. There will be no occurrence of the dead zone. As the season advances, chances of dx will increase on 7MHz when the longest part of the path lies in darkness. The most successful dx will be after midnight. Local traffic could be interrupted by the dead zone during the latter half of the night.

The provisional sunspot number for July 1980 from the Swiss Federal Observatory was 135. The daily numbers during the period 17-22 July all exceeded 200. The predicted smoothed numbers for November and December 1980 and January 1981 are 136, 134 and 131 respectively.

HF propagation study

		Predicted hpf + luf in megahertz for October 1980															
		00	02	04	06	08	10	12	14	16	18	20	22				
Suva (s)	1600	1900	1700	2000	3000	3700	4000	3800	3000	3200	2600	2100	2100				
Wellington (s)	1900	1900	1700	2500	3300	3600	3300	3100	2700	2500	2400	2100	2100				
Osaka	1810	1811	1711	2612	3513	4113	3411	2410	2109	2008	1708	1009	1009				
Hong Kong	1709	1511	1713	3315	4316	4915	4212	3209	2606	2506	2105	1807	1807				
Sydney (s)	1712	1516	1718	3319	4118	3515	3411	3206	3003	2604	2106	1809	1809				
Moscow	1503	1302	1203	2404	3506	4007	4107	4105	3403	2703	1903	1603	1603				
Bangkok	1809	1611	1713	3815	4617	5016	4914	4710	3906	2805	2105	1907	1907				
Singapore	1908	1711	1713	4016	4818	4917	4314	4609	3906	2804	2204	2006	2006				
New Delhi	1903	1706	1709	4011	4813	5013	4612	4108	3305	2503	2203	2003	2003				
Perth	2011	1914	1917	4220	4222	3915	3610	3106	2904	2305	2107	2107	2107				
Tehran	2003	1904	1906	4208	4910	5011	4610	4607	3004	2803	2303	2103	2103				
Colombo	2004	1907	1911	4215	4917	5017	4615	4610	3006	2904	2304	2104	2104				
Bahrain	2203	2004	1906	4109	4912	5013	4612	4608	4204	3103	2403	2203	2203				
Cyprus	2003	2003	1804	3406	4509	4709	4309	4307	4205	3104	2403	2103	2103				
Aden	2504	2306	2008	4111	5014	5115	4614	4611	4508	3305	2704	2404	2404				
Seychelles	2500	2300	2100	4100	4400	4500	4500	4300	3900	3400	2800	2600	2600				
Mauritius	2600	2400	2100	4000	4100	4100	4100	3900	4000	3500	2900	2700	2700				
Nairobi	2603	2503	2105	3709	5113	5214	4814	4710	4707	3604	3003	2802	2802				
Malta	1803	1702	1502	2104	3607	3909	3708	3607	3506	2804	2103	1803	1803				
Salisbury	2803	2704	2105	3510	4214	4216	4215	4213	4210	3806	3203	2902	2902				
Cape Town	2900	2800	2200	3000	4200	4400	4400	4400	4500	4100	3500	3000	3000				
Lagos	3004	2903	2403	2506	5011	5313	4914	4814	4811	4107	3504	3104	3104				
Suva (l)	3000	2900	2400	2400	3600	3200	2700	2700	2600	3100	3500	3200	3200				
Gibraltar	1602	1502	1402	1302	2804	3305	2705	3005	3004	2703	2602	1702	1702				
Ascension	3004	2803	2503	2207	4712	5215	4916	4816	4715	4310	3504	3104	3104				
Wellington (l)	3000	2800	2500	1900	2800	2400	2200	2200	1900	1900	2900	3200	3000				
Dakar	2800	2700	2400	2300	4410	5112	4913	4712	4611	4408	3505	3000	3000				
Las Palmas	2403	2302	2102	1704	3806	4608	4410	4310	4209	3906	3003	2603	2603				
Falklands	2906	2704	2405	1906	2913	4218	4522	4823	4622	4517	3513	3009	3009				
Rio de Janeiro	2905	2704	2404	1907	2911	4615	4719	4219	3718	4014	3610	3007	3007				
Buenos Aires	2805	2604	2404	1906	3009	4315	4619	4421	4519	4616	3612	3008	3008				
Sydney (l)	2714	2512	2311	1808	3008	2712	2418	2322	2024	2222	3119	2916	2916				
Lima	2700	2500	2300	1800	2500	2600	4800	4700	4800	4400	3600	3000	3000				
Barbados	2603	2302	2202	1803	1905	4209	4713	4615	4615	4512	3700	3206	3206				
Bogota	2500	2300	2200	1700	1900	2700	4700	4700	4600	4500	3700	2900	2900				
Jamaica	2400	2100	2000	1700	2000	2400	4600	4500	4500	4400	3600	2800	2800				
Bermuda	2400	2100	2000	1700	1800	3700	4600	4500	4500	4400	3600	2700	2700				
New York	2305	2006	1806	1706	1707	2609	3612	4413	4413	4311	3409	2607	2607				
Mexico	2300	2000	1800	1700	2000	1700	2500	4400	4300	4300	3400	2607	2607				
Montreal	2305	2008	1808	1708	1709	2711	4113	4314	4314	4212	3310	2509	2509				
Denver	2300	2000	1800	1700	1600	1600	2100	3500	4000	4100	3200	2400	2400				
Los Angeles	2300	2000	1800	1700	1700	1700	1700	2800	4000	4000	3100	2400	2400				
Vancouver	2100	1900	1700	1700	1700	1600	1700	2400	3900	3900	2800	2300	2300				
Iceland	1408	1308	1208	1207	2008	2808	3209	3009	3009	2808	2008	1508	1508				
Honolulu	2100	1900	1700	1700	1700	1800	1800	1500	1800	3500	2800	2300	2300				
Fairbanks	2100	1900	1700	1700	1800	1800	1800	1900	2400	2800	2700	2300	2300				

First two digits are hpf, last two luf. LUF 00 indicates data not available.



S... Short path
L... Long path
1-5 days
6-20 days
Openings on more than 20 days in the month

obituaries

The Society records with regret the deaths of the following radio amateurs:

Mr R. Brown, RS40335

Ron Brown died on 9 August, before hearing he had obtained his licence. He was the local RAIBC representative for the Bournemouth area and an active member of the Bournemouth Radio Society.

Mr W. T. Harvey, G4DEC

Bill Harvey, who died on 15 March, had been a member of the RSGB since 1954. He obtained his licence in 1974, and enjoyed transmitting, and attending the local club although partially disabled, but was forced by ill-health to give up the hobby three years ago.

Mr K. Heap, G3NCZ

Ken Heap died on 24 May. He was a founder member of the East Lancs Amateur Radio Club and held the offices of chairman or vice-chairman for many years. He was a member of the RSGB slow morse practice transmissions organization, and also gave instruction to the Sea Cadet force. His operations were mainly on cw and a.m. Ken was the net-controller of the club's Sunday morning net.

Mr H. Howard, G4CUH

Harold Howard, who has died, was chairman of the Cornish Amateur Radio Club some years ago, and later acted as the club's auditor.

Mr S. A. Howard, G8TY

Sid Howard, a long-time member of the RSGB, died recently at the age of 70. He was a very keen and active amateur, mainly on the hf bands, and was instrumental in starting many young listeners on the way to a full licence. Prior to his 1937 G8TY call he was licensed as 2BHS, and in those days was a very able home constructor. He was secretary of the Radio Fraternity Lodge No 8040.

Mr F. H. Lawley, G6ZG

Hugo Lawley died on 29 July aged 66. He had been licensed for over 40 years and was considered the "father" of Great Yarmouth Radio Club.

He was a keen cw operator and during the war was an active VI member of the Radio Security Service. He was also a founder member of Norfolk Raynet.

Mr A. A. J. Meyers, G3EYE

"Jingo" Meyers, as he was known on the air, died in July. He was a keen cw operator on the hf bands and also made the occasional phone QSO on vhf. He was active until a few weeks before his death.

Mr J. Moxham, GW4HEO

John Moxham died recently, aged 45. Because of his popularity he was elected chairman of Rhondda Radio Society in 1978, although he had only been a member for a few years.

Mr B. H. T. Oliver, MBE, MIMechE, G3DJQ

Basil Oliver died on 1 July, aged 73. In spite of many years' illness, he was frequently on the air with his friends on 3.5 and 7MHz. He held a Malayan callsign before his G call.

Mr R. R. Osborne, G8BRR

Mr Osborne died recently. Amateur radio was one facet of his deep interest in all areas of electronics.

Mr F. A. Ridgway, G3PXZ

Fred Ridgway died on 15 July, aged 62. His interest in amateur radio dated back before the war and he was known on all bands from 1.8MHz to 1.3GHz. He was a founder member and subsequently president of Albright & Wilson ARS, with whom he developed a special interest for 144MHz and portable contest operation. He will be remembered by many vhf enthusiasts for his efforts in organizing the 1971 Midland VHF Convention.

Mr H. J. Stannard, G2YC

Jack Stannard died on 30 June, aged 69. He was a well-known amateur in northwest London, where he had operated since 1930, and was a pioneer of 144MHz.

Mr L. H. Webber, G3GDW

Larry Webber died on 16 August, aged 77. He was a founder member and vice-president of the Torbay Amateur Radio Society and was active on all bands until his death.

We have also been advised of the deaths of:

Mr D. C. Axtell, GW3INO.

Mr C. T. Capper, RS39104, in November 1979.

Mr J. M. Holmes, RS3686, on 10 December 1979.

Mr G. V. Hunt, RS3877, on 8 April.

Mr F. H. Tyler, G6GF, in July.

Special event stations

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

GB2CKC, 17-19 October

This station will be operating during JOTA for the 77th Christ the King Venture Scout Troop. Details from Dr R. J. Nash, G4GEE, QTHR.

GB4RHC, 18-19 October

The 1st Rainworth Scout Group will be operating the station from Robin Hood camp site, nr Mansfield, for JOTA. They will be active on 3.5, 28 and 144MHz, ssb and fm. Further details from J. M. Coates, G4GYU, QTHR.

GB2MS, 18-19 October

This station will be active for the Jamboree on the Air from 8th Sefton East Scout Group HQ, United Reform Church, Northway, Maghull, nr Liverpool. It is planned to operate on all hf bands between 1-5pm on both days. The station will be operated by Ormskirk ARC, who will also be giving demonstrations with the Scout group of various aspects of amateur radio. Further details from Mr P. J. Kay, G4GCB, "Norin", 6 Shireoaks, Belper, Derby.

GB8BVS, 18-19 October

A Jamboree on the Air station for the 5th Basildon Venture Scouts will be operated by members of the Basildon Marconi Amateur Radio Society, at the Scout Hut, Craylands, Basildon. The station will be operational on 144 and 432MHz. All contacts will be acknowledged by a special QSL card. Further details from Chris Mitchell, G8PKM, "Hardwicks", Berry Lane, Langdon Hills, Essex.

GB2RVS, 18-19 October

Radcliffe Scouts will be operating this station for JOTA, at Giants Seat camp site, Outwood, Manchester. Visitors are welcome. Details from D. C. Lloyd, 243 Stand Lane, Radcliffe, Manchester M26 9SA.

GB2KWC, 30 October

This station will be operational at the official opening of the West Kent College of Further Education, Brook Street, Tonbridge, Kent, on the hf bands and 144MHz. Further details from Bryan, G4FGU, QTHR.

GB2IME, 8 November

There will be a station operating at the Instron Model Exhibition, Instron Pavilion, Booker. It is intended to operate on all modes on 3.5-28MHz, 144MHz ssb, fm, five stations in all. For further details write to K. Gilbank, G8UJN, 3 Firs Close, Manor Farm Estate, Hazlemere, Bucks. Tel 049481 2866.

Mobile rallies calendar

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

5 October—Great Lumley Amateur Radio & Electronics Society Annual Mobile Rally, Community Centre, Great Lumley, Nr Chester-le-Street, Co Durham. Talk-in on S22, special callsign GB3GLR. All usual attractions, bring and buy. Details from G8HPW, QTHR.

National Field Day 1980 results

Prior to 1939, NFD was a competition between the various RSGB regions which each entered one team of four stations to compete for the NFD Trophy. Although a few unofficial groups operated portable during the contest, they did not compete. This limited entry was not acceptable to the many new post-war licensees who wanted the contest to be open to all members.

In late 1946, a newly-formed Contests Committee met to consider the rules and format for post-war NFD. They wanted to continue the friendly rivalry that had existed through the inter-regional contests, but recognized that the entry must be widened. Their solution was to open the contest to RSGB Town and Area groups, of which there were several hundred in 1946, and they based the rules for the first post-war NFD, held in June 1947, on this concept. The format and guidelines laid down three decades ago still form the basis of today's NFD contest.

NFD 1947 was a leisurely affair with a good entry. It was held on 7-8 June and among the many groups who participated were a number who appear in the 1980 tabulations. Southgate, G5FA/P and G6ZO/P, won the contest with a combined score of 583 points made from 202 contacts. They are still very active in NFD and are this year's winners of the Frank Hoosen Trophy—34 years on and still going strong!

In contrast to the slow pace of the first post-war contest, 1980 NFD was a hard-fought affair between 101 groups who had to contend with a spell of poor hf band conditions. The lack of long-sustained periods of fast scoring on 14 and 21MHz seems to have adversely affected the performance of Open section groups to a much greater extent than their Restricted counterparts. The lower frequencies took the bulk of the contest traffic for much of the 24h. Some excellent scores were recorded by Restricted section entrants, and the leading three stations topped the score achieved by the winner of the Open section.

Open section

There were 51 entrants in this section (one more than in the Restricted) and these included a number of single-band entries. Most groups suffered from the poor hf band conditions, and scores were down quite substantially from those recorded in the 1979 event.

The winners of the NFD Shield are Swansea (last year's runners-up) with 2,933 points from 823 contacts. Their best band was 14MHz, but they were only able to make 835 points compared with over 1,100 last year. Operators were GW3INW, GW3NJW, GW3NYY and GW3OAY, and equipment an Omni-D feeding a three-band quad and 264ft of c/f wire.

In second place, nearly 200 points behind Swansea, are the Guildford group, G6GS/P, who won the Gravesend Trophy with a score of 2,747 points from 697 QSOs. The group used Drake "twins" feeding a TH3, rhombic and a trap dipole. Their operators were G3IAF, G3KMO and G3SYM, and their best band was 7MHz—where the rhombic must have been very useful.

East Notts CG, G3TBK/P, was third with 2,646 from 681 contacts. G3TBK, G3SHY and G3YCT were the operators, and they used an FT101E, TA33 and a multiband dipole.

Restricted section

In contrast to the Open section, a number of groups were able to better their 1979 scores, and 19 entrants scored more than 2,000 points compared with 13 last year.

The Bristol Trophy winners, the Teesside group, G3ZEM/P, found a number of openings on 14MHz which gave them a good base for their 817 contacts and a checked score of 3,237 points. Operators G3YUV and G3ZEM used Drake "twins" and a 280ft c/f wire.

Just 16 points behind Teesside are last year's winners, the Northern CG, G3VMW/P, who made 3,221 points from 767 contacts. G3VMW and G3VPF were the operators and their equipment was an FT101E and a 264ft wire. In third place is Stockport, G6UQ/P with operators G3NOM and G3PEK. They used a TS520 and a 200ft wire to make QSOs and a score of 2,987.

Scottish NFD Trophy

In recent years the Glenrothes "A" group have made this their own trophy, and we have come to expect them to be the highest GM entrants. This year the West of Scotland group ran them close on claimed scores, but in checking, the gap widened and Glenrothes, GM4GRC/P, retain the trophy for yet another year. Operators were GM3OLK, GM3YOR, GM3ZSP, GM4ALK, GM4EJI and GM4IPS, and they used a two-element quad and dipoles with an FT101E transceiver. 14MHz proved to be their best band, but a good number of 1.8MHz bonus contacts helped along their score.

In second place are the West of Scotland group, GM4AGG/P, who also did quite well on 14MHz. They used 28MHz to a greater extent than Glenrothes, but had a lower total on 1.8MHz. Their main antenna was a

NFD Trophy	
Swansea ARS	2,933 points
Bristol Trophy	
Teesside Contest	3,237 points
Gravesend Trophy	
Guildford & D RS	2,747 points
Scottish NFD Trophy	
Glenrothes & D ARC	2,136 points
Frank Hoosen (G3YF) Memorial Trophy	
Southgate RC	1,167 points
Leading scores on individual bands	
Open section	
1.8MHz Farnborough & D RS	618 points
3.5MHz Harlow & D ARS	1,109 points
7MHz Mansfield RS	1,057 points
14MHz Southgate RC	1,167 points
21MHz Guernsey ARS	966 points
28MHz East Notts Contest Group	462 points
Restricted section	
1.8MHz Lichfield ARS	556 points
3.5MHz Echford ARS	1,069 points
7MHz Shirehampton ARC	1,107 points
14MHz Teesside Contest	724 points
21MHz Great Western Contest Group	483 points
28MHz Northern Contest Club	752 points
Overseas stations giving most points to entrants	
Europe: YU3FOP	Australasia: VK6RV
Africa: ZD8TC	South America: YV4BOU

700ft wire, supplemented by single-band dipoles, all fed from a TS520 transceiver.

Kingsway, GM4AAF/P, were third, using an FT101E and a variety of wires and beams including a three-element Yagi, 80m loop, dipoles, etc. All three leaders were in the Open section of the contest.

Check logs

Logs were received from G3TSM, G6NK, G6ZG, LZ1IM, LZ1WJ, OK1KGA/P, OK2KVI, SP7AW, SR7KTE, UA6APP, VK5PG, VK5QG, VK6RV, YU3FOP, YV4BOU, ZD8TC and ZP5AP. These were most useful and the committee thanks all concerned. Special mention should be made of the efforts of ZD8TC who worked UK portables on all six bands. He had several five-band contacts but found that 14MHz let him down for the sixth band. A list of certificate winners for the stations that gave competitors the most points is shown in the leader table.

1.8MHz (Report from G3KKQ)

Conditions were good in most parts of the country except in the north-east where local thunderstorms caused heavy static. There were also high static levels in the south-east. Six stations worked ZD8TC, who was on the band from 0045 to 0220gmt, and two worked an N3 and PY1RO.

The highest checked score was returned by Farnborough & District RS, G3RRA/P, with 618 points from 95 contacts. In second place were Leicester Poly, G3SDC/P, with 568 points and 84 QSOs. Both groups were in the Open section. Lichfield, G3WAS/P, was the highest scorer in the Restricted section with 556 points from 78 contacts. The most effective users of the band were Stockport "A" who made 462 points in just 80 minutes.

The standard of logs fell far short of those received for a normal top band contest, and many stations lost points through inaccuracies.

Apart from going solo on other bands, no serious entry can afford to ignore 1.8MHz, although only 73 groups used the band. The problem is when to go on and how long to stay. As Hereford put it "You only get one bite of the cherry". Other comments: "We left it too late"; "Should have returned to the band" are typical. The first eight stations came on the band between 2030 and 2100gmt, and in the succeeding hours the following numbers were recorded:

New stations coming on:- 25, 17, 10, 6, 5, 2, 0.

Stations leaving band:- 0, 6, 16, 23, 12, 4.

In addition several stations did return at odd times during the 24h, but these were for short spells. It will be interesting to observe what effect (if any) these observations have on next year's operation.

Members of the West of Scotland ARS NFD contest group. L to r: (back) GM4ENN, GM4FDM, GM4GIH, GM4COX, GM4CXM and GM4JDU; (front) GM8OYO (catering staff), GM4FVQ, GM4HYF, GM4BGS and swi Alan.

Photo: A. J. Dimmick



3.5MHz (Report from G4BUO)

The poor hf band conditions meant that many groups used this band more than they had planned, and several reported their best-ever 3.5MHz scores. Most stayed on the band during the night, making mostly four-point QSOs with EU/P stations. A few were rewarded with dx contacts from ZD8TC and others.

The Open section band leader was once again the Harlow & D ARS, G6UT/P, with 1,109 points from 320 contacts. Operators were G3WUX and G3WRO. This year they also operated on 7MHz for 5h. Chelmsford, G4DAN/P, were the next highest Open entrant.

The Echelford ARS, G3UES/P, were the highest placed Restricted section group, with 1,069 points. They made 28 more QSOs than Harlow, but had a number of contacts with fixed stations. Their operators were G2FNK, G3DOR, G3KKQ, G3MCK and G3VFB. Most of the contenders for the Bristol Trophy figured well on 3.5MHz, and Stockport "A", G6UQ/P, spent nearly 6h on the band, putting them into second place in the Restricted section on 3.5MHz.

Everyone lost points, ranging from three to 69. The incidence of logging errors rose noticeably as the night wore on!

7MHz (Report from G3MXJ)

It is interesting to note this year that many stations in the Restricted section obtained higher scores than those in the Open section. The certificate for the Open section band leader goes to Mansfield RS, G3GQC/P, operated by G3DBZ, G3XWZ, G4AAH and G4HCD. Their log included 92 UK and 135 EU portables out of a total of 367 contacts for a score of 1,057, a single-band entry. They used an SB102 transceiver and a full-wave wire. In second place are Salisbury, G3FKF/P, with 314 valid contacts for a score of 1,017, another single-band entry. Equipment was an FT101 with two dipoles at right-angles, and their operators were G2FIX, G3PAV, G3ZNH, G4AJD and G4FMJ.

In the Restricted section the leaders are Shirehampton, G4AHG/P, with 1,107 points from 362 contacts made by G3XTS, G3YHV, G4DVB and G4EQP using an FT101E and an inverted-V antenna.

Log keeping was generally poor and many stations lost points, some a considerable number. In a few cases there appears to have been a total absence of duplicate checking.

Conditions on the band were good throughout the period of the contest, and most groups spent a considerable portion of their time on the band. The skip was short enough to provide excellent openings to EU, and the large number of portables provided a fast scoring rate. During the day conditions were good for inter-G working but dx was more difficult to come by. Most USA call areas were worked, and the more exotic calls appearing in logs included ZD8TC, 4X4VL, ZS6ME, LU8DQ, ZL1AH and ZL2UV.

14MHz (Report from BRS20249)

Conditions were down on last year when the path to North America remained open all night. This year there were only limited openings to the USA and Canada, in fact some groups were unable to make any contacts with North America. The bulk of the work on the band involved European QSOs, with dx offerings from VK and ZL plus a few stations in Africa. ZD8TC was quite active and was worked by a number of stations.

In the Open section, the Southgate RC, G3SFG/P, won the Frank Hoosen (G3YF) Memorial Trophy with the highest 14MHz score of 1,167 points, and managed to almost equal last year's winning score under much poorer conditions. During the 24h, G3KTZ and G3RWL made 376 contacts using a TX4B and T4RB with a rhombic, a ZL special and a dipole.

The Restricted section overall winners, G3ZEM/P, the Teesside group, are the band leaders with 227 contacts made in six sessions of 6h total operating time. They managed to work a substantial amount of dx in comparison with other groups in both the Open and Restricted sections. Details of their equipment and operators are given in the main section of the report.

For those statistically minded, 45 stations operated on the band from the Restricted section averaging 326 points and 43 stations in the Open section averaged 400 points. Many stations lost points through inaccuracies in logs.

21MHz (Report from G3NKS)

Conditions for dx were by no stretch of the imagination as good as last year, but even so some good scores were recorded by the better equipped stations. Some managed to find a few openings to the USA during the Sunday afternoon, although scoring was not very fast.

Guernsey ARS, GU3HFN/P, repeating their 1979 success on the band, again take the Open section certificate with 966 points from 320 valid QSOs. Operators were GU3MBS, GU4CHY and GU4EON, who spent nearly 10h on the band, including a good session on Saturday evening when they made 116 contacts in 3.5h. They used an FT101B feeding a three-element beam to work 195 USA stations and a moderate selection of dx from the rest of the world. GW5ZL/P, the winners of the NFD Shield, were the second highest placed Open section entrant on this band.

The Great Western CG, G3NKS/P, get the band award for the Restricted section with 151 valid QSOs and 483 points made in 4h total operating time on the band. Operators were G3MZV and G3NKS, and equipment an FT401 and 264ft of c/f wire. DX worked included over 50 USA contacts, A4, ZD8, ZS and 424. In second place are the Northern CG, G3VMW/P, with 405 points from 129 QSOs.

OPEN SECTION

Posn	Name of club or group	Call sign	1.8MHz	3.5MHz	7MHz	Points 14MHz	21MHz	28MHz	Total	Number of contacts
1	Swansea ARS	GW5ZL/P	366	304	562	835	592	274	2,933	823
2	Guildford & D RS	G6GS/P	354	517	912	456	150	358	2,747	697
3	East Notts Contest Group	G3TBK/P	396	353	624	436	375	462	2,646	681
4	Guernsey ARS	GU3HFN/P	328	284	247	583	966	208	2,616	749
5	Gravesend RS	G3GRS/P	548	447	573	353	316	370	2,607	631
6	Leicester Polytechnic ARS	G3SDC/P	568	453	621	371	241	348	2,602	636
7	Verulam ARC	G3VER/P	456	628	622	423	87	316	2,532	628
8	Racal AR Group	G3RAC/P	392	344	835	392	394	156	2,513	655
9	Liverpool & D ARS	G3AHD/P	436	411	483	472	244	334	2,380	580
10	Bromsgrove & D ARC	G3VGG/P	484	242	407	518	352	360	2,363	600
11	Crawley ARC	G3WSC/P	24	493	586	640	192	368	2,303	617
12	Maidenhead & D ARC	G3WKX/P	426	367	321	567	243	328	2,252	554
13	Newbury & D ARS	G3WOI/P	354	384	554	438	235	278	2,243	574
14	Torbay ARS	G3NJA/P	550	430	376	479	284	114	2,233	550
15	Sheffield & D RS	G3FJE/P	388	444	554	283	168	354	2,191	557
16	Cheltenham AR Association	G5BK/P	330	376	511	433	178	354	2,182	564
17	Leyland Hundred AR Group	G3GGG/P	366	479	512	272	274	252	2,155	530
18	Glenrothes & D ARC 'A'	GM4GRC/P	416	327	435	563	177	218	2,136	537
19	Hornsea ARS	G4EKT/P	130	515	537	503	266	174	2,125	581
20	Sutton & Cheam RS	G2XP/P	464	481	570	210	177	204	2,106	542
21	Reading ARC	G3ULT/P	132	415	615	447	195	268	2,072	547
22	West of Scotland ARS	GM4AGG/P	238	145	462	556	207	450	2,058	520
23	Chiltern ARC	G3CAR/P	476	525	435	223	66	300	2,025	447
24	Kingsway Technical College ARC	GM4AAF/P	258	209	539	378	254	382	2,020	537
25	Leicester RS	G3LRS/P	298	506	563	459	125	60	2,011	545
26	Greenock & D ARC	GM3ZRC/P	0	389	268	281	416	426	1,780	530
27	Scarborough ARS	G4BP/P	314	332	392	398	102	240	1,778	423
28	Harlow D ARS	G6UT/P	0	1109	569	0	0	0	1,678	491
29	Crystal Palace & D RC	G3VCP/P	256	358	465	266	174	156	1,675	446
30	Conway Valley ARC	GW6TM/P	498	277	457	257	157	0	1,646	388
31	Clifton ARS	G3GHN/P	0	670	503	261	89	80	1,603	434
32	Grimsby ARS 'A'	G3CNX/P	142	263	519	359	83	182	1,548	397
33	Easington & Hartlepool ARCs	G4APN/P	334	231	482	408	87	0	1,542	394
34	Dundee Group	GM3KYI/P	0	381	319	411	193	104	1,408	399
35	Edgware & D RS 'B'	G3GC/P	296	318	248	105	115	210	1,292	299
36	Ilford RSGB Group	G3XRT/P	32	414	622	180	0	0	1,248	348
37	West Kent ARS	G3WKS/P	0	348	548	232	57	54	1,239	346
38	Wirral ARS	G3NWR/P	194	0	160	832	0	0	1,186	384
39	Southgate RC	G3SFG/P	0	0	1,167	0	0	0	1,167	376
40	Portsmouth D & RS	G3DIT/P	186	410	332	137	59	8	1,132	297
41	Mansfield RS	G3GQC/P	0	0	1,057	0	0	0	1,057	405
42	Farnborough & D RS 'A'	G3RRA/P	618	0	0	0	427	0	1,045	232
43	Salisbury R & E Society	G3FKF/P	0	0	1,017	0	0	0	1,017	316
44	Chelmsford ARS 'A'	G4DAN/P	0	924	0	0	0	0	924	278
45	Verulam Training Group	G3EPT/P	132	0	279	201	142	62	816	225
46	The Hamsters	GM3UWX/P	0	221	231	86	90	84	712	247
47	Preston ARS	G3KUE/P	0	295	236	84	4	0	629	201
48	Farnborough & D RS 'B'	G4FRS/P	0	613	0	0	0	0	613	214
49	Mid Lanark ARS	GM3PKK/P	0	195	112	59	8	0	374	119
50	Bournemouth RS	G8FG/P	0	0	0	0	372	0	372	124
51	Chelmsford ARS 'B'	G3WHR/P	0	0	14	0	10	4	28	8

Note: Contacts made are unchecked figures.

A late entry was received from G4ARN/P with a claimed and unchecked score of 2,241.

With several exceptions the 21MHz logs were well presented and reasonably accurate. Many groups would have lost fewer points had they paid more attention to the suffixes sent by stations being worked. It is not safe to assume that the letter P always follows the oblique stroke.

28MHz (Report from G6LX)

In spite of very poor conditions 76 groups used the band to make inter-G and EU contacts. A few dx stations were worked, but contacts outside Europe were the exception rather than the rule. Openings to Europe favoured the more northerly stations, and once again Restricted section entrants did better than those in the Open section. Most groups used the band in short sharp bursts rather than for any sustained period. The two leading stations in both sections are highly placed in the main sections of the contest, and their operators and equipment are listed elsewhere in this report.

The East Notts CG, G3TBK/P, who were overall third in the Open section, made 462 points on the band to give them the certificate for the best Open section group. West of Scotland were next with 450 points.

Northern CG, repeating their 1979 success, were the highest placed Restricted section entrant with a score of 752 points. In second place are Teeside, the Bristol Trophy winners, with 500 points.

Comments from entrants were few, but those that were received all stressed the very poor conditions and the difficulties in making a reasonable number of contacts at a good scoring rate. Most of the logs were fairly accurate, but there were a few unmarked duplicate contacts. A number of stations have lost points, but mostly due to incorrect recording of RST, number or call sign. With the marginal conditions that existed, it is not surprising that some groups had problems in reading the very weak and noisy signals.

With the $\times 2$ bonus for the band, it is always worth spending a few minutes to check 28MHz. Band openings are usually quite short, but if you strike it lucky, a good number of points can be collected quite quickly.

Equipment and antennas used

The 1979 NFD report included information about the antennas and gear used by entrants, but this did not satisfy some groups who have asked if more detail can be given. In particular, information was requested about the methods of multi-banding being used and the length of feeder adopted by Restricted section entrants. Unfortunately we can only publish the information that is given by entrants on the cover sheets, and Restricted section groups are often reluctant to specify exactly how they feed and multi-band their antennas. The groups in the Open section are usually more forthcoming and supply more detail on the cover sheets.

The increasing use of mobile towers enabled a number of entrants in the Open section to "Christmas tree" hf beams and support wire antennas from the same single support. Several groups, although not as many as last year, used four-band nested quads or 7MHz Yagis, but the majority used fixed wire antennas for the band. The Yagi is clearly the favourite choice for the hf bands, and some 39 were in use this year. These ranged from multi-band 3, 4 and 6-element types to stacked single-band antennas. One group erected a monster array of three separate five-element Yagis, the 14MHz antenna having a 42ft boom. Multi-band cubical-quads and delta-loops were the next most popular with 11 groups reporting their use. Most of the rotary beams were mounted at heights exceeding 45ft and there were many at the 60ft level. Other hf beams included the ZL special and W8JK types. Several

RESTRICTED SECTION

Posn	Name of club or group	Callsign	Points					Total	Number of contacts
			1.8MHz	3.5MHz	7MHz	14MHz	21MHz		
1	Teeside Contest	G3ZEM/P	404	661	671	724	277	3,237	817
2	Northern Contest Club	G3VMW/P	504	533	571	456	405	3,221	767
3	Stockport RS 'A'	G6UQ/P	462	698	634	517	276	2,987	740
4	Great Western Contest Group	G3NKS/P	524	528	595	438	483	2,890	719
5	Channel Contest Group	G4DAA/P	436	537	706	622	276	2,861	729
6	SRCC Croydon	G6LX/P	328	515	916	200	274	2,611	641
7	Sunderland	G3RDI/P	450	536	526	465	338	2,495	641
8	East Barnet AR Contest Group	G6KQ/P	390	541	662	394	324	2,489	621
9	Lichfield ARS	G3WAS/P	556	578	589	372	265	2,464	621
10	Hereford ARS	G3YDD/P	530	268	683	311	256	2,398	573
11	Government Communications ARC	G3SSO/P	510	390	413	450	203	2,258	533
12	Addiscombe ARC	G4ALE/P	461	315	735	433	166	2,248	586
13	Colchester Radio Amateurs	G4CRA/P	418	441	658	524	71	2,184	562
14	Stockport RS 'B'	G3SNX/P	404	403	475	440	273	2,169	545
15	Burrowbridge Radio Group	G3XKR/P	530	378	489	395	99	2,143	503
16	Scunthorpe ARC	G4FUH/P	408	232	490	368	228	2,128	542
17	White Rose RS 'A'	G3XEP/P	405	201	513	292	285	2,080	507
18	Bracknell ARC	G4BRA/P	452	433	401	338	165	2,059	501
19	G4KF Contest Group	G4KF/P	238	343	510	385	175	2,033	502
20	Edgware & D RS 'A'	G3ASR/P	236	371	512	300	168	1,911	463
21	Catterick Garrison ARC	G4RS/P	426	286	381	188	360	1,865	457
22	Oxford & D ARS	G2DU/P	296	281	480	279	230	1,816	460
23	Gloucester ARS	G3MA/P	440	216	515	337	167	1,779	452
24	Ayr AR Group	GM3KJF/P	326	202	276	548	200	1,610	423
25	Maidstone YMCA ARS	G3TRF/P	340	278	341	325	116	1,558	393
26	Southdown ARS	G3WOK/P	132	499	644	190	14	1,543	373
27	Caterham Radio Group	G4APL/P	322	356	334	219	53	1,506	349
28	Radio Club of Workop	G4CRE/P	0	394	408	326	154	1,490	418
29	Moray Firth ARS	GM3TKV/P	408	233	244	273	249	1,463	361
30	White Rose RS 'B'	G4FIM/P	232	256	456	277	111	1,456	416
31	Vange ARS	G3YCW/P	0	301	558	327	97	1,399	394
32	Reigate ATS	G5LK/P	0	473	546	199	33	1,395	399
33	Lincoln SWC	G4BU/P	44	306	432	248	177	1,343	357
34	Blackpool & Fylde ARS	G5ND/P	0	479	438	250	155	1,338	378
35	Glenrothes & D ARC 'B'	GM4HBG/P	112	171	539	241	125	1,334	365
36	North Bristol ARC	G4GCT/P	202	259	257	331	233	1,330	354
37	Bury RS	G3BR5/P	338	60	310	274	182	1,324	301
38	Thames Valley ARTS	G3TVS/P	378	213	288	143	192	1,314	321
39	Ainsdale RC	G2OA/P	92	502	235	230	126	1,221	335
40	Thornton Cleveleys ARS	G4ATH/P	52	279	502	179	50	1,126	318
41	Basildon Marconi ARS	G4JKG/P	190	310	188	243	106	1,121	311
42	Shirehampton ARC	G4AHG/P	0	0	1,107	0	0	1,107	336
43	Grimsby ARS 'B'	G3YMF/P	0	445	488	143	30	1,106	324
44	Havering & D ARC	G3TTB/P	46	327	544	181	4	1,102	321
45	Echford ARS	G3UES/P	0	1,069	0	0	0	1,069	352
46	Eccles & D RS	G3GX/P	0	0	1,063	0	0	1,063	334
47	Bristol Contest Group	G6YB/P	0	0	853	0	0	853	343
48	Weston-super-Mare RS	G6LQ/P	0	287	306	88	97	786	329
49	Cannock Chase ARS	G6SW/P	0	0	644	0	0	644	260
50	Chingford RSGB Group	G3NQT/P	0	0	256	245	15	516	143

Note: Contacts made are unchecked figures.

of each were used: six groups used wire beams of the V and rhombic type or end-fed wires up to 700ft long. Most groups who used beams had back-up antennas; the dipole was favourite, with trap verticals next in popularity (12AVQ, 14AVQ and 18AVQ).

Apart from the groups that used rotary beams, most 7MHz antennas were simple wire affairs. One group used a lazy-H and another a set of phased-verticals.

On 1.8 and 3.5MHz the c/f wire with low-impedance or tuned-feed predominated. A few groups supplemented their antenna capability with separate full-sized loops and verticals, and the "sloper" was also favoured. The G5RV, double-extended zepp and phased half-waves also appear in the cover sheet details for a few entrants, but these were less used.

The Restricted section entrants mostly used c/f wires with tuned feeders, although there was a small number of trap-dipoles in use. One group had a "pulled-out" loop fed with tuned line, and there were several end-fed wires of various lengths. The c/f wires varied from 102ft (G5RV) to 300ft, and almost every group seemed to have a magic length. These included: 102, 115, 125, 135, 138, 139, 142, 155, 160, 164, 177, 184, 192, 200, 202, 204, 208, 222, 235, 250, 260, 264, 266, 268, 270, 272, 291, 295, and 300ft. The problem of voltage nodes at the transmitter end of the tuned line, which has caused problems in the past with runaway keyers and "hot" equipment, seems to have been overcome this year. It seems possible that the reason behind the odd lengths of wire used by some entrants is linked to the need to use a specific length of feeder to avoid this difficulty.

The FT101 series of transceivers was again used by many groups. These ranged from the original Mk1 to the latest ZD models. Next in popularity was the TS520 series, followed by the TS820 and the 401 series. The Heath range was also well to the fore, followed by the Drake "twins". Other types included the FT301, FT227, FT107, TS120, TS180, Swan 500, FT901, KW2000, TenTec Omni-D, TR7, TS510 and one home-built transceiver.

Once again we were surprised that only a few groups in the Open section took advantage of the extra receiver rule. One entrant commented that it was a "time-waster" and complained of the need to use a "dedicated" antenna. A few groups reported that they had used micro-computers for log keeping and duplicate checking, but from comments it seems that these were not as useful as expected. Interference generated by the processor and rf were problems, as well as insufficiently debugged programmes and slow speed of operation as the memory became loaded.

Petrol and diesel driven generators were the norm, but several groups used batteries with float charge. One group who used a generator that had been converted to run off lpg found that it needed more gas cylinders than expected and they were forced to finish the contest with batteries borrowed from various cars on the site to feed their solid-state transceiver!

Comments from competitors

(Rules and organization)

"Just right" — Sutton and Cheam.

"Leave well alone" — Croydon.

"Cannot understand Clifton's objections to the Restricted section" — G4KF CG.

"Most of us would like a 10W limit" — Edgware "B".

"No changes please" — Guernsey.

"Congratulations on a good contest — just right" — Southdown.

"We like the efficient documentation for the entry" — Grimsby.

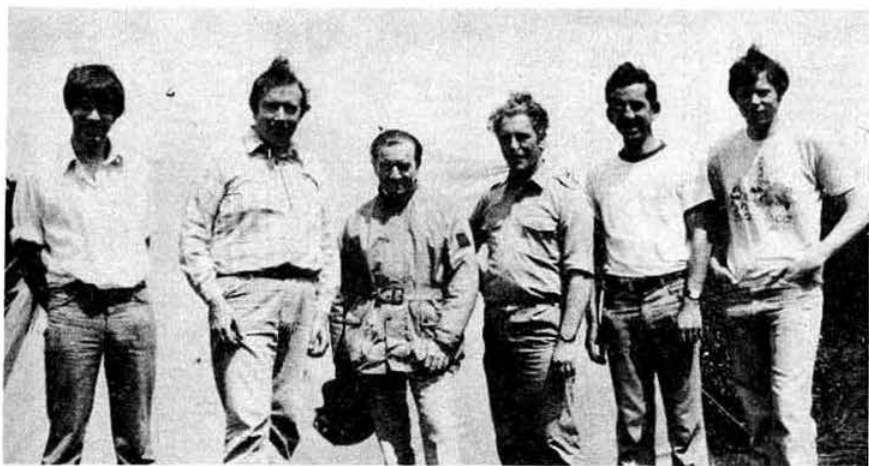
"Thanks for all the hard work" — White Rose (and many others).

"10m bonus helps the northern stations" — Gravesend.

"Thanks for all the hard work in getting it right" — Farnborough.

"Good well organized contest — just right" — Addiscombe.

"We really thought the committee was taking inspections too seriously, when a flock of parachutists descended on our site and nearly became impaled on our masts" — Edgware "A".



Members of the Farnborough & DRS "A" station members. L to r: G4FON, G4HZV, G3RRA, G3MKG, G3VAA and G3SLV

(Weather)

Generally good over most of the country, so no group really had a chance to moan this year!

"Nice weekend, thank you for picking some good wx" — *Southdown*.

"No rain apart from a shower on Saturday" — *Great Western*.

"Weather reasonable" — *Addiscombe*.

"WX ok this time" — *Edgware "A"*.

"Heavens opened up while we were setting up, but otherwise good" — *Leyland Hundred*.

"Light showers on Sunday did not really wet the muck just spread by the farmer" — *Burrowbridge*.

(Conditions)

"Ugh" — *Lichfield*.

"Where did all the Ws go?" — *Sutton and Cheam, and 12 other groups*.

"Awful" — *Addiscombe, and 16 other groups*.

"Poor dx conditions" — *Great Western and 10 other groups*.

"Very poor" — *Leyland Hundred*.

"Poor hf conditions so had to spend more time on the lower frequency bands where the GU prefix was not so advantageous" — *Guernsey*.

(Equipment)

"Burnt out one 4kVA diesel generator" — *White Rose*.

"Generator blew up" — *Bracknell*.

"Generator seized" — *Edgware*.

"Unbalanced generator" — *Burrowbridge*.

"Generator would only give a maximum of 200V offload and our FT101 buzz-sawed on anything less" — *Verulam TG*.

"Could not use our TH6DXX as QRX for parts" — *Guernsey*.

"We must have won the award for the station with most elements" — *Maidenhead*. (They had three separate five-element wide-spaced Yagis).

"Contacts logged with an on-site computer—we hope to get it debugged by next NFD" — *G4KF CG*.

"We shall always remember the TA33 that arrived in two separate kits that challenged our diy experts, until it was found that a third and vital kit had been forgotten" — *Verulam TG*.

"We forgot to secure one of the jacks on our mobile tower before winding up to 60ft. Talk about the leaning tower of Pisa." — *Anon*—by request as the owner was not present!

(General)

"Several of our members came out in a painful rash which it seems was due to a particular type of caterpillar that was crawling around our site—just another hazard of NFD" — *Vange*.

"Regarding NFD, I did note that many stations were not using their calls often enough in the heavy QRM. Particularly pleased with the 1.8MHz QSOs—it was a lot of fun" — *ZD8TC*.

"Support from swls superb" — *White Rose*.

"We planned to have two operators and three helpers. The day before NFD, one operator went into hospital for an operation. One of the three helpers is blind and another has lost his lower arms—did we have fun when the only able-bodied helper went home and we had to fill the generator. We are thinking of changing our name to the Lichfield Bedfast Contest Group! Either that or we need some more members in our group" — *Lichfield*. (Any offers to Pete Miles, G3KDB).

Comments from the HF Contest Committee

The committee was saddened to note that the standard of log keeping has worsened and that this year almost every entrant has lost points, some in quite substantial numbers. Lack of accuracy in recording callsigns, reports and numbers was prevalent, and in a few cases there appears to have been a total absence of duplicate checking. One group had over 30 unmarked duplicate contacts and there were several with over 20. The committee's action on this point (penalty of four times the claimed score) has been well publicized and the answer should be obvious. The legibility of some logs left much to be desired, and one appeared to be a photocopy of the rough sheets used during the contest itself! No points are allowed for contacts that cannot be read!

Separate log sheets are required for each band, a point that was made clear in the instructions that were issued with the NFD stationery. Several entrants mixed up their log sheets, and one group, located north of Hadrian's Wall, submitted their log with 21MHz contacts on the back of 14MHz, and 1.8MHz on the back of the second sheet of 21MHz. The adjudicators had to separate the various sections and photocopy them before checking. It is essential that entrants use separate log sheets for each band. Checking of NFD is a complex operation involving the separation of the logs for individual checking by separate teams. It is just not possible to handle mixed-up log sheets, and any future entries of this nature will be voided and the points lost.

Most groups seem to have settled in with the new rules, and this year there were no complaints about any aspect of the contest—other than a cry in the wilderness from Edgware who prefer a 10W power limit. There were several queries about the scoring system, and we were asked why the minimum of two points applied, instead of the original one point for contacts with UK fixed stations. We were also asked why a contact with a dx station only counted for three points, while QSOs with a UK or European portable had a one point advantage. This is related to the numerous requests from groups to simplify the scoring system, and the changes were introduced in 1979. Contacts with a particular class of station now count the same. Most entrants seemed to find the scoring easier and we have not previously had any adverse comments. As NFD is essentially a portable contest, it seems right that contacts with portable stations should score more than those with fixed stations—even dx!

In conclusion

As for the past few years, NFD '80 was organized and checked by a small group of members of the HF Contests Committee. This year, BRS20249, G3KKQ, G3MXJ, G3NKS, G4BUO and G6LX were responsible. In addition to individual band checking, G3NKS designed the contest stationery and handled the entry procedures, while BRS20249 accepted and sorted the entries for checking. He also kept the final score tally and prepared the tabulations for publication. G6LX supervised the overall checking and wrote this report. Work done by the group for this NFD totalled over 500 man-hours.

The first full weekend in June 1981 coincides with the Continental Whit holiday, so subject to the agreement of our Continental friends the next NFD will be held over the weekend 14–15 June 1981.

We look forward to seeing all the 1980 entrants among the contestants for 1981—let us all hope for better propagation conditions on the hf bands!

G6LX

1980 VHF National Field Day results

A break in our English summer gave reasonably good weather for most of the contest, although after all the rain in the previous weeks, many sites were far from being in ideal condition. The Can Contest Group operating from near Stonehaven reports taking over three hours to get out of the 12in of mud on their site.

Band conditions were also far from inspiring, but all the band leaders made more QSOs than in previous years, which must have encouraged them at least.

Many groups still seem to have problems getting all the gear together, especially in working order. One should remember that most of the successful groups take many weeks, if not months, to prepare for such an event, checking everything down to the last nut and bolt under field conditions. But as with most things, practice hopefully makes perfect! Better luck to all those fated groups for next year.

70MHz

Average conditions, a small increase in the number of entries and very few complaints or suggestions gave the adjudicator little scope for comments. Signals were generally good and operating of the high standard expected on this leisurely band. One station with six operators made five QSOs—two entrants used a.m. with some of their contacts failing to recognize the mode and one station who submitted a respectable entry used A1 only.

The almost total neglect of the cw sector was most significant, with A1 contacts only taking place between 70.18 and 70.22MHz.

The committee has received a proposal to divide the contest into two periods. The first to be any mode, and the second A1 only, with both contacts with any one station scoring. Some contestants asked what had happened to the break in the night. So let us please have your comments on these subjects, so that a decision can be made before next year.

Finally a sad reflection, in reply to a request for a signal quality report "Quite good for a contest".

144MHz

The leading station, G4BWG/P, appears to have got everything right this year, running nearly full power into a good feeder and an impressive antenna system at 90ft agl. They obtained a tremendous margin over the second placed contestant, working what I believe to be a record number of stations on this band in VHF NFD. But not only was it quantity that gave them victory, but also quality. Their 12-95 points per contact really must be commended.



Members of the Martlesham Radio Society and Ipswich Radio Club. L to r: G4FZZ, G3ZNU, G8GCO, G3YCY, G4FSG, G8FAW, G3NYK, G4GVV, and "farmer" Jimmy

LEADING STATIONS

Winner	Martlesham RS & Ipswich RC
Runner-up	Bracknell RS & G4ERP
Leading GW group	Bracknell RS & G4ERP
Leading GI group	Mafia Contest Group
Leading GM group	S Scotland Contest Group
Leading GD group	Isle of Man ARC
Leading GJ/GU group	Guernsey ARS
70MHz leader	GM3WOJ/P (S Scotland CG)
144MHz leader	G4BWG/P (C Palace & Socom)
432MHz leader	G4IRC/P (Martlesham & Ipswich)
1.3GHz leader	G3XDY/P (Martlesham & Ipswich)

EQUIPMENT OF LEADING STATIONS

Martlesham RS & Ipswich RC	
70MHz (G4FAW)	2 x BLY90 pa, 120W out, SD306 rf, 6-el at 55ft.
144MHz (G4BPO)	2 x 4CX250B pa, 400W out, BFT66 rf, 4 x 14-el at 85ft.
432MHz (G4IRC)	2 x 4CX250B pa, 400W out, NE21935 rf, 25-el QLY at 80ft.
1.3GHz (G3XDY)	4 x 7289 pa, 200W out, NE64535 rf, 4 x 25-el QLY at 75ft.
Band leaders	
70MHz (GM3WOJ)	4CX250B pa, 130W out, 3N204 rf, 9-el at 30ft.
144MHz (G4BWG)	2 x 4CX250B pa, 350W out, 2 x 19-el at 90ft.
432MHz (G4IRC)	As above.
1.3GHz (G3XDY)	As above.

Conditions generally were described as average to good, giving most groups dx in excess of 500km and thus taking their signals well into Europe.

One or two unsubstantiated reports of poor signals were received, but most groups now appear to be living with the high power era. There was an abundance of 4CX250Bs around, and it was noted that the first 44 stations used output powers in excess of 100W.

Log keeping standards were generally fairly good, but some groups lost points because QTHs of fixed UK stations were not logged.

432MHz

Entries for this section and the score of the band leader were up on last year. Conditions were generally considered to be poor with only occasional dx openings, although most stations did manage some dx. The best dx worked on the band was a contact between G3LCH/P and F6BQX/P at 745km.

An overall complaint concerned the low activity during the Sunday period, also a Syldis navigational aid centred on 432.5MHz caused problems to some east coast groups, and in some cases reduced their operational hours. High power, multi-antenna arrays and improving systems were still the order for this band, and choosing a site compatible with propagation was still as unpredictable as ever.

Some groups reported having "on site" problems while using transverters with a 144MHz i.f., not only were they hearing the local strong 144MHz signals, but this year their own 1.3GHz station using 144MHz as an i.f. as well. We can only conclude that the "blackbox boys" must be doing good business.

1.3GHz

The number of entries for this band was eight more than last year, and over 200 different stations were known to be active in the UK.

Equipment has advanced considerably with all but three stations using ssb. This was mainly due to the advent of the "commercial transverter": 19 appeared on the cover sheets. However, this showed itself in many groups' logs as a disadvantage as a number of 144MHz stations were worked and claimed. A transverter with a 144MHz i.f. used in a multiband event, where there are many strong 144MHz signals, must be very carefully used. Perhaps an i.f. of 145MHz would help overcome many of these unwanted signals. With all the extra transverters on the band, many more direct contacts were made, once again emphasizing the need for the permanently manned fourth station.

Many of the transverters were used "bare foot", running very low power, but some good contacts were made. G3SPJ/P, operating from YO29 using only one watt, achieved an average of 218 points per QSO, somewhat higher than the band leader! What could be achieved from such a site is yet to be discovered.

OVERALL RESULTS

Posn	Group	*Total score	Band position			
			70MHz	144MHz	432MHz	1-3GHz
1	Martlesham RS & Ipswich RC	3,289	27	2	1	1
2	Bracknell ARC & G4ERP CG	2,639	7	2	6	2
3	Addiscombe ARC & Hadrabs C	2,479	5	11	2	20
4	Stockport RS	2,396	10	8	3	5
5	Wulfrun CG	2,364	8	3	10	7
6	S of Scotland VHF/UHF CG	2,202	1	24	4	34
7	Cray Valley RS	2,135	16	5	16	10
8	C Palace & DRC & Socom CG	2,113	51	1	39	15
9	The Hillbillies	2,009	30	13	11	3
10	Harwell ARS	1,898	41	14	9	12
11	Ebor Group	1,881	3	46	20	13
12	Marlet CG	1,819	20	35	5	18
13	Reading ARC	1,815	25	20	26	4
14	Norfolk VHF/UHF CG	1,758	12	9	18	31
15	Bedford ARC CG	1,703	49	17	15	14
16	Mafia CG	1,677	6	21	19	35
17	Horsham ARC	1,589	19	18	28	25
18	Sutton & Cheam RS	1,551	37	30	12	24
19	Shefford & DRS	1,548	42	4	24	55
20	Southdown ARS & Hastings RC	1,543	38	6	17	—
21	Quantock CG	1,527	23	38	8	39
22	Westmorland VHF Group	1,525	9	52	36	17
23	Albright & Wilson ARS	1,484	26	26	34	22
24	Leicester & M Mowbray RS	1,481	47	54	31	8
25	Isle of Man ARS	1,466	2	27	69	—
26	Medway VHF/UHF CG	1,464	74	29	25	9
27	ARC of Nottingham	1,359	57	47	22	19
28	Maidenhead & Thatcham CG	1,336	45	67	56	6
29	Hull & DARC	1,326	29	15	60	33
30	South Birmingham RS	1,300	50	63	23	21
31	West Kent ARS	1,287	44	22	43	30
32	S Bucks CG/Forest Glade DXC	1,232	56	55	32	23
33	Great Lumley ARS	1,217	13	25	57	57
34	Crawley ARC	1,213	46	45	21	41
35	Southampton RC/RSGB Group	1,207	—	32	14	11
36	Hornsea & DARS	1,175	18	60	33	51
37	Crawley Court ARG	1,175	54	76	13	47
38	Bournemouth RS & Poole RAS	1,156	14	44	50	56
39	Salop ARS	1,138	31	48	30	—
40	Southgate RC	1,137	35	23	78	42
41	Tamworth ARS	1,131	69	41	29	32
42	Blackwood ARS	1,127	73	49	7	—
43	Cheltenham ARA	1,114	59	16	42	—
44	RS of Harrow	1,106	64	33	40	38
45	S Manchester RC	1,102	52	64	46	26
46	Surrey Radio Contact C	1,100	34	53	53	36
47	South Dorset RS	1,092	48	31	35	—
48	Spalding & DARS	1,076	60	19	52	54
49	Norfolk ARC	1,067	38	10	102	53
50	Guildford & DRS	1,027	40	75	62	29
51	Guernsey ARS	1,013	33	36	59	59
52	Northern Heights ARS	958	17	59	73	—
53	White Rose RS	923	53	61	41	—
54	Bolton & DARS	920	22	94	58	—
55	Telford & DARS	903	32	92	45	—
56	Edinburgh VHF Group	883	65	43	55	58
57	Maidenhead & DARC	879	67	77	72	27
58	Tyneside ARG	870	11	84	91	—
59	Edgware & DRS	865	61	68	64	45
60	English China Clays RC	848	15	69	94	—
61	Grafton RS	846	68	89	67	28
62	Hereford Sabu CG	822	43	58	98	49
63	Malvern Hills RAC	811	58	90	66	44
64	GM4BVE Group	804	4	—	—	—
65	Plymouth RC	788	24	103	84	56
66	West Cumbria Group	788	21	86	93	—
67	Clifton ARS	774	66	87	65	43
68	Doncaster Inst of H Education	752	68	72	76	48
69	North Kent ARS	697	62	80	77	—
70	Dover RC	693	—	12	54	—
71	Cornwall RC	676	36	82	101	—
72	Loughborough Falcon RC	667	63	93	75	—
73	Newbury & DARS	632	55	70	100	—
74	Can CG (Aberdeen)	606	69	62	95	—
75	Mid-Ulster Group of RSGB	575	80	28	51	—
76	Haverling & DARC	556	78	66	71	46
77	G4KF CG	550	28	—	—	—
78	Torbay ARS	547	72	97	87	—
79	RAF Scampton ARC	515	—	51	38	—
80	Dunstable Downs RC	509	—	—	63	16
81	Farnborough & DRS	494	—	—	27	37
82	Moonrakers CG	487	—	50	44	—
83	Rhyl & DARC	462	—	39	82	52
84	Mid-Sussex ARS	439	—	56	83	40
85	Wirral & DARC	437	—	40	68	—
86	Ayr ARG	429	—	42	90	50
87	UC of Swansea ARS	403	81	57	61	—
88	Motorola ARC	390	—	81	47	—
89	Northumbria RC	378	—	34	92	—
90	Chester & DRS	374	—	83	49	—

Posn	Group	*Total score	Band position			
			70MHz	144MHz	432MHz	1-3GHz
91	Border ARS	361	75	85	—	—
92	Mid-Cheshire ARC	357	76	88	—	—
93	Milton Keynes & DRS	328	77	100	88	—
94	Leeds & DCG	307	—	65	79	—
95	Preston ARS	296	—	79	74	—
96	Swindon & DARS	289	—	73	80	—
97	Mid-Lanark ARS	276	—	37	104	—
98	Coventry Tech College ARS	247	—	102	70	—
99	Basildon Marconi ARS	246	—	74	89	—
100	Grimsby ARS	235	—	96	81	—
101	Barry Coll of F Education RS	214	—	71	96	—
102	Greater Peterborough ARC	207	—	98	85	—
103	Mid-Warwickshire ARS	198	79	104	99	—
104	Basingstoke ARC	190	—	101	86	—
105	Coulsdon ATS	158	—	95	97	—
106	Bury St Edmunds ARS	145	—	78	107	—
107	Conway Valley ARS	111	—	91	104	—
108	N Ulster RSGB Group	85	—	99	104	—
109	Orkney CG	10	—	105	103	—

$$* \text{ Total score} = \frac{70\text{MHz score} \times 1,000}{70\text{MHz leader's score}} + \frac{144\text{MHz score} \times 1,000}{144\text{MHz leader's score}} + \frac{432\text{MHz score} \times 1,000}{432\text{MHz leader's score}} + \frac{1-3\text{GHz score} \times 1,000}{1-3\text{GHz leader's score}} \quad \text{G4BEL}$$

Posn	Call sign	Points	QSOs	QTH	Best dx	Km
1	GM3WOJ	1,532	122	XO26	G3NPF/P	530
2	GD3YEO	1,462	121	XO68	GU4ASO/P	549
3	G3UUT	1,272	126	ZO55	GU4ASO/P	552
4	GM4BVE	1,231	97	XO10	G4EGU/P	535
5	G4ALE	1,211	112	YK31	GM3JNW/P	581
6	G4FFF	1,185	81	XO11	G4EGU/P	616
7	GW4BEZ	1,183	143	YM75	GM4IPK/P	434
8	GW3XBY	1,080	136	YM44	GM4IPK/P	502
9	G3JYP	1,078	100	YO29	G4DWB/P	547
10	GW6UQ	1,034	132	YN75	GM4IPK/P	423
11	G3XXQ	1,012	97	YO20	G3YYF/P	472
12	G3MPN	994	100	AM06	G3FFF/P	508
13	G4CJG	970	91	ZO22	G3YYF/P	453
14	G3PFM	966	116	YK19	G3FFF/P	504
15	G3WKF	943	89	XK56	G3JYP/P	520
16	G4EGU	938	102	AL65	G3FFF/P	616
17	G4EMW	934	117	ZN11	G4DWB/P	469
18	G3TEU	922	96	ZL78	G4DWB/P	548
19	G3NPF	920	116	ZK08	G3FFF/P	571
20	G4AOL	919	110	AK11	G3FFF/P	589
21	G3ZFX	913	93	YO54	G3YYF/P	461
22	G8WY	906	111	YN39	GU4ASO/P	440
23	G2ASF	899	104	YL75	G3FFF/P	453
24	G3ZYY	881	100	YK05	G3FFF/P	467
25	G3WGV	866	119	ZL54	GM3JNW/P	503
26	GW3UEY	865	117	YM54	GM4IPK/P	510
27	G4FAW	847	95	AM67	G4ISR/P	555
28	G4KF	842	108	ZK09	G3FFF/P	680
29	G3AMW	837	101	ZN18	G4DWB/P	521
30	G3ZTZ	827	131	ZL15	GM4IPK/P	572
31	GW4AZS	826	112	YM25	GM4IPK/P	460
32	G3UKV	814	117	YM28	GM4IPK/P	462
33	GU4ASO	806	70	YJ48	G3UUT/P	552
34	G4FUJ	805	108	ZL51	G4ISR/P	595
35	G4BPR	804	109	ZL42	GM4IPK/P	604
36	G4DWB	803	55	XK63	G3JYP/P	547
37	G4BOX	801	121	ZN71	GM4IPK/P	418
38	G3YYF	794	95	AK03	GM3WOJ/P	595
39	G3PDH	776	84	AM05	GM4EIP/P	495
40	G3PJX	774	110	ZL69	G3FFF/P	530
41	G5RP	770	115	ZL33	GM4IPK/P	596
42	G3FJE	766	120	ZM79	G3FFF/P	468
43	G4ASR	765	104	YM67	GM4IPK/P	525
44	G4BWH	742	88	AL73	GM3WOJ/P	534
45	GW4EZT	736	93	YM04	GM4IPK/P	445
46	G3TIR	735	93	AL54	GM3WOJ/P	526
47	G8LM	728	114	ZM36	G3FFF/P	413
48	G3SDS	725	85	YK28	GM4BVE/P	428
49	G4FEV	722	116	ZM68	G3FFF/P	460
50	G4EYD	714	110	YM50	GM4IPK/P	490
51	G3VCP	712	90	AL45	GM3WOJ/P	529
52	G4IRB	710	107	ZN61	G4ALE/P	320
53	G3PSM	700	80	ZO61	G4DWB/P	506
54	G3RDQ	698	105	ZL73	G3FFF/P	513
55	G3UAX	693	99	ZL53	G3FFF/P	490
56	G4HMG	677	112	ZL26	G3FFF/P	481
57	G4HNS	673	103	ZN74	GM4IPK/P	429
58	G4GOA	646	98	YM79	G3FFF/P	384
59	G3MOE	640	100	YL20	G4ISR/P	393
60	G4HLF	637	75	ZN60	G3WKF/P	468

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Posn	Callsign	Points	QSOs	QTH	Best dx	Km
61	G3PSP	635	108	ZL29	GI3FFF/P	510	66	G8HRC	1,665	251	AL22	DK9VZ/P	513
62	G4CW	625	86	AL51	GI3FFF/P	560	67	G4IOW	1,647	250	YM04	F1KLQ	615
63	G3RAL	622	92	ZM24	G4DWB/P	408	68	G3ASR	1,624	267	ZL29	GI4FUE/P	510
64	G3MLS	619	102	ZL06	GI4ISR/P	455	69	G8NYR	1,585	156	XK56	OR6VB	—
65	GM4HAM	602	65	YP58	G4ALE/P	525	70	G3VOI	1,567	251	ZL53	GM4CAN/P	625
66	G3JKY	577	72	AL52	GM3WOJ/P	552	71	GW3VKL	1,565	231	YL25	PEOMAR/P	630
67	G3TWG	570	98	ZL37	GM3WOJ/P	460	72	G3UER	1,560	244	ZN44	F6EMT/P	610
68	G3ZKE	565	91	ZL18	GI3FFF/P	495	73	G8SRC	1,526	243	YL29	GM4CAN/P	575
69	GM4PK	550	39	Y008	G4BPR/P	604	74	G8VYK	1,507	251	AL33	GM4IGS/P	492
70	G3KPU	547	82	ZN44	G4DWB/P	422	75	G6GS	1,504	276	ZL69	GM8FFX	645
71	G4EUE	529	85	ZM71	GI3FTT/P	413	76	G4GSK	1,496	234	ZL73	PA0XMA	575
72	G3LHJ	519	57	YK33	G3UJT/P	446	77	G3WVK	1,484	236	ZL37	F5FK/P	620
73	GW4HBK	505	73	YL25	GM3WOJ/P	340	78	G3IRM	1,469	172	AM54	DJ1PU/P	568
74	G4IYA	492	65	AL43	GM3WOJ/P	508	79	G3KUE	1,395	190	YN18	GU3HFN/P	500
75	GM3JNW	378	32	YP18	G4ALE/P	560	80	G8TNO	1,359	238	AL51	F1BBS/P	570
76	G4CAX	224	68	YN57	GM4IFK/P	410	81	G4JYO	1,339	264	ZL54	PE0IPP	515
77	G4AFN	215	48	ZM76	GD3YEO/P	330	82	G4CRC	1,284	117	XK63	G4EUY/P	565
78	G5AQQ	165	37	AL22	G4ALE/P	315	83	GW3GIZ	1,211	245	YN65	G3YMD/P	422
79	G4HWF	15	5	ZM63	GM3WOJ/P	360	84	G3ZQM	1,201	155	Y020	F1CBH/P	520
80	GI4BDL	19	3	XO61	EI1CR	110	85	GM8BDX	1,180	120	YP18	PA0WRC/P	675
81	GWHZH	15	5	XL40	GWXYB/P	116	86	G8DML	1,159	134	Y054	F6EMT/P	708
							87	G3GHN	1,157	210	AL52	GM4IGS/P	570
							88	G3ZTT	1,147	207	YN67	OR7HP	530
							89	G3AFT	1,145	196	ZL18	DF1JC	519
							90	G4BVF	1,144	236	YM79	OR7HP	475
							91	GW6TM	1,107	160	YN62	PEOMAR/P	520
							92	G3ZME	1,077	217	YM28	DL0AN/A	640
							93	G8VXG	1,064	228	ZM24	DL0AN/A	572
							94	G4AOB	1,063	168	YN39	F6EMT/P	610
							95	G4FUR	1,036	179	ZL60	EI2VGN/P	—
							96	G3CNX	983	130	ZN38	PA2REH/P	510
							97	G3NJA	976	139	YK33	GM8MJV/P	661
							98	G4EHW	860	126	ZM48	DL2KAL/A	500
							99	GI4JNS	848	70	WP66	G4BUO/P	685
							100	GM8KC	779	146	ZM76	GM8MJV/P	440
							101	G3TCR	764	152	ZL65	GM3PKX/P	450
							102	G3UVV	751	139	ZM72	PE1ARC/P	451
							103	G4HTD	724	126	YK05	GI3SGX	438
							104	G3UDN	452	82	ZM63	PEOMAR/P	378
							105	GM4CMI	60	10	YS05	G4EUY/P	356

1 BRS42236 14 6 ZL
Check logs acknowledged from G3BPM and GM3TAL.

75
G5HD

144 MHz BAND RESULTS

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G4BWG	10,286	794	AL45	F1DSQ/P	915
2	G4BPO	7,567	675	AM67	Y25WN/P	836
3	GW8BHH	7,134	644	YM44	DB2EU	770
4	G4IRX	6,529	589	ZM79	DL0AB/P	727
5	G4BUO	6,496	603	AL65	F1DSQ/P	890
6	G6HH	6,016	535	AK03	DD7LR	702
7	GW4ERP	6,007	610	YN75	DK9VD	801
8	GW8LYD	5,475	581	YN75	F1CPX	998
9	G3ZIG	5,280	462	AM06	OZ1OZ	617
10	G4ARN	4,923	427	AM05	DG4AY/P	648
11	G4JAR	4,754	396	YK31	F6KP/P	856
12	G3YMD	4,750	426	AL76	DLUOX	583
13	G4APD	4,400	490	ZL15	F1FNY	775
14	G3PIA	4,375	501	ZL33	DJ6RX	811
15	G8GBY	4,362	405	ZN18	F6BYJ/P	—
16	G5BK	4,252	507	YL20	DC2BM	670
17	G4JUB	4,238	442	ZM68	F1BBS/P	682
18	G4HRS	4,203	444	ZK08	E2AEI/P	880
19	G4DSP	3,938	344	ZN60	OZ1OZ	662
20	G4CCC	3,826	477	ZL54	F1EPD	870
21	GI4FUE	3,800	292	XO11	F6EOQ	682
22	G3WKS	3,786	397	AL73	OR6WC	767
23	G3SFG	3,714	473	ZL42	F0MD	682
24	GM4IGS	3,615	310	XO26	PA0RDY	693
25	G4EUY	3,552	366	Z022	DK0GH/A	—
26	GW3OXD	3,474	427	YM54	DG1KD	685
27	G4IOM	3,471	325	XO68	FK6NR/P	696
28	G4BAC	3,337	249	XO61	F6EMT/P	800
29	GM8MVA	3,333	426	AL43	GI4FUE/P	565
30	G4CQR	3,328	467	ZN71	DL8AT/P	730
31	G8SDS	3,139	336	YK28	GM4CAN/P	690
32	G8FAB	3,122	397	ZL52	F3TD	744
33	G3EFX	3,024	421	ZL06	DF8FG	707
34	G8PWX	3,017	295	YP69	G3CHN	—
35	G4DZO	2,903	326	AK11	DK0EA/P	655
36	GU3HFN	2,808	259	YJ48	ON6FV	722
37	GM3PKX	2,807	262	YP25	F6EMT/P	801
38	G4ETN	2,769	335	YL75	DL0RQ/A	676
39	GW4ARC	2,686	346	YM04	F1EIC	810
40	GW8WDC	2,682	344	YN65	F1DUZ/P	670
41	G8TRS	2,669	422	ZM71	F3YF	628
42	GM3KJF	2,658	243	XO19	F6EMT/P	760
43	GM8MJV	2,637	240	YP58	F6EMT/P	808
44	G4GTH	2,581	309	YK19	GM8FFX	675
45	G3WSC	2,484	306	AL54	F1FNY/P	660
46	G3JFO	2,482	288	Z055	F6EMT/P	685
47	G8CW	2,479	397	ZL52	F3TD	744
48	GW3SRT	2,396	334	YM25	DF1JC	710
49	GW6GW	2,268	306	YL25	PA2REH/P	633
50	G4JNI	2,240	319	ZL52	DF1JC	607
51	G4GI	2,223	303	ZN58	F6EMT/P	605
52	G3FDW	2,207	211	Y029	F1KLO	772
53	G4DDY	2,205	349	AL51	DL7LD	687
54	G3LRS	2,189	314	ZM36	DK9VV	642
55	GM8VWA	2,101	365	ZL26	GM8FFX	603
56	G3ZMS	2,065	265	ZK10	DK5TV/P	690
57	GW3UWS	1,913	216	XL40	GM4ILD/P	675
58	G3YDD	1,911	277	YM67	PE1BVX/P	590
59	G2SU	1,903	296	ZN11	F1KLO	667
60	G4EKT	1,823	216	Z078	DL0RQ/A	586
61	G3XEP	1,822	246	Z061	DL0RQ/A	667
62	GM4CAN	1,771	137	Y008	G3SDS/P	689
63	G8OHM	1,770	306	YM50	DJ8PB	490
64	G3FVA	1,740	279	ZN61	F6EMT/P	584
65	G4FIM	1,667	283	ZN12	ON7YB	681

144MHz Listeners
1 BRS32525 1,020 181 AL41
2 BRS15822 672 126 ZL40
3 BRS26003 437 55 Y023

BRS41794 disqualified: Rule 3
Check logs acknowledged from G4ASO, G8EFA and G8VLJ.

G3VPK

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G4IRC	2,375	239	AM67	DD2A/J/P	643
2	G8PUB	2,224	192	YK31	DC0IL	726
3	GW4CLA	1,703	209	YN75	PA0WRC/P	605
4	GM4DIJ	1,680	137	XO26	ON5FF/P	721
5	G4GZO	1,525	190	AK11	DK1FA	634
6	GW4BRA	1,512	194	YN75	F6BQX/P	675
7	GW4JKV	1,371	165	YL25	PA0PVW	605
8	G4DSF	1,336	150	YL75	PA0THT	701
9	G3NNG	1,330	180	ZL33	DL0SO	602
10	GW3UBX	1,227	159	YM44	ON5WR/A	562
11	G3YTE	1,219	185	ZL15	PA0THT	744
12	G3LCH	1,168	176	ZN71	F6BQX/P	545
13	G4IBA	1,159	166	ZL73	F6BYJ	670
14	G8HVV	1,115	162	ZL52	DF2JU	572
15	G8FMG	1,093	152	ZM68	DC0IL	465
16	G4FAM	1,063	129	AL65	GM3DIJ/P	555
17	G8BQX	1,044	132	AK03	H89AOF/P	640
18	G4GRT	1,011	112	AM06	GI3VPK/P	507
19	GI3VPK	960	74	XO11	G4GZO/P	599
20	G8SFI	956	108	Z055	PE1BXA/P	480
21	G3XNS	930	130	AL54	GM4DIJ/P	526
22	G3EKW	922	154	ZN74	PE1BXA/P	469
23	G3OHM	921	153	YM50	PA0EZ	479
24	G4GJM	900	156	ZM79	PA0LVO	480
25	G5MWV	889	121	AL43	GI8ROJ/P	529
26	G3ULT	882	164	ZL54	PE1BXA/P	498
27	G3SVL	880	152	ZL66	GI3VPK/P	512
28	G3WZT	877	141	ZK08	EI1AA/P	541
29	G4JBX	875	143	ZM71	PA0EZ	478
30	GW3VZG	868	122	YM25	PA0EZ	562
31	G4FOX	820	136	ZM36	PA0THT	481
32	G8GXE	770	136	ZL26	GI3VPK/P	523
33	G5GX	767	88	Z078	G8PUB/P	445
34	GW3TGL	747	123	YM54	ON5PX/A	535
35	G8LKP	744	100	YK28	GI3VPK/P	516
36	G3SPJ	740	72	Y029	ON5FF/P	620
37	GW3VXK	737	77	XM17	ON5FF/P	650
38	G3RKY	710	106	ZN58	GM4AFF/P	419
39	G3FZL	704	92	AL45	GM4DIJ/P	528
40	G4FBK	689	119	ZL06	F6BQX/P	528
41	G8LVQ	686	90	Z061	ON5FF/P	531
42	G4INL	657	104	YL20	PA0EZ	488

Posn	Call sign	Points	QSOs	QTH	Best dx	Km	Posn	Call sign	Points	QSOs	QTH	Pwr	Best dx	Km
43	GBUFI	648	94	AL73	GM4DIJ/P	534	22	GW3NZS	4,200	34	YM54	6	G4BWM/P	337
44	G4JNT	640	109	ZL52	PA0EZ	480	23	G3WVW	4,107	43	ZL26	5	G3GWI/P	295
45	GBUGL	634	111	YM28	F6EMT	520	24	G4CMU	3,347	32	ZN71	10	G3YKI/P	285
46	G3UHF	624	108	ZN61	ON5FF/P	470	25	G3SWC	3,318	35	ZK08	30	GW4CWB/P	300
47	GBWNB	617	117	ZL54	G13VPK/P	489	26	G4IRB	3,254	31	ZN61	3	G3ECF/P	245
48	G4GNV	616	84	YK05	ON7WR/A	530	27	G3LVV	3,126	36	ZL37	25	PE0MAR/P	338
49	GW8GIZ	609	98	YN65	PE0MAR/P	550	28	G4EYV	3,071	32	ZL18	3	PA0EZ	391
50	G4EKE	596	94	YK19	G13VPK/P	495	29	G4ECF	2,678	38	ZL69H	20	G4CXA/P	247
51	GB8ROJ	566	50	XO61	G5MW/P	529	30	G4DRV	2,546	32	AL73	1	GW4BRT/P	328
52	GBNPH	557	77	ZN60	PA0CML	416	31	G3JOC	2,680	17	AM06	35	PE1BXA/P	313
53	G3ZPB	555	115	AL51	PA0EZ	368	32	G4FWC	2,482	28	ZM71	1	G3TDG	151
54	G4IET	550	78	AL76	G8SFI	389	33	G3PQY	2,291	17	ZN18	10	PA0EZ	420
55	GM8TSI	545	60	YP58	G8PUB/P	525	34	GM4BYF	2,250	12	XO26	150	G4JUG/P	455
56	GW4GWU	543	82	YM04	PA0EZ	583	35	G4BWM	2,042	10	XO11	60	G3SOU/P	485
57	G4GBF	541	70	ZO22	G8PUB/P	475	36	G8TB	1,986	31	AL51	50	G3XDY/P	128
58	G4HYG	534	78	YN34	ON5FF/P	507	37	G4FRS	1,944	29	ZL66	4	GW3NZS/P	199
59	GU3MBS	502	54	YJ48	G3EKW/P	417	38	G3HBW	1,853	24	ZL06	3	GW3VCT/P	205
60	GBPSE	499	66	ZN18	ON5PX	474	39	G4HRY	1,709	15	YL75	1	G3RCV/P	303
61	GW3KSS	491	81	XL40	PA0EZ	440	40	G3RXJ	1,674	22	ZK10	30	G3XDY/P	167
62	G3TLM	487	94	ZL69	GM4DIJ/P	492	41	G3GRO	1,579	21	AL54	10	G4CJX/P	164
63	G4DDC	485	90	ZL18	G13VPK/P	480	42	G4AEZ	1,571	23	ZL42	1	GW3WOH/P	142
64	G3SHY	481	105	AL29	GM4DIJ/P	455	43	G4DBW	1,535	22	AL52	3	GW4BRT/P	299
65	G4DBW	444	81	AL52	—	—	44	G4EYJ	1,481	18	YM79	1	GW4CWB/P	117
66	G4GFX	437	93	YM79	PE0MAR/P	440	45	G3SHY	1,416	25	ZL29	1	G3XDY/P	114
67	G4EYV	421	86	ZL18	GM4DIJ/P	434	46	G3TPJ	1,380	23	AL22	1	G4BYV	124
68	GW8NOY	418	76	YN65	ON5FF/P	532	47	G4GRF	1,348	23	ZL73	80	G5MW/P	139
69	GD3FLH	415	43	XO68	G4GZO/P	484	48	G4BZD	1,342	17	ZN44	1	G4CJX/P	205
70	G3ZFR	413	85	ZM72	ON5FF/P	405	49	G4ASR	1,280	14	YM67	15	G3GWI/P	265
71	G4HRC	393	81	AL22	PA0EZ	340	50	GM3YDN/P	1,209	8	XO19	4	GW3VCT/P	220
72	G4GGV	389	88	ZL37	GM4DIJ/P	—	51	G3TLI	1,141	8	ZO78	5	PA0WWM	388
73	G4ENR	387	74	ZN11	G3FZL/P	449	52	GW8ACG	1,059	13	YM04	3	GM3YDN/P	225
74	G8RIP	382	64	YN18	G4GZO/P	375	53	G4DYC	882	8	AM05	150	G3SOU/P	243
75	GBSNF	375	83	ZM24	GM4DIJ/P	321	54	GBKMY	668	8	ZN60	1	G8CXA/P	124
76	G4IKZ	374	76	ZN44	G8PUB/P	420	55	G3DOT	544	8	ZM79	1	G4CJX/P	105
77	G4CW	373	76	AL51	GD8EXI	445	56	G3VPC	374	5	YK19	1	G4JUG/P	112
78	G3ZVW	359	77	ZL42	G13VPK/P	464	57	G4AKB	243	4	YK05	2	G3SOU/P	113
79	G4FIM	344	54	ZN12	ON5FF/P	505	58	G4DWM	173	4	ZO22	1	G3GWI/P	63
80	GBMDH	335	68	YL29	PE0MAR/P	440	59	GM8MNG	63	1	YP58	1	G3SPJ/P	63
81	G3YMF	331	53	ZN38	G8PUB/P	440	60	GU3KFT	44	1	YJ48	2	GJ8KNV	44
82	GW8UGX	316	58	YM04	G4GZO/P	322								
83	G3XUP	313	63	ZK10	F1CPX/P	381								
84	G4HZA	301	51	YK05	—	—								
85	GB8EN	294	56	ZM48	GM4DIJ/P	350								
86	GB8JN	275	75	ZL65	G8LVQ/P	320								
87	GB8JA	269	40	YK33	GM4DIJ/P	463								
88	GB8RA	252	62	ZM76	GM4DIJ/P	375								
89	G4JKG	237	67	AL33	G8PUB/P	308								
90	GM3THI	222	25	XO19	G4GZO/P	520								
91	G4HUX	220	34	YO20	G8HVV/P	385								
92	G4FCC	201	31	YP69	G5MW/P	—								
93	G4EDV	188	24	YO54	G4FAM/P	455								
94	GB8AR	186	27	XK56	GM4DIJ/P	—								
95	GM4AFF	178	16	YQ08	GW3VZG/P	469								
96	GW4BRS	146	34	YL25	E1AA/P	245								
97	G6HC	136	48	ZL60	ON7WR/A	—								
98	GB8ZK	131	33	YM67	ON5DX/A	500								
99	GB8TV	111	29	ZM63	GW4GWU/P	155								
100	G3NVO	66	22	ZL53	G8PUB/P	164								
101	G4EIK	64	8	XK63	GM4DIJ	480								
102	G4HVC	62	—	AM05	—	—								
103	GM4CMI	10	2	YS05	GM4GUO/P	148								
104	GM4FKD	7	3	YP25	GM3ULD	55								
105	GW3MDK	7	3	YN62	GW8RIP/P	—								
106	GM4DBB	7	3	WP65	GI8JPG/P	90								
107	GBSDK	6	6	AM54	G4CFF	19								

Posn	Call sign	Points	QSOs	QTH	Best dx	Km
1	BRS32525	211	53	AL41	F6EMT/P	410
						G8ACJ

Posn	Call sign	Points	QSOs	QTH	Pwr	Best dx	Km
1	G3XDY	15,721	81	AM67	200	DK1VC/P	436
2	GW4BRT	10,160	56	YN75	40	PE0MAR/P	505
3	G4HWA	8,300	67	ZL15	130	PA0EZ	430
4	G3AKF	7,968	65	ZL54	30	PA0EZ	456
5	GW4CBW	7,418	50	YN75	150	PA0MAR/P	500
6	GW3VCT	7,335	42	YM04	40	PA0EZ	581
7	GW3WOH	7,057	44	YM44	50	G3RCV/P	322
8	G4JDI	7,036	57	ZM36	50	GM4BYF/P	347
9	G5MW	6,990	52	AL43	50	DJ3ZU	411
10	G3RCV	6,980	45	AL65	50	GW4BRT/P	351
11	G3SOU	6,822	54	ZL52	250	GI4BWM/P	484
12	G4CJX	6,453	55	ZL33	30	PA0EZ	468
13	G3GWI	6,403	34	ZO56	80	PA0WWM	437
14	G3WTP	5,653	53	ZM68	30	PA0EZ	390
15	G3FZL	5,535	33	AL45	10	DJ3ZU	383
16	G4ARD	4,786	51	ZL18	40	PA0EZ	394
17	G3SPJ	4,637	21	YO29	1	G3TDG	409
18	G3YKI	4,631	35	AK11	6	PA0EZ	382
19	G4IUL	4,574	38	ZN74	100	PE1BXA/P	470
20	G4JUG	4,552	21	YK31	60	GM4BYF/P	454
21	G4GZI	4,301	42	YM50	35	PE0MAR/P	420

contest news

RSGB HF Contests Championship 1980-81 rules

1. RSGB hf contest general rules do not apply.
2. No entries for the championship are required.
3. The championship will be decided on the basis of RSGB hf single-operator contests held between 1 October 1980 and 31 July 1981.
4. Points will be awarded to the leading 10 UK stations in the results published in *Radio Communication*, as follows:

Contest	1	2	3	4	5	6	7	8	9	10
21/28MHz Telephony	80	70	60	50	40	30	20	15	10	5
7MHz CW	70	60	50	40	30	25	20	15	10	5
7MHz Telephony	70	60	50	40	30	25	20	15	10	5
2nd 1-8MHz	40	35	30	25	20	15	10	5	0	0
1st 1-8MHz	40	35	30	25	20	15	10	5	0	0
Commonwealth	100	90	80	70	60	50	40	30	20	10
Low Power	30	25	20	15	10	5	0	0	0	0
R Round-up	60	50	40	35	30	25	20	15	10	5
Summer 1-8MHz	40	35	30	25	20	15	10	5	0	0

5. Points gained by stations using the same basic call sign (with or without suffixes) and entering two or more of the nine individual contests will be totalled and a table published in *Radio Communication*.
6. Club stations. To be eligible for inclusion, a club station must be operated by the same single operator during each contest. In the event of a club station meriting an award, the award will be made to the operator concerned and not to the club.
7. Awards. The winner will receive the G2QT Trophy. A certificate will be awarded to the runner-up.

144MHz Fixed Contest rules

0900-1700gmt, 7 December 1980

The following general rules, published in the January 1980 issue of *Radio Communication*, will apply: 1, 2, 3, 4a and c, 5a, 6a, 7a, 8, 9a, 10a, 11a, 12-22.

All entries and checklogs to: VHF Contests Committee, c/o Mr J. H. Quarmby, G3XDY, 16 Pearcroft Road, Ipswich, Suffolk IP1 6PJ.

144MHz CW Contest rules

1000-1600gmt 2 November 1980

The following general rules, published in the January 1980 issue of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6b, 7a, 8, 9a, 10a, 11a, 12 to 22.

All entries and checklogs to: VHF Contests Committee, c/o Mr G. M. C. Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

DF Qualifying Event Salisbury results

Twenty-two teams assembled midway between Stonehenge and Salisbury on a particularly wet day for the start of our "aqua" df event.

About half headed for the A station, G2FIX/P, five miles south of the start and the rest set off for the more distant B station, G3FKF/P, 11 miles west.

Both stations were in thickly wooded areas well away from any vehicle approach, with muddy tracks not too clearly defined on the metric map. Hopes were that finding their cars might be as tricky as finding the stations!

Mike Hawkins surprised the A station by checking in during the second transmission, but seemed to slow up a little on his quest for the B station!

The tea was arranged by Lorna (xyl of Paul Yeates) and helpers at the Activity Centre, where the cheery atmosphere made up for the unfortunately wet day. Thanks to Sir Evan Nepean, G5YN, who managed the event.

Posn	Name	Club	Time of arrival	
			Station A	Station B
1	E. Mollart	Mid-Thames	1429	1521
2	W. Pechey	Mid-Thames	1416	1526
3	A. Simmons	Mid-Thames	1536	1448
4	G. Whenham	Coventry	1446	1537
5	P. Tyler	Mid-Thames	1546	1454
6	I. Butson	Colchester	1547	1542
7	C. Merry	Dartford Heath	1445	1547
8	W. North	Mid-Thames	1548	1458
9	P. Lisle	Mid-Thames	1550	1458
10	R. Vickers	Slade	1601	1503
11	M. Hawkins	Chelmsford	1402	1603
12	D. Newman	Slade	1511	1603
13	T. Gage	Mid-Thames	1623	1436
14	B. Bristow	Mid-Thames	1623	1457
15	P. Woollett	Dartford Heath	1433	1626
16	R. Shepherd	Mid-Thames	1630	1532
17	R. Parsons	Burton-on-Trent	1431	—
18	R. Goodearl	Mid-Thames	1447	—
19	A. Butcher	Chelmsford	—	1517
20	C. Plummer	Mid-Thames	—	1532

Two competitors failed to find either station.
W. Pechey and G. Whenham qualify for the National Final.

DF Qualifying Event Rugby results

Twenty teams assembled in Saley Forest to take part in the Rugby df, the continuous rain of the previous day having given way to sunshine.

Excellent signals were heard at the start and at the given time twenty cars roared away on their quest. Station A, G2ASF, manned by Dave Farn, Gordon Reason and John Burrell, was situated south of Bletchley on Cow Common, an area designated for future industrial development. The transmitter was hidden in a long thick hedge which ran the length of the area. There were at least four ways in, and most competitors chose the long way.

Station B, G4ECO, manned by Barry Palmer and Bill Mays, was in Lodge Farm Spinney by the side of the railway south of Castlethorpe. Some competitors had difficulty in finding this station, but Brian Bristow had no trouble arriving at 1505 having already found station A.

A party of 50 sat down to tea at Yardley Gobion Village Hall, where the results were announced and the prizes awarded. Thanks are due to Mrs Sue Lineham and her helpers for tea, and to Mr Mayes of Lodge Farm for permission to use the spinney.

Posn	Name	Club	Time of arrival	
			Station A	Station B
1	B. Bristow	Mid-Thames	1432	1506
2	C. Plummer	Mid-Thames	1451	1531
3	C. Wells	Mid-Thames	1450	1531
4	A. Simmons	Mid-Thames	1433	1541
5	R. Parsons	Burton-on-Trent	1504	1542
6	B. Mahoney	Rugby	1444	1542
7	R. Vickers	Slade	1452	1542
8	P. Tyler	Mid-Thames	1460	1544
9	I. Butson	Colchester	1512	1553
10	W. North	Mid-Thames	1511	1557
11	C. Merry	Dartford Heath	1605	1442
12	M. Easterbrook	Dartford Heath	1454	1611
13	G. Whenham	Coventry	1454	1622
14	J. Hazelton	Mid-Thames	1511	1622
15	W. Pechey	Mid-Thames	1628	1505
16	E. Mollart	Mid-Thames	—	1455
17	R. Goodearl	Mid-Thames	—	1506
18	T. Gage	Mid-Thames	—	1530
19	J. Drakeley	Slade	—	1531

One competitor did not find either transmitter.
C. Plummer and C. Wells qualify for the final.

DF Qualifying Event Chelmsford/Colchester results

Twenty-five teams assembled at the start on Layer Breton Heath, four miles south of Colchester.

Although both stations gave good signals at the start, most competitors favoured the B transmitter, G4HCK/P, located in a small wood eight miles northeast of the start. A quarter mile long wire antenna was run along between two streams which ensured that not all competitors left the area dry shod.

The A transmitter, G3KJ/P, was hidden in vicious undergrowth beside a disused railway track at Stow Maries. A number of teams found that, once on the track, it was not easy to leave it—one member of Mid-Thames escaping via a pond!

The organizers were nearly overwhelmed by requests for 62 teas and completely filled the Prince of Wales, Great Totham, where Mike Hawkins was presented with the Mid-Essex Trophy.

Posn	Name	Club	Time of arrival	
			Station A	Station B
1	A. Simmons	Mid-Thames	1545	1431
2	M. Hawkins	Chelmsford	1602	1442
3	W. North	Mid-Thames	1603	1436
4	W. Pechey	Mid-Thames	1603	1443
5	C. Merry	Dartford Heath	1604	1442
6	G. Foster	Stratford	1604	1438
7	B. Bristow	Mid-Thames	1626	1444
8	E. Mollart	Mid-Thames	1628	1436
9	P. Tyler	Mid-Thames	—	1433
10	D. Holland	South Manchester	—	1443
11	M. Easterbrook	Dartford Heath	—	1446
12	T. Gage	Mid-Thames	—	1456
13	P. Clark	Chelmsford	—	1459
14	D. Newman	Slade	—	1516
15	R. Goodearl	Mid-Thames	—	1524
16	P. Woollett	Dartford Heath	—	1524
17	L. Pleasant	Colchester	—	1530
18	G. Whenham	Coventry	1530	—
19	R. Parsons	Burton-on-Trent	1531	—
20	R. De La Rue	Colchester	1611	—
21	R. Emery	Colchester	—	1623
22	R. Newman	Colchester	—	—
	J. Herbert	Colchester	—	—
	G. Hubble	Colchester	—	—
	R. Shepherd	Mid-Thames	—	—

M. Hawkins and W. North qualify for the National Final.

March 144/432MHz Contest results—errata

An error arose in the 144/432MHz multi-operator section results; the South Bucks CG should have been placed second with 4,890 points, and the Lagan Valley RS in third place with 4,693 points.

April 432MHz Contest results addendum

Posn	SWL SECTION	Points
1	RS32525	171
2	RS41733	61
3	RS15822	59

This section was unfortunately omitted from the table published in the August issue.

(Continued on page 1068)

members' ads

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB. They must be submitted on the Members' Ads order form printed in alternate issues of *Radio Communication*, or on a postcard similarly laid out. Each must be accompanied by a recent *Radio Communication* mailing label addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for £1 for every 40 words or part thereof. They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

Closing dates in 1980 for issues in brackets: **24 October (December), 21 November (January), 19 December (February).**

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale. Advertisements may be edited or abbreviated as necessary.

Advertisements for 27MHz equipment will not be accepted.

Post to: **MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS.**

Do not post to RSGB HQ or Advertising Representative

FOR SALE

JV6PV4500, little used portable video recorder, monochrome, camera, 9in Sony, batt/mains, monitor/rx, rechargeable battery, power unit/charger, 10 once only used tapes, rf converter, all leads, £550. P. S. Bush, 41 Waverley Road, Bristol BS6 6LT. Tel 0272 44688 or 43932, daytime.

Pye 70cm base station R460/T461, exc cond, five Pye PF70 single channel handy talky on SU18, three nicads, nicad charger for 10 nicads, manuals, offers. G4GLP, QTHR. Tel Camberley 24706.

Free 40ft Versatower with QTH detached bungalow, 3/4 bedrooms, 17ft lounge diner, kitchen, integral garage, separate bathroom, w/c, gardens front and rear, planning permission for 60ft tower, £27,500 ono. Hamilton, G4IAV, 329 North Road, Atherton, Manchester M29 0RF. Tel 0942 870954.

Stabilizing transformer, 220VA, 190/260V, 220V output, new, £15. Tape recorder, four track, four speed, faulty, manual, tape, mic, 240V, £12. Starphone uhf, as removed from vehicle, spkr, £50. Lowe vhf monitor, xtal mains battery, £10. G8CVR, QTHR. Tel Aldridge 52706.

Deceased amateur's equipment (GM3YXU): KW1000 linear amplifier, £200. KW Victor tx vfo, psu, £35. 19 set tx/rx, psu, atu, £35. All with manuals, many other items. Contact Orbell "Garaich", Highland Wildlife Park, Kincaid, Kingussie, Inverness-shire. Tel 054 04 280, evenings.

Trio 9R59DS comm rx, mint cond, comp with spkr, manual, £55. Buyer collects. Hunting, 22 Northgate, Oakham, Leics. Tel Oakham 2685.

GEC Messenger fm tx/rx, 10 channel, S20, S22, R5-7 fitted, toneburst, £70 ono. GEC RC665/TR a.m. 4m tx/rx, 10 channel Selcal rx, faulty, £40 ono. Both with manuals. G4GLP, QTHR. Tel Camberley 24706.

Yaesu FT7 hf tx/rx, FL110 linear, both only six months old, about 10 hours use, perfect cond, £380. Regret will not split. G3KLF. Tel Fareham 236906, weekends and evenings only please.

TS120V, superb, as new, £290. Hodec 12V mains psu for same, £15. Audio speech processor, great reports, £15. SWR25 twin swr power meter, £5. SEM iambic keyer, twin lever key, £25. HF5 vertical, 60ft coaxial, £20. G4HAK, QTHR. Tel 01-302 5052.

FT202R, vgc, nicads, very tidy homebrew charger, all six channels fitted, S18, S20-23, R3, £90. Datong FL1 audio filter, vgc, £40. Shure 444T mic, built-in pre-amp, £20. G4GCL, QTHR. Tel West Yorkshire (0924) 402257.

IC202E, s/state 25W linear, rf switched, £170. Pye compact uhf hand-held, leather case, on RB10, less batts, £40. G4HNN. Tel 01-778 9756.

FT101E, mint cond, no mods, manual, handheld mic, £400. Buyer collects or carriage extra. G3UZN, QTHR. Tel 026 371 3238.

AR8BLF 74kHz 30-5MHz, wkg order, very heavy, £25. Buyer collects. Brown, 2 Seaside Road, Lancing, West Sussex. Tel Lancing 5500.

FR101S rx, broadcast xtals, few hours use only, £350. Eddystone EB35 rx, £100. Shinwa lp filter, 75Ω, £15. Delivered reasonable distance. **Wanted:** Drake MN2700 atu. Redman, G4HBP, Ploughman's Piece, Thornham, Norfolk. Tel 322.

Transverter, Magnum Two, 10-2m, fb cond, offers around £50. G2JR, QTHR. Tel 0203 455021.

MA1961 Rascal antenna changeover unit for 1kW rf, comprises Dow key for tx/rx and antenna, integral psu, seven other station control services, incl 26 and 12V, regulated for accessories front panel, has green and orange indicator lamps, 16 by 9 by 3 1/2in, £35. Buyer collects. Four Dow key relays, two "C" type, one "N" type, one S0239, sockets, £11 each incl p and p. G30FK, QTHR. Tel 0734 733674.

FT101E, SP101, absolutely mint, not touched internally, orig packing, only used for about four hours, £450. Trio JR310 amateur bands tx/rx, 80-10m, scruffy case top but works well, £60. G4GCL, QTHR. Tel West Yorkshire (0924) 402257.

TR7010 pre-amp, £110. AR240 charger, rubber duck, case, £105. G8MMF NOT QTHR. Tel 01-656 2029.

Yaesu FT7 hf mobile tx/rx, six months old, only used three hours, genuine reason for sale, box etc, in A1 cond, sensible offers. Tel Martyn, Bedford 870827.

FT101E, as new, hardly used, ac/dc leads, manual, no mods, buyer collects, £450. G4GDZ. Tel South Benfleet 57263, weekends, or after 7pm. **Nascom 1**, psu, buffer board, card case (20 slot), 2K expansion memory, Creed printer, interface, much software, £190. Creed seven hole parallel paper tape punch, tape reader—5,7,8 hole, 40 plus reels of tape, £15. TF1100 sensitive VVM 10-10MHz, manual, £10. Hewlett Packard prescaler 5252A, max count rate 350MHz, £10. Teletype 28, incomplete, for spares, £5. Creed 75 keyboard, balun, very solid, weather-proof, coaxial switch, other bits and pieces. G8OVG, QTHR. Tel 0295 77 269.

Yaesu FT201 tx/rx, 80-10m, 260W p.e.p., cw filter, fan, solid-state except pa, £285. Trio 2200GX, fitted 11 channels, auto toneburst, nicads, helical, dial light, homebrew charger incl, £115. Both rigs mint cond, little used, orig packing. Avometer model 7, leather case, new prods, leads, good cond, £25. Roller coaster coil, 1/4in shaft, 30 turns plated wire, 2in diam, unused, £5. Collect/pay postage. **Wanted:** Datong morse tutor, reasonable price, cond. Taylor, G4EBT, QTHR. Tel Rotherham (0709) 70021.

Drake TR4C, matching psu, vfo/spkr, recently serviced and realigned by Radio Shack, £410. G3LMH, QTHR. Tel 0962 881644.

Fax machine: Deskfax TR100, as per *Radio Communication*, August '78 p674, 100% wkg, tx/rx paper, £20. G14CZW, QTHR. Tel 0365 4009, day, 4500, evening.

Yaesu FT301, FP301, £475. FC301 atu, £80. YO301 monitorscope, £130. Atlas 180, matching ac console, £230. Pyramid 800W linear 80-10, £100. Heathkit HW101, matching psu, £145. G3KKF NOT QTHR. Tel Aylesbury (Bucks) 748256.

Trio TR7500 2m tx/rx, 80 channel mobile mount, manual, toneburst, boxed, £170. FT202R handheld 2m tx/rx, six channels, toneburst, case, nicads, charger, S20-22, R5, S8, 144-875, manual, boxed, £95. Pye Cambridge 2m fm tx/rx, six channels, £40. G8KOM, QTHR. Tel Littlewick Green 2453.

TR2200GX, comp str, all usual accessories, nicad, 18 xtals etc, VFO306, 144-146, to match VB2200GX 10W pa, all manuals, leads, mobile mount, £165. G8TKR. Tel Wheathampstead (Herts) 3688.

Trio R820, matching SP820 spkr, cost £800, accept £580. Bearcat 220FB, cost £240, accept £170. Mizuho atu, cost £30, accept £20. All in mint cond, and used little, carriage free. R820 by Securicor. Cameron, "Coombe Cottage", Pitchcombe, Stroud, Glos.

KW2000E, ac power supply, Shure mic, overhauled by KW in July, vgc throughout, prefer buyer inspects and collects, no mods, £280 ono. G4FPG, QTHR. Tel Elmstead (Kent) 312.

STE Arac 102 2-10m rx, a.m., fm, ssb, 8Y/2m Yagi, both in exc cond, orig packing, £65. Reason for sale going hf. Buyer collects. G4JBJ, NOT QTHR. Tel 021-378 0540.

Quartz 16, R2, R7, S19, S23, £110. Liner 2, £100, both ono. G3KIP, QTHR. Tel 0892 23836, evenings.

TS120S, still in guarantee, £395. TS520S, mint, £385. MC50, £25. FL2100B, perfect, £290. Europa mobile, £95. Mini quad, incl balun, coaxial, etc, £75. QRO linear, 3-400, £95. Many other bits. List. Offers considered for any above item. G4IQT. Tel Luton 881323.

Heathkit IG42 sig gen, £30. Heathkit MSP1 high voltage psu, £15. Heathkit HS24 mobile spkr, £5. Japanese swr bridge, £5. G3UML, 52 Parkview Gardens, London NW4 2PN. Tel 01-202 7071.

Pye Westminster fm 10 channel fitted 145, S20-22, R3-5, R7, 15W output, fitted toneburst rx pre-amp, £80 ono, or exchange FT202, KP202, TR2200GX, or similar plus cash. G8GCU. Tel Hailsham 842024.

TS120S, MC35B, IC260E, FT207R, NB9D, NC1A, G-whip flexi, with coils, Araki 285D 2m colinear, KW dummy load, books, components, t/p paper. For other info, G4BGE, QTHR. Tel Bracknell 21502.

Arac 102 rx, 144/28MHz, all modes, 12V dc, £55. G3VEZ, QTHR. Tel 0202 25044.

FDK Multi 2700 multimode tx/rx, pre-amp, fan, exc cond, £410 ono. Signal generator, hardly used, £50 ono. Trio DM800 gdo, £40 ono. 2m-70cm transverter, QM70 Cobra, £50 ono. G4IHR, QTHR. Tel Leicester (0533) 403428.

Binoculars 25 x 105, German Fortress, incl stand filters etc, exchange with cash adjustment for PET computer or similar. Heathkit GR78 rx, £40 ono, or exchange for cassette recorder. SR9 2m rx, £40. Tel Weymouth 73240 or Weymouth 786930.

Trio 2200GX S20-22, R1, 3, 7, usual accessories, vgc, orig packing, comp set spare valves for Drake TR4C (excluding 13DE7) some duplicates, Joystick vfa system "A", unused. G4BNQ. Tel Leeds (0532) 665831.

FT221R, vgc, handbook, leads, etc, £320 ono. G8TPQ (SE London). Tel 01-698 1741, evenings or weekends.

HC mini beam, Stolle rotator on 32ft tripod steel mast, say £125. Buyer dismantles and collects. G3YRR, QTHR. Tel 0472 54718.

Eddystone 750 rx, double superhet, variable selectivity etc, matching spkr, general coverage, perfect, £75. 12AVQ vertical ant, 10/15/20, as new, £24. G3XBE, QTHR. Tel Bradford 28219.

Standard C8800 2m fm, £215. 2-6 channel Cambridges, one boot, one dash, fm'ed, £40 each. Magnum 2 transverter, £75. Wanted: Chimney for 40X250B. GMIKT NOT QTHR. Tel 031-660 3768.

TS700 2m multimode, 11 x tals, handbook, £290. Liner 2m ssb, matching Belcom psu, handbook, £100. 70cm fm Cambridge, six channel, seven sets xtals, control, cable, data, £65. Prefer buyer inspect—collect. G8BEQ, QTHR. Tel 061-368 9019.

TA33Jr, 10-el Skybeam, rotator, £85. AM10D 2m fm R4-6, S20-22, £40. Scope/radar tubes EM14/1, 5UP1, £3 each. BC522 tx, £10. Mobile psu, £2. 16mm sound projectors, £156, £10. Ampro, £30. Various valves, see. Buyers collect. G4BPW, QTHR. Tel 0283 813395.

Yaesu FT207R handheld, three nicads, remote mic, spkr, helical and quarter wave antenna, Delux impulse charger and battery eliminator, brand new, unwanted gift, £240, plus postage. Tel 0926 54152.

IC202S, vgc, usb, lsb, cw/tone, 144-0-0-6MHz, approx 1-7Ah internal nicads, case, orig packing, £135. C. Littlejohns, G8UGJ. Tel c/o Barton-under-Needwood (Staffs) (028371) 2507.

Futaba L series, five channel radio control system, two servos, nicads, charger, installed in Fiesta 80in wingspan glider, £90 ono. Two xtals, 8MHz, X18 for S20 and 144-40, £1.25 each. G8LHC, QTHR. Tel 021-476 1161.

Yaesu 1012D, mint, unmarked, 1½ years guarantee, latest model, fan, mic, a.m., offers. Many other parts and units, multimeters, etc, at stupid prices. Emigrating, so waste no time. Tel 01-776 1628.

Linear amp component, chassis transformer, 3XPL509, £20. 25W vhf pa chassis, £3. Homebrew organ tdl dividers, three pitches, rhythm, chord generators, single manual, pedals in console, 15W amp, 15in spkr swell pedal, buyers collect. G4BPW, QTHR. Tel 0283 813395.

Yaesu FT17B, 80-10, 100W cw, cw filter, 50W ssb, 25W a.m., exc cond, £300. G4FHE, QTHR. Tel Reigate 42411, ext 216.

FTDX50S, Sommerkamp, Awas FT401B, 320W p.e.p., matching spkr, factory fitted fan, filter, no mods, £260. Homebrew 160 transverter for same, £25. Will split. G4GIM, QTHR. Tel 0767 82049, after 5.30pm or weekends.

2m and 70cm ssb station for £215, TR7010, h/b vfo, digital readout, 2-70cm transverter, all good. G8CVO, QTHR. Tel Bolton 57775.

Icom 701, psu, Icom RM3, atu Z Match, dummy load, broadband antenna transverter, AR88 manual, trimming tools, Osler swr power meter, Trio ptt mic, 600Ω, matched 6JS6C valves, new, boxed, xtal 144-300. Wanted: Trio desk mic MC50. G3NZT, QTHR. Tel Newby Bridge 550.

Yaesu FT501/FP501 digital tx/rx, good cond, spare valves, £350. Mosley Elan 10/15m three element beam, £45. Only selling because I feel like a change. G4BBIQ, QTHR. Tel 044-128 3245.

IC255E, five months old, as new, £195. Pye inverter, 12V dc i/p, 800V, 300V-100V dc o/p, £20. J. Yates, G4AKP, 70 Collingwood Road, Hunstanton, Norfolk.

FTDX401 QRO ssb tx/rx, 600Hz cw filter, delivered 60 miles, £230. G3MHF, QTHR. Tel Eastbourne (0323) 762252.

FT200B, FP200, YD846 fist mic, all as new, comp with manual, stored in orig packing, new and spare set of finals, £300 onvo. Steve Lawrence, G4EOF, 7 Ashfield Road, Market Harborough, Leicester.

For the micro builder, 8085, £5. 3-off 8212, £3. 2-off 8755, £15. 8253, £4. 40-off TMS 4030, £1.50. G. Heath, 103 Pollard Oak Road, Oxted, Surrey RH8 0JE. Tel Oxted 4503.

FT901DM, as new, £750. FT227R, £150. FT2, not wkg, best offer. SR610, £30. G4KG, 2 Sunbury Court Island, Lower Sunbury, Middx. Tel Sunbury 82267.

Heath HW101 tx/rx, HP23A power supply unit, matching speaker, vgc, £250 ono. G3PAX, QTHR. Tel 0903 40513.

Yaesu TF7 hf tx/rx, FL110 linear, as new, Hustler mobile antenna, 10-80m, £375. G3UEE, QTHR. Tel 0201 371004, evenings.

Marconi TF801A 10-300MHz generator, wkg, £20. 813s, used, £3. VCR517A, £3.50. Creed 40V 4A psu, £6. Professional tape recorder, 3-head 3-motor pmps balanced mic, ip xlr, etc, £165. All ono. Moss, 37 Knollmead, Surbiton, Surrey. Tel 01-337 7309.

145 airband xtals, 18X fund, 6-01-7-05MHz, £30 ono. Small collection vintage bc rx's: Marconi 264(A), Murphy D46, KB30S, Pye 459, Pye R53, 8WB; Philco 6V. Swoop for 680X, 730/4, HQ170. Buyers collect or deliver 50 miles. G8IHY, QTHR.

Trio 2200GX, nicads, charger, case, fully xtalld, 30W pa, £115. G4IJU. Tel Nottingham 653174.

Storno 700 solid-state 10W fm dash-mounting six channel tx/rx, mic, mounting bracket, needs xtals for 2m, vgc, maintenance manual, £65. Bailey, G4LLJ NOT QTHR. Tel Middlesbrough (0642) 546791, between 9am and 4pm, weekdays.

FT101E, SP101, G3LLL fm unit, two years old, in mint cond, orig packing, new pa valves, £400 ono. G4DBX, 96 Coleridge Way, Crewe, Cheshire. Tel 0270 581657.

Drake SPR4 communications rx, noise blanker, calibration ±1kHz, all modes, full coverage 150kHz-30MHz, 23 xtals, ac 240V dc, with power cord, cost over £500 new, £350. G4IAV, QTHR. Tel 0942 870954.

Marconi Atalanta high grade rx, 20,000-11m dual conversion, variable selectivity, 10 bands, nl, bfo, cal, bandspread, etc, 240 ac, £75 or exchange for GEC BRT400K or 830/7. G3OJR, 190 Victoria Avenue, Hull HU5 3DY. Tel Pete, 0482 43353.

FT401B, used little, in orig box, handbook, mic, best offer. G4JWM, 5 Lisker Avenue, Otley. Tel Otley 464165.

KW600 linear amplifier for 10-80m operation, instruction book with diagram supplied, £150. G3WDR, QTHR. Tel Felixstowe 5971.

FT501/FP501 digital tx/rx, exc cond, 500W p.e.p., 80-10m, £390. G4DKA, QTHR. Tel 01-445 7074.

FDK Multi 700E, six months old, £170. Going hf, rty ST5 tu, £25. Creed 7E, £20. G4ADE, 26 Ashcourt Drive, Horssea, Humberside HU18 1HE. Tel 04012 4365.

Trio TS510/PS510 80-10m tx/rx, cw/ssb, two 6146 pa, exc cond, orig packing, manuals, £210 ono. G3SJH, 50 Christopher Road, Birmingham 29. Tel 021-472 8577.

TS180S hf bands tx/rx, dual ssb xtal filters, excluding digital memory option, exc cond, £495, plus carriage. G3XHX, QTHR. Tel Liskeard 43749.

Shure 444T desk mic, incorporates base mounted pre-amp ptt bar, £15. Lustraphone high quality dynamic in orig leather case, £11. Grampion DP4 dynamic, desk mounting base, in orig case, £10. Buyer collects. G3OFK, QTHR. Tel 0734 733674.

Shack clearance: 160, 80m G-whip, £10. AT5 mobile psu, £10. Gresham Lion ex-computer psus, small, compact, 5V, 2A, £10. 30V, 2A, set to 24V, £12; Heathkit HA201A 2m linear, 10W out, £15. All exc cond. G4FLY, QTHR. Tel 0734 594495, evenings.

FT101, all cables, mic, £250. G-whip 80-10, £20. E-Zee Match, £20. F508B, £80. G3UWO, QTHR.

Heath HW100, five band hf rig, SB600 psu, spkr, all manuals incl, fb rig on all bands, £160, or part exchange HW8. G4JGX NOT QTHR. Tel Helston 61431.

KW Vespa Mk2 tx, 160/10m, £80. Codar Q-multiplier, £5. Creed 7E teleprinter, Labgear LG50 a.m./cw tx, £20. G3TIS, QTHR. Tel Wye (0233) 812888.

80/10 2/813s, DAF linear, separate heavy duty power supply, two fans, £65. Washington stereo record player, valved 8W channel, separate spkrs, £25. Two boxed Toshiba 6JS6C, £6. Buyers collect. GW3FPH, QTHR. Tel Deeside 815989.

Complete 2m ssb: Liner 2, internal pre-amp, matched MEL 40V amplifier, Belcom 12V 4A psu, offers around £130. GMBRTI, QTHR.

Drake R4A xtals for 28-30. 1-8, £185. Tonna 16-el 2m Yagi, brand new, boxed, £25. Lafayette vhf, fm rx, 152-173, 240V ac, £30. 1-5in alloy tubing, 50p per ft, max 21ft. Murphy Rover tx/rx, wkg on 70-26MHz, £15. GMB3QA, QTHR. Tel 0620 2519.

Yaesu FT202R, nicads, case, charger, spkr/mic, S20-22, R2-4, £120 ono. FRG7 rx, fitted ssb filter, fine tune, £150. G8VHG. Tel Hull (0482) 855436.

TS700G, pre-amp, sidetone, vox 3N20L/S in front end, £320. FT2F, R0, RR0, R2, R5-7, S20-23, £75. PW 2m rx, £25. ST60 stereo amp, 30W per channel, £25. G8RAE. Tel 01-360 0210.

Nascom 1, £120. G3HHE, QTHR. Tel Leeds 682388.

G2DAF ssb Mk2 tx, 80-10, professionally built, Kokusai mechanical filter type 455-15CK, £45. Buyer collects. G2NG, QTHR. Tel 01-977 6137.

VHF, uhf Realistic PRO2008 keyboard entry eight channel scanner rx, covers 68-88MHz, 144-512MHz, 240V ac, only two months old, £150. G4FLY, QTHR. Tel 0734 594495, after 5pm.

Lowe SRX30 rx, as new, £110, or as part exchange with hf tx/rx. Tel 0892 25983.

FLDX400, £170. **FRDX400**, £150, or the pair, £300. 18AVT/WB, £40. **G3ITH**, QTHR. Tel Kingswinford (Staffs) 3879.

Telephone dialler chip AY59100, converts dial phone to pushbutton, send pulses *not* tones, last number redial facility, with data, £11. 12-key keypad, £6. IC215, nine channels, mobile mount, orig packing, must sell, offers? **G8FRL**, QTHR. Tel Cambridge (0223) 64565, evenings.

NEC CQ110E tx/rx, 160-10m, 300W p.e.p., usb, lsb, fsk, a.m., cw filters, 100-235V ac, 13-5V psus, all built in, digital readout, cooling fan, used little, superb rig, mint cond, boxed, £475 ono. **G3UJE**, QTHR. Tel 0565 53669, after 6pm.

Unique opportunity! Drake C line, guaranteed unused, 1-5 and 2-5 cw filters, full coverage 10m, 160m, manuals, boxes, etc, first £750. Icom IC255 E, unused, Jaybeam 6-el quad, TASR 5/8 whip, £230. Photographic equipment incl three Minolta bodies, one new, two mint, F1-2, F1-4 standard, 28mm w/a, 135mm telephoto, all Rokkor lenses, electronic flash, tripods, filters, ex tubes, T mounts, mostly unused, top quality hi-fi system, incl 66 monitor spkrs, (Celestion) Thorens etc. Details, tel Barry 741520.

Atlas 180 tx/rx, AR230 console power supply, topband to twenty, no faults, no mods, top line performance, £240. **G4AJD**. Tel Amesbury 0980 23254.

30ft ex-windup tower, self-standing 6ft sq base, comp scaffold poles, prop-pitch motor, TA33JN beam, comp, £150. Delivery cheap by arrangement, might separate. **G3SCD**, QTHR. Tel 0507 84283, evenings or 0507 602327, daytime.

Icom IC210, £150 or offers. **G3UMK**, QTHR. Tel 0283 790973.

Viceroy Mk4 10-80m tx, vgc, new driver pa, spares, manual, prefer buyer collect, £65 ono. **G3IAK**, QTHR. Tel Runcorn 72464, after 6pm.

NCX5 sbsb cw hf tx/rx, modded, pair 6146 in final, MD108 bal mod, wkg all bands, c/w, ac, dc psus, circuit diagram, handbook, £130. Would swap for 70cm mobile rig, w.h.y? **GW4BCD**, QTHR. Tel Porthcawl (065671) 8963, after 6pm.

Redifon GR286, private and international units, tx/rx, a.m., fm, 2m, channel xtals, toneburst, manual, offers. **G8EVK**, Worthing, Sussex. Tel 64167.

Eddystone EC10 Mk2, manual, battery/mains psus, £60. MM 5W 144MHz a.m. tx, £15. Jaybeam 10Y/2M with 50ft UR67, £18. 2m QCV07-50 linear, 2-5W drive, 100W out, built-in psu, £10. Brand new QCV06-40As, £10. **G4CNV**, QTHR. Tel Romsey (0794) 513771.

SMC73 gen cov rx, calibrator, S-meter, etc, 2m converter and connectors, £150 ono. Tel 021-382 8411.

Trio TR7010, fitted SD306 pre-amp, £125. Microwave Modules 2m transverter MMT144/28, £65. PSU for valve linear, ideal for pair 4CX250Bs, £25. **G4IDE**, QTHR. Tel Wolverhampton 783181.

Vintage enthusiasts, from 1925-35 era: 12 reaction coils, 76 valves, 26 Ferranti clip-in wirewound resistors, plus other parts, £20, plus packing and carriage. **G3EDD**, QTHR. Tel Cambridge 880232.

Numerous amateur radio items, left by the late F. G. Holt, **G3XQT**. Contact Mrs L. A. Holt. Tel Wolverhampton 764923.

HW100, 80m-10m sbsb tx/rx, handbook, HP23 psu, £130. KW202, hf rx, £150 ono. FT2FB, 2m, fm, eight channels, toneburst, £80 ono. SEM Sentinel 2m converter, 2-4MHz i.f., £9. Microwave Modules varactor tripler, 2m-70cm, £12. **G3TRH**, QTHR. Tel Rayleigh (0268) 773778.

Drake TR4C with noise blanker, MS4 spkr/psu, recent professional overhaul, £350. Sommerkamp FT250/FP250, new pa valves, many spares, £225. Jaybeam 68-el multibeam, used little, £9. Can deliver Home Counties. **G8KAX**, QTHR. Tel John Lemay, Chelmsford 67131, ext 254, work.

Icom IC240, comp with 80 channel switch box, auto toneburst, exc cond, orig packing, £145. **G4FYF**, QTHR. Tel Billingshurst (040381) 4411.

Trio 2200G fitted 12-5 channels, auto toneburst, dial light, nicads, charger, etc, £100 ono. Yaesu FRG7 communications rx, mint cond, boxed, as new, £160 ono. **G8GYO**, QTHR. Tel 051-342 7155.

KW Atlanta, vfo, new pas, £190 ono. Marconi V/VM TF428B /1, handbook, £6.50. Airmec sig gen CT212 85kHz-32MHz, £18. All inspect/collect or carr extra. **G3PJN**, QTHR. Tel Chesterfield 6040, after 6pm.

Catronics three ply rty/vdu boards, built but not assembled, modulator, offers, £55. Purchase mpv makes redundant also reluctant sale HROST (xtal), full set coils, 20m b/s psu, £25 ono. Catronics CT103, £80 ovno. Delivered range Barnstaple/Stevens. **G3UJB**, QTHR. Tel Barnstaple 76996.

KW200B, psu, desk mic, £200. Pye W15U, 10 channel, £120. PF1s, three sets nicads, £35. Burned 365 5W mobile on SUB, £50. Marconi tv camera, lens, £25; all with handbooks. **G3PLX** vdu, needs case, £65. **GBPWT**, QTHR. Tel Maidstone 50095.

IC215 2m fm portable, good cond, xtals for R0-9, S20-24, S33, RR7, 1-6AH nicads, helical whip, orig packing, etc, £120. **G3YEK** NOT QTHR. Tel 01-903 0720 (Wembley).

Partridge Joystick vfa, latest JM2 system, 500W p.e.p., used indoors only, practically new, £45 or near offer. Buyer collects. **G3PDE**, QTHR. Tel 04215 65135.

Pye Vanguard AM25B, H.B., £15. Pye base tx, £10. No19 set, £15. Codar RQ10X Q-multiplier, internal psu, £10. Buyer collects. **G8IFH**, QTHR. Tel Hadlow Down (082-585) 515.

TA33Jr, balun, fully weatherproofed, first class cond, inspect/collect, £50. Drake AA10 amplifier, 2m, 1W in, 10W out, comp with matching 2200G, £125. 2m amplifier, 10W in, measured 35W out, 15dB pre-amp, £35. **G3YJL**. Tel Walton-on-Thames 23228.

Yaesu FRDX400, all options, £125. Datong UC/1 £95. Avo CT378B 2/250MHz sig gen, £40. **G8CZW** dc dvm $\frac{\mu}{V}$, $\frac{V}{V}$, $\frac{V}{V}$, $\frac{V}{V}$, £36. All collect, South London. Smith, BRS12638. Tel 01-778 3217.

IC255E, auto toneburst, full rev rpt, nicad memory back-up, up/down tuning from mic, orig packing, £225. Standard C800 pocket scanning rx, S18, 20, 22, R1-2, R7, tx 0-1W o/p, S20, nicad, charger, ant, £60. Pye PF20UH, three channel, RB0, RB10, SUB, xtal toneburst, nicad, charger, ant, 0-5W o/p, handheld fitted skt for ext ptt/mic, £100. Heath IO18U scope, £10. **G8EPQ**, 4 Prince of Wales Close, Wisbech, Cambs. Tel 0945 63614, evenings.

Yaesu FRG7, eight months old, superb cond, hardly used, still under guarantee, £180. Reason for sale, going vhf. Tel Crewkerne (Somerset) 73909.

IC211E, 2m, all mode tx/rx, keypad, ttl computer interface, £395. Jaybeam C5/2M colinear, £30. New Ham 2m hf rotator, £95. 2m portable tx/rx, using STE AT23/AR20 modules, nicads, etc, £110. National TR602GB portable television, £45. **G8LSC**, NOT QTHR. Tel Orpington 2584.

Creed 7B teleprinter, cover, £7. Creed 85R reperforator, £5. FSR 1-1 frequency shift adaptor, psu, old tones, £5. Homebrew amateur band rx, Electroniques front end type QP166, £20. **G3ATA**, QTHR. Tel Luton 26995.

Base and portable 2m station, IC215, R0-9, S8, 9, 19-23, h/b mains psu, 20W pa, orig packing, manual, etc, ten months old, bargain, £145. **G8VGR**. Tel Hastings (0424) 429757.

Collectors: Admiralty h/f wavemeter G61, oscillator G35, handbooks, calibration charts, circa 1940, total weight 50kg approx, offers over £65. Early GPO Morse key, polarized relay, mahog/brass/bevelled glass, £30. Carr extra. **GM3LJU**, QTHR. Tel 036 987341, evenings.

Trio 2200GX fitted S0, S19-24, R6, R6R, R7, R7R, R5, nicads, charger, etc, £100. Apolox open reel tape recorder, £10. **Wanted:** KW E-Zee Match or similar. **GW3YPP**, QTHR. Tel St Athan 750822.

HRO 5T (octal valves), psu, all gc coils, spare valves, handbook, vgc, £50. Codar PR30X preselector, self-powered, as new, £10. **KW** swr match, unused, £10. LM14, charts, manual, as new, £50. Three command rxs, BC453 Q5er, medium wave, top band models, £6 each. All carr extra. **G3NJP**, QTHR. Tel Cranbrook (0580) 714482.

Icom IC26E/A, all mode 2m tx/rx, recent purchase, boxed, nearest offer to £280. Daiwa (Trio) CN620 twin meter, swr/power meter, 1-8-150MHz, list price £52, unused, boxed, £46 or near offer. Hansen FS-602M peak-rms reading wattmeter/swr bridge, 50-150MHz, new, unused, listed at £46, bargain at £38 ono. **Wanted:** 2m multimode with rf o/p in excess of 14W. **G3AYA**, QTHR. Tel Ware 870010.

Three w/band rx homebrew mains psu/spkr, rf preselect, relevant copies *Radio Electronics Constructor* for circuitry, good wkg order, BRS owner going G4, £25. Buyer collects. Dent, 7 Hedleyside Road, Whitley Bay NE25 9HB.

SWL station hf/vhf, CR100 used as a tunable i.f. converter for 20m, 10m and 2m bands, psu, xtal calibrator, atu with preselector, long wire antenna for hf, 10-el Parabeam for 2m, complete station, £65 ono. **G8KGF**, QTHR. Tel 02802 6626.

JR599 Custom Special 160-10m and 2m rx, all modes, all filters, manual, SP5DS spkr, both vgc, £170 ono. **G4GYO**, QTHR. Tel Northwood (0274) 21732, weekends.

Versatower P40, HD head unit, auto brake winch, only few months old, brand new, boxed, Hygain TH3 Mk3 beam, BN86 balun, CDE Ham 4 rotator, 30m of cable, boxed, as new, 35m UR67/RG213 coaxial cable, offers please. Tel 0602 54047, anytime.

Handheld, 2m, KP202, 2W, S20-22, R3-6, charger, two antennas, leather case, nicads, £75. **G8CVR**, QTHR. Tel Aldridge 52706.

Handheld, Yaesu FT202R, fitted S20-23, R3, R6, nicads, charger, helical, case, ext mic, good cond, £105. Pye Cambridge boot mount, a.m., control box, cable, spare board for 2m conversion, £20. **G4KAF**. Tel Phil, Bristol 514848.

Racal RA117, case, manual, exc rx, all frequencies to 30MHz, £315 1/2 ono. **G4EJJ**, QTHR. Tel Sheffield (0246) 412775.

Drake T4XC, R4C ac power supply, extra filters, xtals, M54 spkr, Shure 444 mic, all good cond, no mods, £625. **G4FNS**, QTHR. Tel Bedford 54074.

KW Viceroy in wo, cond fair, £75 ono. **G2DAF** rx in wo, £55 ono. Both heavy, buyers collect. Codar AT5, homebrew psu, anode voltmeter, switching, £30. **G3VVC**, QTHR. Tel 092 97 534.

Shure 444 mic, £20. Trio spkr SP520, £10. AEC pwr/swr meter, £15. G4BXR, QTHR. Tel 0908 566266.

Back Nos American magazines: *CQ* from 1946, *QST* from 1948, sell/exchange. *Wanted:* *QSTs* 1979 and prior 1948. *CQs*, Collins tx/rx, D104, Vibroplex, cabinet for S27. ARRL handbooks. Write Baker, Bontnewydd, Aberystwyth. Tel 097-421 608.

TS120V, cw filter, desk, mobile mics, free mains psu, £350. Multimobile antenna, base, unused, £20. Lunar 144MHz pre-amp, £8. Xtal calibrator, boxed, £8. Dynamic fist mic, £2.50. Buyers collect or pay carriage. Moss, G4ILO. Tel Woolwich (01-316) 0054.

Collins KWM-1, hf, tx/rx, No 1056, recently re-valved, superb cond, homebrew psu, offers? G8LJG, QTHR. Tel Redditch 23044.

Trio TS700S 2m digital, all mode tx/rx, mint, £400. Venus SS2 slow-scan tv monitor (super pictures), £130 ono. Buyers collect each item, cash please. G8AJI, QTHR. Tel 021-544 6171, Saturday/Sunday, or after 6pm.

Joystick, Joymatch LOZ500 antenna system, used receiving only, £30, offers. Tel Cheltenham 580352.

FT101E, first class cond, 350Hz cw filter, mic, leads, manual, £410. Buyer collects. G4FSI, QTHR. Tel 0252 715218.

Trio 2300, 80 channel 2m fm tx/rx, vgc, comp with case, charger, mic, set of nicads, often an extra, £145. H/B charge while operating psu for above, £9. J. Dingwall, G4ILW, QTHR. Tel Newcastle 0632 872661.

AR240 2m portable, rubber helical, nicad charger (mains), sold in orig carrying case, one year old, £120. GM4HKW, QTHR. Tel Falkirk (0324) 25559.

FRG7 gen cov rx, perfect cond, cw perspex cover, handbook, in orig packing case, £150 or exchange for IC240 or similar. G8KNO, QTHR. Tel Taunton (0823) 72782, evenings.

KW204 tx, fitted low power outlet for transverter, £120. KW202 rx, £120. The pair with all leads, £220. Prefer buyer collects, carriage extra. G4BPJ, QTHR. Tel Penzance (0736) 61211, after 6pm or weekends.

FT901DM, £850. YO901P with bandscope, £285. Both in first class cond. G4BLB, QTHR. Tel Deal 3538.

Datong D70 morse tutor, used for eight weeks successfully, with p and p, £40 ono. Tel Canterbury (0227) 711383.

Drake TX, AC4, all 10m, £200 ono. Heath SB401, SB303, £300 ono. All cables, plugs, mics, spkr, spare valves incl, all manuals incl, all in first class wkg order. GM5AIW, Tel Kilsyth 822645.

FT101Z, mic, fan, best rx I've ever used, mint cond, current list £600, will sell for £500 ono. *Wanted:* unmodified HW7. G4FMD, QTHR. Tel Malcolm, Great Dunmow 3119.

RAE correspondence course, in as new cond, examination passed, £30. Tel Abergele 823674, evenings.

Linear FL2000B, mint cond, £150. *QST* 1972-6, *Radio Communication* 1972-9, need cupboard space, offers. GM3CSM, QTHR. Tel 041-8826859.

Trio TS520SE, four months old, hardly used, £385 or consider part exchange your rig. Pye Bantam hb fm, no mods, £30. Portable television, 12in, mono, £30. G4JLX, Tel South Benfleet 50985.

Heathkit HW17A, fitted fm detector, HWA-171 mobile power supply, good cond, £40. Rebuilt R1155, miniature valves, internal power supply, £20. Panda Cub, working or for spares, £15. G4FQW, QTHR. Tel Accrington 391682, evenings please.

QTH corner bungalow, outskirts Bournemouth, two fitted bedrooms, lounge, d/room or third bedroom, kitchen, bathroom, separate toilet, fgh, space boat/caravan, immediate possession, £31,150. Exchange considered Yorkshire area with view. Davis, 13 Glamis Avenue, Bournemouth. Tel Northbourne 3621.

TR2200GX, S20-S22, R4, 6, 7, nicads, charger, case, £110 ono. G3SGR, QTHR. Tel Bristol (0272) 45441.

2200Gs, seven channels, 11 channels, nicads, charger, 10W pa, £130, £135, respectively. SML25 swr twin meter, £8. 2m 8XY ant, £15. Coaxial switch KSW1, £4. 5-6V 1-5A power cards, £10 each. SP70 spkr, £15. G4GMS NOT QTHR. Tel Cowden 751.

FLDX400, £140. FRDX400, £140, 2m, 4m, all filters, good cond, or £270 pair. Liner 2, PA3 pre-amp, mobile mount, ODR123P regulated psu, £100. Manuals. One owner. G3TWP, QTHR. Tel 0794 517196, evngs.

FT221R in orig box, accessories, YC221 digital display, £375. MMT 432/144, 70cm transverter, £95, or £430 the lot. Tel Chester (0244) 533051.

40ft heavy duty triangular galvanized steel tower, two section, top section accepts 2in dia tube, rotator, offers over £100 considered. CD1212 40MHz, scope, plug-in, dual/single trace, £150. Delivery can be arranged at cost. G4JMJ, 11 Shorecroft, Bognor Regis.

Moving house, must sell urgently: Yaesu FT207R, charger, spare nicad, SR9, 2m vfo, rx, all absolutely mint, boxed, NEC CQ110E hf digital tx/rx, Hygain, 18AVT/WB, perfect, Joystick type J, brand new, low prices for quick sale. G4BKM, QTHR. Tel Denham (0895) 834358.

Yaesu FT200, psu, Osker SWR200, Hygain 18AVT, DM3, mic, headphones, sundry leads, KW dummy load, comp station, £250. G3UOX, 45A Norwich Road, Scole, Diss, Norfolk IP21 4EE.

IC22A, fitted R2-7, S0, S20-24, 144-8, toneburst, mounting bracket, £100. G8AHH, QTHR. Tel Farnworth (0204) 791360.

Codar AT5 160/80 a.m. tx, £15. Collins TCS12 rx, £10. BC221, mains operated, charts, handbook, £20. Class D wavemeter, no charts, £5. All items buyer collects or carr extra. G3OXG, QTHR. Tel 0767 260562.

HW8 QRP tx/rx, mint cond, hardly used, genuine reason for sale, £76 ono. Bowes, 123A Old Bath Road, Cheltenham. Tel 26945.

SB401, SB303, tx/rx, vgc, all cables, mic, £300 ovno. Airmec 314 vtmv, £20. *Wanted:* IC211E. Miller. Tel Braintree 40263, evenings.

FT101E, separate spkr, orig packing, hardly used, £430. G. Lucas. Tel 01-903 8181, office hours.

Deceased swl's station: rxs, Eddystone 888, am bands, £70. EA12, am bands, £120. 940 gen cov, £80. Excellent cond, no handbooks. Symon, Tiptree, Essex. Tel 815548, day, 817388, evenings.

KW204 with vox, £190. KW202 rx, £170. 444 mic, £18. All immac. FB stn, top to ten, ssb, cw, am. G4FXI, QTHR. Tel Aylesbury 21542.

TR2300, fully synthesized, nicads, charger, Trio 10W p.a., mobile mount, helical, £180. Akai black and white portable video tape recorder, psu, camera, tv tuner, leads, cases, etc, vgc, cost nearly £1,000, accept £400 ovno. G8VUL. Tel Coventry 62429.

National 432 fm tx/rx, model RJX431, 10W output, 24 channels, three filled, £150. Narda 8-12GHz gasjet amplifier, model N620S-6, 7-5dB nf, 25dB gain, inquire. KB2M, 30 W Union Tpk. B-8, Wharton, NJ 07885, USA.

FT101B, fan, accessories, orig packing, exc cond, used very little, £299. *Wanted:* FT221R. G2HCV NOT QTHR. Tel 01-866 4871, home, 01-952 7722 ext 200, work.

KW2000A, matching ac psu, good cond, £120 ono. New QTH, no hf antenna allowed, buyer inspects and collects. G3VZP, Morrison, 7 Hamersley Hayes Road, Cheadle, Stoke on Trent, Staffs ST10 2DW.

Microwave Modules 432/50W linear amplifier, £80. Microwave Modules 1,296/28 converter, £20. Jaybeam 46-6l 70cm multibeam, £15. New QV03-20 valves, £5 each. G4AEZ, QTHR. Tel 01-366 7166, after 6pm.

IC215 2m fm portable, vgc, auto toneburst, R0-7, S8, S32, S19-22, RR6, nicads, charger, case, manual, helical whip, mobile mount, £115 ono. G8SCV, QTHR. Tel Newmarket 4295.

FT101 Mk2, cw filter, latest mods, property of late G3BHC, £270. FL101 tx, 160-10, £260. FT301D, FP301 digital, 160-10, mic, handbook, etc, £450. All ono. G3RCE, 23 Bristol Road, Southsea, Hants.

Pye CT232 colour tv, 22in, one owner, supplied by local private dealer, tube insured, superb picture, trouble-free, on wheeled stand, £180 ono. 100kHz frequency marker, two transistors, neat, accurate, cased, £6 post paid. Tel Frome (0373) 4694.

Final reductions to clear: TS820, £500. IC211E, £385. 7200G (10 channels), £105. PS30 power supply, £55. FS700H swr/pwr meter, £35. Monitorscope HO10, £40. All as new collect preferred or pay carriage. G2YS, QTHR. Tel Rickmansworth 76864.

Yaesu FLDX400, FRSDX400, separates and matching spkr, rx fitted 2/4m converters, full compliment of filters, recently aligned, £325. MMT144/28 2m transverter, as new, £65. Buyer collects. G8IXG, QTHR. Tel Reading 84692.

KW1000 linear amp, £150. Slow scan monitor, needs some attention, £40. Icom IC22, 5/8 boot mount whip, £90. Pye 4m Vanguard, control box, etc, 70-26, 70-375 xtals, £20. G3VOF, QTHR. Tel Ingrebourne 73366.

FDK Quartz 16, S20-23, R0 input, R2-7, mobile mount, £120. G8TIS. Tel Wakefield (0924) 823973, weekends.

IC215 3W portable fm tx/rx, channels: R0-8, S20-23, large nicads, charger, helical, spare telescopic whip, case, orig packing, mint cond, £145 ono. IC30A 70cm, 10W, fm, six repeater, two simplex, £165 ono. G4JXV, Tel Basingstoke 28241.

TR2200GX, fully xtalled, nicads, charger, case, sell or exchange for hf rig, KW107 or Yaesu YO100 monitor scope. G4IUI. Tel Chorley (025 72) 62988.

Trio TS120V, cw filter, mic, orig packing, immac, £380. 18AVT/WB 10-80m vertical, £40. G-whip, 10-80m coils, base, £28. Homebrew audio processor, £5. Homebrew stab 12V psu, £5. 5FP7 slow scan tube, £7.50. G3YIQ, QTHR. Tel 0270 212227.

FT101 Mk2, factory 160m, cw filter, fan, no mods, exc cond, orig packing, £300. IC240, 80 channel add-on unit, mobile whip, £130. G3VRY, QTHR. Tel Chesham 5010.

Avo valve tester, two-unit type, manual, £20. American Radio City valve tester, 220V operation, manual, £20, exchange good oscilloscope, etc. Edwards, 34 Haden Way, Willingham, Cambs. Tel Willingham (0954) 60658.

Standard 828M 10W mobile, xtalled all repeaters plus S20-23, CV110 matching vfo giving continuous coverage 144-146, comp with mobile mounting kit, all in orig packing, £150 cash. G3KOU, QTHR. Tel 02357 66462, evenings.

Liner 2, 3N204 pre-amp, good clean cond, 144-100 to 144-370, £95 ono. G4CRE, QTHR. Tel 0909 81310.

C146A 2m handheld, 2W out, toneburst, nicads, charger, xtals for S20-23, R2, R7, helical, leather case, mic plug, as new cond, in orig packing, handbook, £70. G8UZE, Croydon. Tel 01-654 2665.

Storno CQL600 4m 10W fm dash mounting tx/rx, six channel, xtalled 70-26, 70-30, 70-48 cw, mic, mobile mount, vgc, manual, £100. Pye Cambridge 4m six channel, dash mounting, xtalled 70-26, £40. Solartron CD1016 dual scope, needs slight attention, £30. Alkaline batteries 12V @ 120 A/hr, cw, spare electrolyte, manual, £35. Hitachi cassette recorder, built-in Electret mic, unwanted gift, £18. 2m 40W linear, QZ02640 ps, cw, integral inverter, 12V, £35. G3ZTZ, QTHR. Tel 0276 26067.

Trio 7500 2m tx/rx, 80 channel, used little, complete, boxed, £175. 5/8A whip, magmount, cable, £10. *Wanted:* TS8205 service manual, buy or borrow, expenses paid. G3SEF, QTHR. Tel Rob, 0922 415369, weekends, or 01-580 4468 ext 2723, work.

Swan 100MX hf tx/rx, 80-10m, preselector, rit, xtal calibrator, vox, noise blander, used little, £410 ono. Heathkit HR1680 amateur bands ssb/cw/rx, cw filter, xtal calibrator, kit price now £238, only £110 ono. G4JQP, G8FKC, QTHR. Tel Radstock (0761) 34216.

Quartz 16 R3-7, S20-23, £110. IC255E, £210. FP4, 12V psu, £12. Heath HP238, 700V/280V psu, £15. Junker hand key, £12. All well cared for, txs in orig packing, will deliver Kent, Sussex. G3TMT, QTHR. Tel Lindfield (04447) 3492.

TS700SP, mint cond, orig packing, manual, mic, 144-148 coverage, toneburst, £310 ono. Heathkit SB104A, SB644, SB614, all solid-state, professionally built, £450. G3VKP, QTHR. Tel Cambridge 842978, after 6pm.

Realistic DX300 digital readout general coverage rx, new this year, £150 ono. G3WAL, QTHR. Tel Rugby 70385.

FT101E, FV101, SP101, two spare pa valves, two spare driver valves, all plugs, leads, manual, exc cond, £470. G3VLQ, QTHR. Tel Reading 59591, after 7pm.

Icom IC240, 22 channels, programmed for RO-9, S19-24, auto toneburst, comp with manual, all accessories, orig packing, exc cond, £150. GM4KBR. Tel Bob, 041-632 1450, after 6pm.

AR88D, good cond, no mods, spare valves, handbook, no case, £55. Admiralty key, £3. *Wanted:* Dummy load, 50Ω, KW or similar. Tel Maidstone 64561.

KW202 rx, £175. KW204 tx, £175. KW108 monitorscope, all in vgc, £55. Will deliver 50 miles. G4BWB, QTHR. Tel Bristol (0272) 426486, evenings 6-7pm.

Triangular lattice tower, 32ft, four section, climbable, comp with base assembly, rotator, bearings, stub. Ready for collection, £85 ono. G3VBP, QTHR. Tel 0249 815066.

FDK2700 Mk2 2m multimode tx/rx, 10W output, built-in 10m Oscar converter, SEM PA5 pre-amp, £350 ono. G4JAU, QTHR. Tel 0202 514078.

Yaesu FT7 hf tx/rx, incl all 10m xtals, accessories, FL110 linear to match FT7, both in perfect cond, only six months old, £380. G3KLF. Tel Fareham 236906, weekends or evenings only please.

Complete station: TenTec Argonaut 509, xtal calibrator, cw filter, mic, electronic keyer, model 405 linear, 100W input, 117V mains supply or all can operate from 12V dc, exc cond, all manuals, £310. G5DEH. Tel Newmarket 4757, anytime.

IC22A 2m tx/rx, 13 channels, six repeaters, handbook, mobile whip, Jaybeam, 2m quad, £150 ono, or will swap for psu for FT250 10/15 beam gdo plus or minus cash difference. Tel Bury St Edmunds (0284) 66661.

Drake TR7 station, unused, as brand new, boxed, TR7 tx/rx, PS7 psu, R7 rx, RV7 remote vfo, L7 linear, MN2700 atu, SP75 speech processor, 7077 desk mic, MS7 spkr, FA7 fan, DL1000 d/load, genuine reason for sale, offers. Tel 0602 54047.

TenTec QRP, 5W, TenTec linear amp, 50W, £200. Datong FL1, agile audio filter, £50. Katsumi electronic keyer, EK150, £50. G4FKL, QTHR. Tel Sunderland 73350.

Trio TR7500 cw mobile mount, mic £170. AOR240, handheld tx/rx, cw mains charger, helical whip, carrying case, car charging unit, £110. G8SWJ, 40 Wilson Drive, Outwood, Wakefield. Tel 0924 824211, after 6pm.

AR30 rotator, 2m 4-over-4, slot-fed antenna, cables, weather-proofed, 20ft mast, £35. Emsac 2m, Nuistor converter, hb psu, £10. *Wanted:* swr/power meter, suitable up to vhf, SWR200 etc, any type considered. G8SDZ, QTHR. Tel Hawthorn (0225) 810665.

KW2000A, ac ps, exc cond, £200. Buyer collects. G3ORU, QTHR. Tel Sheffield 363155.

10m 3-el beam, coaxial feed, £18. Buyer collects G2DTC, QTHR. Tel 0922 415048.

Loudspeakers, 13x8in, 10W, 8Ω, one brand new, one slight tear, £5 pair. Creed 7B spare parts, see with requirement. Electronic Mastermind game, as new, £7. Postage extra. G8NGM, QTHR.

Liner 2, pre-amp, psu, £100. *Wanted:* two chimneys for 4CX250. Two bases type SK630 or SK620. GM8LWR. Tel 031-669 2861, evenings.

FT221R, £260. YC221, £60, pair for £300. TR2200, fitted S20, S22, R0, R3, R7, £60. FT101E, as new, £425. 813 x 2 linear, 10-80, £100. *Wanted:* FT225RD. G3OXV, QTHR. Tel Daventry (032 72) 2265.

Radio components: hundreds new and obsolete valves, transistors, psus, vfo, wavemeter, relays, coils, capacitors, resistors, every conceivable component including AVO 7, the constructor's paradise, £12.50, carr extra. G3OAZ, QTHR. Tel 0256 65126.

Unused equipment in orig cartons offered at three quarters list price. Icom IC202S, Bearcat 220FB, STE ARAC102, Datong UC1, Datong FL2, MM2000, MMT28/144, Yaesu FL110, Avanti 10m quad. Consider exchange fm gear, cash either way. G3SEV, Essex. Tel 0702 585548.

2m fm tx/rx, Icom IC225, 80 channels, synthesized, nearest offer to £160. Prefer buyer inspects, collects. G3DNX, QTHR. Tel 061-480 9994.

Ten brand new 4CX350A valves, £20 each. Four uhf bases, only £5 each. Both items genuine Eimac. G4CGS, 24 Rolleston Drive, Newthorpe, Notts NG16 2BD. Tel Langley Mill (07737) 67503, Saturday and Sunday only.

FT200, FP200, audio filter, full coverage of 28MHz, £200. G4ATV, QTHR. Tel 021-706 0744.

Lowe SRX30 rx, Wadley loop system, gives exc stability, accurate readout, performance, cond as new, instructions, circuit diagram, orig packing, £120. J. M. Meek, 4 Byways, Clevedon, Avon. Tel 871039.

FL200B tx, 80-10m, 240W input power, built-in power supply, exc cond and appearance, £98. G4IBG. Tel 0273 731391.

FTDX401, SP401, mic, £220. TS700S digital, SP70, £390. VFO700S, £55. Datong clipper, £25. FRG7 digital, £165. Osler swr meter, £20. GEC spectrum analyser, £25. Two 16-el Tonnas, phasing harness, £55. P40 Versatower, h/d head unit, £290. G4CUS, QTHR. Tel Battle 3205.

FT200, FP200, Holdings if clipper, spare pa valves, all 10m xtals, £200. Buyer collects or arranges carriage. G3ATF, QTHR.

TR2200GX, immac cond, fitted 10 channels, comp with nicads, charger, helical, base psu/charger, free Jaybeam ground plane, £110 ono.

G4HCL NOT QTHR. Tel March (Cambs) (0354) 740827.

Heathkit SB303 rx, with cw filter, SB401 tx, incl three spare 6146s, £290. HQ1 minibeam CDE rotator, £85. KW107 Supermatch, £60.

G4DUM, QTHR. Tel Crayford (0322) 526460.

CR100, manual, £12. CR150, manual, pu, £12. Wattmeter, 5mW-5W, £12. BC221, (LM series equivalent), pu, charts, £20. Wayne Kerr sig gen, 8-9-300MHz, £6. BPL elect cap tester, 0-600V, 2-2200mF, £12. Marconi vvm 0-150V, probe, £6. AVO CT155 cal meter, £6. Cossor fm rec alignment, 10-25, 90-105MHz, £6. Marconi 1 per cent lc bridge, manual, £15. Ignition tester, TF1348, manual, needs EN31, £5.

Oscillator, am/fm, 20-80MHz, £12. TF937 am/fm gen, 85kHz-30MHz, xtal, £12. AVO transistor analyzer, £6. Friden flexowriter punch reader, £12. Collect or add carriage. SAE for list. G8GZY, 217 Yardley Wood Road, Birmingham B13 9JJ. Tel 021-449 8686.

FR101 rx, FL101 tx, exc cond, £380 pair. KW202 rx, KW204 tx, rarely used, £280 pair. G4FVR, QTHR.

Property of the late G3EYE: Yaesu 227RB tx/rx, FDK800D tx/rx, FDK Multi 2000 tx/rx, FDK Multi U11 tx/rx, FDK handheld, IC201 2m multimode, needs attn. Scopes, pre-amps, psus, rotator, swr meters, frequency counters, digital meter, rty tx, many other items. SAE for lists. G4FYJ, QTHR, or G8SVM, 29 Forest Drive West, London E11 1JZ.

2708 eprms, used once, erased, £2.50 each. G3HSC morse course, three records incl advanced, £4. G8SJH NOT QTHR. Tel Hitchin 58728.

Multi U11 xtals: SU8, SU16, SU18, SU20, RB0-14, reverse RB10, RB14, comp with magmount whip, £185. MM144/28 transverter, £85. MM432/28 transverter, £85. G8HPD, QTHR. Tel 058283 3307, after 6pm.

Heathkit HW101 80-10m ssb/cw tx/rx, homebrew psu, mic, handbook, exc cond, prefer buyer collects, £170. G3YJH, QTHR, Birmingham. Tel 0754 73697.

8080A micro, £2. Three off 2708, £6. Three off 1702 prom, £6. 15 off 2107B 4096 bit ram, £10. AY-3-8500 UART, £2. 8080 user manual, £2. 8080/85 assembly manual, £2. 500 ttl ic's, most full spec, very wide range, £10. 20 off MM8006 1GHz npr, £2 each. MM4 meter converter, 28MHz i.f., £15. Tel 060684 4283 (Cheshire).

Telemeter scope D43R, incl two plug-in diff amp, type G, 10MHz 19in rack mounting, £100 ono. Jerrold 900B sweep generator, 500kHz-1, 100MHz, sweep from 10kHz-400MHz, non-working model for spares, £100 ono. Manuals for both. TV waveform generator, Ferguson WG61, 405/525/625, camera control unit, VA543, sync pulse generator, VA541, both Thorn, no more info, best offer secures. G3WWT, QTHR. Tel 01-898 2417.

ASCII, receive only, teleprinter comp with cover and stand, 110 bauds, 20mA loop input, £40 ono. G3PLX, QTHR. Tel Gosport 21563.

2200GX, 12 channels fitted, case, charger, nicads, extra xtals, £120 ono.

Wanted: info/data on Audac radio mics or Pamphonic type 661W audio power amplifier. G8MMM. Tel 051-336 7143, evenings.

TS520S tx/rx, SP520, VFO520, dc/dc converter, used little, exc cond, boxed, handbook, value originally £650, accept £425. Buyer collects. GW8WIC. Tel Llandulas (049 266) 636, after 6pm.

Trio TS520, immac, £350 ono. Yaesu FT301D, all solid-state, 100W o/p, £450. 70cm, 16-el stack Yagi, £7. 46-el multibeam MMB 46/70, £12. Approx 200 old *Radio Communication*, *S/W Magazines*, offers. Heathkit SB101, 180W p.e.p. tx/rx, £100 ono. G3NAS, QTHR. Tel Aldridge 53718.

FRG7, 12 months old, good cond, G4 forces sale, £150. Marshall, 60 Drake Road, Harrow. Tel 01-868 8368.

FRG7, fine tune, mint cond, manual, orig packing, 2m converter, Daiwa CL22 atu, £165 the lot. Buyer collects. 33 Horsebridge Avenue, Badsey, Evesham, Worcs. Tel Evesham 831010.

FT221RD, with spares, £325 ono. MMT432/144R transverter, £140 ono. Creed 7ERP reperforator, keyboard, £15. Autosender, £10. 30ft three section mast, £10. G8SFM, QTHR. Gloucester. Tel 066 68 307.

Collins 32VI tx, all bands, superb cw rig, built like a battleship, £200. KW204 tx, covers all bands 160-10, hardly used, £165. *Wanted:* Drake TXC tx. G4LW, QTHR. Tel Trowbridge 3166.

FT101Z, comp with fan, mic, as new, only 25 QSOs, small atu, £500. G4IQO. Tel Chris, Portsmouth 819968.

TS520S, matching vfo, mic, spares, superb cond, £440. Shure 444, £15. DX5V hf vertical, £20. PM2000 power meter, £38. MM 2m transverter, £60. All mint, hardly used, orig boxes. G4HHR, QTHR. Tel Thanet (0843) 42930, evenings or weekends.

Yaesu FC301 atu, switches, four antennas, 500W, separate swr and power output meters, £90. Mosley Mustang Mk2 3-el beam, £95. Yaesu 202R handheld, nicads, NC1 charger, £120. All mint. G3UFU, QTHR. Tel 0803 312879.

FT101E hf tx/rx, in vgc, used little, £410 incl Securicor delivery. No offers. G13OLJ, QTHR. Tel 0247 55519.

FT7, 10-80m, 15W, ssb, cw mobile tx/rx, exc cond, £230. G4FUT, QTHR. *Wanted:* Valve QY365. G4FUT, QTHR.

KW2000B, mains psu, mic, handbook, etc, £195 ono. FT7B, used little, 10A psu, orig packing etc, £360 ono. G4GZS, QTHR. Tel Rugby 815506. **70cm fm tx/rx**, Edystone, 12V, RB4, rev RB4, RB6, SU8, SU20, 10W o/p wkg cond, £65. Handheld Starphone, tx/rx for RB4, wkg, leather case, £35. RB4 tx/rx for Starphone, £5. G4FAW, QTHR. Tel Stowmarket 75330.

KW2000, KW2000A, HW100, psu, in wkg order, no mods, collection to be arranged as an extra. G14CBG, QTHR. Tel 0232 657343.

WANTED

Suitcase radios. American researcher purchases military radios built inside civilian style suitcases or other clandestine radios, any style or condition, working or otherwise, complete or incomplete. Send phone number in letter. Melton, Box 2037, Ogden, Utah, 84404, USA.

Telescopic Versatower up to 60ft, must be in good cond. V. Franck, 184 Dalton Lane, Rotherham, South Yorkshire.

Standard radio, power and radio unit type 4192. Control and drive unit type 4190. Control and drive unit type 4243. G8MOS. Tel Alton 84174, after 6pm.

Joystick antenna, must be good cond. G3JIC, QTHR. Tel 0744 23916.

Telephone set "J" YA7815f, army type field telephone with handset. Needed for pair. Prefer wkg order for use by preservation society on airfield. D. Allen, 44 Dacca Street, Deptford, London SE8 3LJ. Tel 691 7839, after 5pm or weekends.

Barlow Wardley hf band portable, late model. Must be in first class cond. W. Briggs, 8 The Grove, Whalley, Blackburn, Lancs. BB6 9RN. Tel 025482 3366.

Electronics front end units, valve or transistor, general coverage or amateur bands, type QP166 etc. Matching 1.6MHz ssb i.f./detector strip. P. Fry, G3TZV, 3 Geneva Road, Bramhall, Stockport, Cheshire SK7 3HT. Tel 061-439 6174.

9MHz filter and carrier tx/rx for G3ZVC tx/rx. Multiband vertical antenna, 12AVQ or similar. G3INZ, QTHR.

Good vhf fm rx 136-200MHz, prefer vfo control, must be in good wkg order, must be selective. Good price paid for right equipment. Steve Lawrence, G4EOF, 7 Ashfield Road, Market Harborough, Leicester.

Passive audio cw filter in good wkg order, could be ex-world war two. G4DLW, QTHR. Tel Helsby 5221.

Racal RA17 table cabinet, any cond. G3LLZ, QTHR. Tel Swindon 0793 38069.

£5 offered for scope Solartron CT436 manual. Humphreys, GW8SGA, 31 Upper River Bank, Bagillt, Clwyd. Tel 0352 713708.

60ft Versatower, tri-band beam, rotator, job lot or separates. Details to GW4IOA, 105 Thompson Avenue, Newport, Gwent. Tel 0633 272548.

Schematic for Nora W69 three-band rx, will copy and return or pay copying cost, postage reimbursed. Source for AZ11, ECH11, EBF11, and ECL11 valves. Bill Johnston, N5KR, 1808 Pomona Drive, Las Cruces, New Mexico 88001, USA.

Faulty scope, not more than ten years old, prefer solid-state, but not essential. Tel offer to Stan, 0327 842 373.

HRO coils, 3-5-7-3, 1-7-4-0, 900-2,050, 480-960. BS coils, MX valves. G3VDY, QTHR. Tel 01-653 4738.

Unfinished or incomplete 2m pa, using 4CX250 type valve. *For Sale:* Pye Cambridge h/b, comp, needs rf board, offers or w.h.y? G8LCC, QTHR. Tel Woodseaves (Stafford) 388.

For the Wireless Museum: Valve-tester particularly wanted. Old wireless rx, tx, amplifiers, valves, components, radio books, catalogues, magazines, QSL cards, testgear. Collection arranged. Details please to hon curator, G3KPO, QTHR. Tel Shanklin 2586.

One pair of Eimac SK600 series bases, and Eimac SK606 series chimneys. C. H. Jeffery, 22 Carlyle Road, Maltby, Rotherham, South Yorks. Tel Rotherham 815649.

Help please! My CT436 oscilloscope transformer has blown; marked Gresham E17550 295088 panel 4x4in, 5in deep, impregnated core 140V 135mA, 30V 30mA, 650V 1mA, 6-3V 1-5A, 4A, 3A, 0-3A. GW2HCJ, QTHR. Tel 0766 770637.

2m fm rx, Search 9 or NR56 vfo, would exchange for Heathkit SW717, 550kHz-30MHz. Tel Accrington 391101.

Handbook or information on Meteoronic single beam scope. Yaesu FTV250 transverter, in good cond. E11DH, QTHR. Tel Dublin 507141.

KW1000 linear, must be good cond. Trio JR500 or Trio 300 rx. 18AVQ WB. *For Sale:* AR88 with handbook, £40. CR100, £10. G3ZYQ, QTHR. Tel 01-363 3363.

Manual for EMI WM16 oscilloscope and wide band plug in. Reasonable price paid. Edwards, G8VPZ, 512 Audenshaw Road, Audenshaw, Manchester M34 5PT. Tel 061-370 3825.

Manual to buy or copy and return, for Heathkit RA-1 rx. Failing this circuit diagram would help. T. A. Smith, 16 Hazel Way, Barwell, Leics.

Facsimile Muirhead 900 gears and synch motor. FM circuit diagram. G3VXZ, QTHR. Tel Maidenhead 27350.

Circuit diagram and mods to 2m, 4m for rx type R1132A, postage refunded. Cheap hf tx, cw and ssb rig, anything considered. M. Thomson, GM4JCJ, Heathfield Labs, The University, Dundee.

Cathodian xtal oven, 6V. G8UN, QTHR. Tel 061-761 6616.

Yaesu FT901DM, beam, rotator, *Radio Communication* 5/71, 8/72, 9/72, 5/76, 8/78. Dunn, G3YAA, 5 Eden Close, Beverley, HU17 7HE.

TS700G or similar multimode, good cond essential. HRO rx, LG300 tx, both must be complete and wkg. Can view/collect Birmingham/Manchester areas. M. Swift, 341 Walsall Road, West Bromwich, West Midlands. Tel 021-588 4801, 6-7pm weekdays.

Manual for KW Vanguard tx. Buy or borrow. Postage refunded. G14CBG, QTHR. Tel 0232 657343.

Hammarlund gear. Seeking rx HQ-170-A vhf and tx. HX500, cond imaterial if price commensurate. Details to 115 Charterhouse Road, Orpington, Kent BR6 9EN. Tel Orpington 29716, evenings, not Thursdays or Fridays, 9-10pm.

Drake SPR4 rx, accessories, 5NB noise blanker, AL4 loop antenna. Any reasonable price paid for good wkg cond. J. Rayner. Tel Welwyn Garden City 33123, evenings.

Signal generator, Marconi type 995A or 995B. G8BKX, QTHR. Tel Portsmouth 20780.

Suitcase type sets: Mk119, Mk122, Mk128, Mk217, BP5 or T5, AR11, A3, Type 3 Mk2 (B2), Type A Mk3 (B2 Minor). Any manuals or literature, incomplete or damaged items welcome. Letters only. Taylor, G3UCT, c/o 31 Willow Walk, Culverstone, Gravesend, Kent.

Dot matrix printer mechanism. 8 or 9 dot, 8-10in paper feed, data, I hope to interface to Nascom 2 direct from video. Ideas, data, help? GW2HCJ, QTHR. Tel 0766 770 637, evenings.

GEC tube LD924E, manual. Venner counter. TSA/3336/1, SA520 counter circuit, XO board, manual. Circuit advance TMC1, manual. Telequipment S32A scope, manual. Racal counter B15R. D. Griggs, 5 Collingwood Avenue, Muswell Hill, London N10 3EH.

Dial for AR88LF rx or u/s set for spares. G. F. W. Harrison, 65 Coronation Road, Radcliffe, Manchester. Tel 061-724 8445.

Looking ahead

5 October—BABC Convention, Post House Hotel, Leicester.

18-19 October—Jamboree on the Air.

6-8 November—Amateur Radio Retailers Association National Amateur Radio Exhibition, Granby Halls, Leicester. (NOTE DATE CHANGE.)

6 December—RSGB AGM, IEE, Savoy Place, London.

Contests calendar

4-5 October	432/1,296/2,304MHz and SWL
4-5 October	IARU Region 1 VHF/UHF/SHF (UHF/SHF section) (<i>Rules in June/July issue</i>)
4-5 October	RSGB UHF (<i>Rules in August issue</i>)
4-5 October	VK/ZL/Oceania (Phone) (<i>Rules in September issue</i>)
5, 12, 19 October	Grafton Top Band (<i>Rules in September issue</i>)
10, 18, 26 October	432/1,296MHz Cumulative (<i>Rules in August issue</i>)
11-12 October	VK/ZL/Oceania (CW) (<i>Rules in September issue</i>)
12 October	21/28MHz (<i>Rules in May issue</i>)
15-16 October	YL Anniversary Party (CW) (<i>Rules in September issue</i>)
18-19 October	WADM DX (<i>Rules in October issue</i>)
19 October	21MHz CW (<i>Rules in June/July issue</i>)
25-26 October	CQ WW DX (Phone) (<i>Rules in September and October issues</i>)
26 October	70MHz Fixed (<i>Rules in August issue: Note change of date</i>)
26 October	Shefford & DARS Transmitting and Receiving (Section 1) (<i>Rules in August issue</i>)
1 November	Shefford & DARS Transmitting and Receiving (Section 2) (<i>Rules in August issue</i>)
2 November	144MHz CW (<i>Rules in October issue</i>)
3, 11, 19, 27 November	432/1,296MHz Cumulative (<i>Rules in August issue</i>)
5-6 November	YL Anniversary Party (Phone) (<i>Rules in September issue</i>)
8-9 November	Second 1.8MHz
8-9 November	Esperanto (ILERA) with swl section. Details from G4MR, QTHR.
8-9 November	International Police Assn (IPA) (<i>Rules in October issue</i>)
9 November	OK DX (<i>Rules in October issue</i>)
15-16 November	First Alternative Energy (<i>Rules in October issue</i>)
15-16 November	Cray Valley Activity (<i>Rules in October issue</i>)
29-30 November	CQ WW DX (CW) (<i>Rules in September and October issues</i>)
7 December	144MHz Fixed (<i>Rules in October issue</i>)
7-8 February 1981	7MHz (Phone) (<i>Rules in August/September issues</i>)
28 February-1 March 1981	7MHz (CW) (<i>Rules in August/September issues</i>)

Cray Valley RS Activity Contests 1980

Contest One 28MHz. 1400gmt until 1900gmt Saturday 15 November 1980.
Contest Two 144MHz. 1000gmt until 1300gmt Sunday 16 November 1980.
Contest Three 1.8MHz. 1400gmt until 1700gmt Sunday 16 November 1980.
 1. **Contacts.** 1.8MHz and 144MHz. All modes. An exchange of report and serial number (starting with 001) and administrative county. Cray Valley members will also send "CV". Contacts via repeaters will not count for points.
 28MHz ssw/cw. An exchange of report and serial number (starting with 001). Cray Valley members will also give "CV".
 2. **Entrants.** The contests are open to all licensed operators and swls either fixed, portable or mobile.
 3. **Scoring.** Ten points for working Cray Valley RS club stations G3RCV and G8FCV.

Three points for working Cray Valley stations.
 Two points for Cray Valley stations working each other.
 One point for any other contact.
 Final score—1.8 and 144MHz: total points multiplied by the number of counties plus countries worked/heard. 28MHz: total points multiplied by the number of counties worked/heard.

4. **Logs.** The following information must be shown:
 Date, time, callign worked, RST(I) and serial number sent, RST(I) and serial number (and county) received, points claimed.

Completed logs to be sent (post-marked not later than 14 December 1980) as follows:

a. Non-Cray Valley members to: Bob Treacher, BRS32525, 79 Granby Road, Eltham, London SE9 1EH.
 b. Cray Valley members to: Owen Cross, G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF.

5. **SWL entrants.** The above rules apply but with the following additions: logs must show date, time, station heard, station being worked, report, serial No (and county) given by station heard, report at swl QTH, points claimed.

Only stations taking part in the contest may be claimed for points.
 The practice of logging a series of contacts made by one station is deprecated. Log entries must not include the same callign in the "station being worked" column more than 10 times.

6. **Certificates** will be awarded at the discretion of the CVRS committee and its decision will be final.

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- **Three-speed simulated P.O. Test** (7" DS EP record). **£2.00.**

All overseas orders, including Eire, must add £1.12 for additional packing and postage from the supplier. RSGB members may deduct 10% from all the above prices. Quote membership reference when ordering.

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CO-AX	UR67/RG213 50ohms	10-3mm	49p per metre (post 5p/m)
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	RG59 B/U 75ohms	6-15mm	22p per metre (post 3p/m)
VALVES	6KD6—£3.75;	6JS6C—£3.30;	6146A/B—£4.90
	6GK6—£1.96;	6LO6—£3.85;	12BY7—£1.63
	6EA8—£1.80;	6BZ6—£1.36;	12GN7—£2.45
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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
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- 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

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- 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
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- Antenna connects straight through when unit is switched off (for reception only).

Price: £22.00 - VAT, total £25.30

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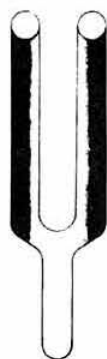
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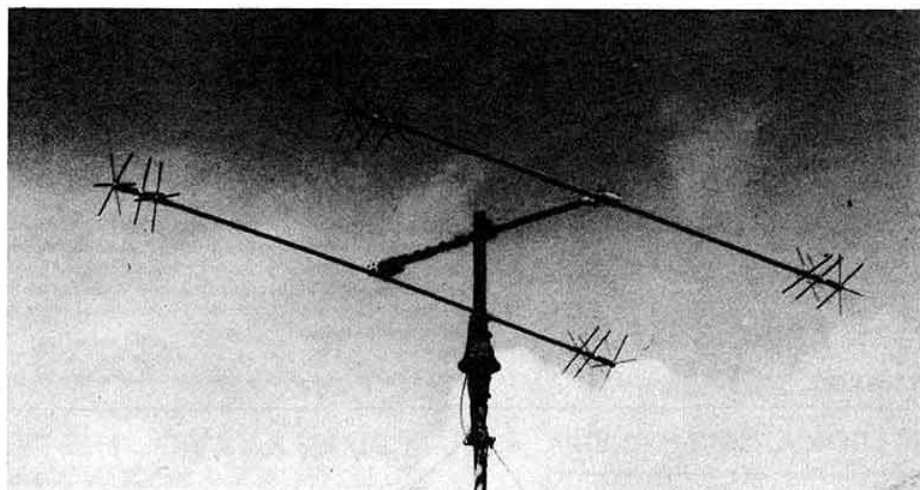
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Price: £77.50 + £2.50 p&p in UK

PACKAGE: beam, rotator, 15m coax UR43, 15m 5 core — £145.00

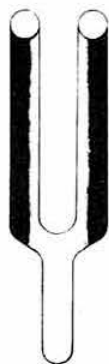
DESIGNED & MANUFACTURED IN THE UK

SPECIFICATION

Element length	11 feet
Boom length	60 inches
Turning radius	7 feet
Operating frequencies	10m, 15m, 20m
Forward gain (ref D pole = 1:00)	3.6 dB
SWR at resonance	1.5 to 1:00 maximum
Power rating	1400 watts PEP
Input impedance	50 ohms
Wind resistance	80 mph
Weight	14 lbs

Rotator requirements AR40

SAE for details, Coax UR43, UR67 and 5 core available



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RV-7	Remote VFO for TR-7	£132.25
L-7	Linear 160-10m 2kW (complete)	£874.00
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MN-2700	ATU/CWSR/RF Wattmeter 2kW	£207.00
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AC-4	Power supply for the above TR-4CW	£109.25

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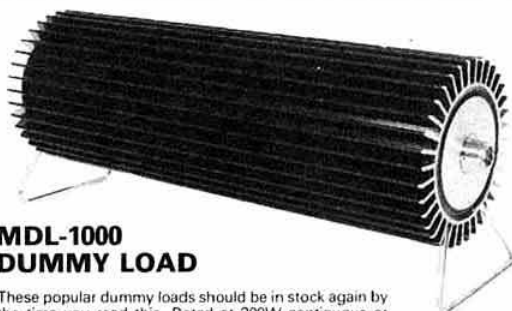
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2X011		9-9	2.77			
2X012		12-12	2.08			
2X013		15-15	1.66			
2X014		18-18	1.38			
2X015		22-22	1.13			
2X016		25-25	1.00			
3X010	80	6-6	6.64	90 x 30	1.0	EACH £5.76 + £1.20 P&P + £1.04 VAT
3X011		9-9	4.44			
3X012		12-12	3.33			
3X013		15-15	2.66			
3X014		18-18	2.22			
3X015		22-22	1.81			
3X016		25-25	1.60			
3X028	120	110	0.72	90 x 40	1.2	EACH £6.72 + £1.30 P&P + £1.20 VAT
3X029		220	0.36			
3X030		240	0.33			
4X010		6-6	10.00			
4X011		9-9	6.66			
4X012		12-12	5.00			
4X013		15-15	4.00			
4X014	160	18-18	3.33	110 x 40	1.8	EACH £8.88 + £1.40 P&P + £1.54 VAT
4X015		22-22	2.72			
4X016		25-25	2.40			
4X028		110	1.09			
4X029		220	0.54			
4X030		240	0.50			
5X016	300	25-25	6.00	110 x 50	2.6	EACH £12.27 + £1.50 P&P + £2.07 VAT
5X017		30-30	5.00			
5X028		35-35	4.28			
5X029		40-40	3.75			
5X030		45-45	3.33			
6X028		110	2.72			
6X029		220	1.36			
6X030		240	1.25			

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TS820	160-10m transceiver 200W P.E.P.
DG1	Digital readout to 100Hz
VF0820	External VFO
YG88C	CW filter 8 pole
SP820	Speaker
SM220	Monitor scope
BS8	TS820 scan board for SM220
AT200	1.8 to 30MHz antenna tuner
TL922	HF linear amplifier 160-10m/2kW P.E.P.
TS520SE	1.8-30MHz SSB transceiver 200W P.E.P.
SP520	Matching speaker
DG5	Digital display/40MHz frequency counter
DK520	Conversion kit allows use of DG5 with TS520
YG3395C	CW filter
TS120V	80-10m mobile transceiver 20W P.E.P.
TL120	80-10m 200W P.E.P. linear
PS20	AC power supply for TS120V
MB100	Mobile mounting bracket
YK88C	CW filter
SP120	Matching speaker
VF0120	Remote VFO
AT120	Antenna tuner (100W)
TS120S	80-10m mobile transceiver 200W P.E.P.
PS30	AC PSU for TS120S, TA130 & TS180S
TS770E	2m/70cm all mode dual bander
SP70	Matching speaker
TR7600	2m synthesised mobile FM 10 Watt
TR7625	2m synthesised mobile FM 24 Watt
PS8	PSU for TR7625 only
TR2300	2m FM portable transceiver
V82300	10W booster
MB2	Mobile mount
RA1	Helical rubber antenna
TS180S	160-10m solid state transceiver digital readout
TS180S	As above with memory frequency control
VF0180	External VFO
SP180	Speaker
DF180	Digital frequency counter
AT180	1.8-30MHz antenna tuner
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LAR PS1200	Power supply unit and ni-cad charger for TR2200GX/
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DR7500	Will take 3 element tribander	108.10
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IC260E	2m all mode mobile	339.00
IC251E	All mode transceiver	479.00

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214B	14-element 15dB long Yagi 144MHz	(c)	£ 45.00
A3219	19-element "Boomer" 16.5dB long Yagi 144MHz	(c)	£ 64.00
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AR10	Ringo vertical 10 metres	(a)	£ 22.00
A10/3	3-element Yagi 7-6dB 10 metres	(b)	£ 52.00
A15/3	3-element Yagi 7-6dB 15 metres	(b)	£ 72.00
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ATB34	3-band HF Yagi 7-5dB 10/15/20 metres	(*)	£235.75

ZL SPECIAL 2 metre 12 element

ZL12	13dB gain, 10' 6" long. Split boom	(a)	£ 28.75
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ZL8	9dB gain, only 6' 0" long. Split boom	(a)	£ 17.25
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Prices include VAT, *carriage extra. (a) £1.50 (b) £2.50 (c) £3.50

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M700EX £199.00; M750 £299.00



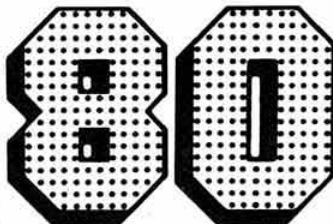
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COMPUTERS AUDIO RADIO MUSIC LOGIC TESTGEAR CB GAMES KITS



26th Nov — WEDNESDAY — 10am-6pm
27th Nov — THURSDAY — 10am-8pm
28th Nov — FRIDAY — 10am-6pm
29th Nov — SATURDAY — 10am-6pm
30th Nov — SUNDAY — 10am-4pm

COMPONENTS DEMONSTRATIONS SPECIAL OFFERS MAGAZINES BOOKS

Royal Horticultural Halls Elverton Street

Westminster London SW1

November 26-30 1980

It's all at Breadboard '80

This is the exhibition for the electronics enthusiast. From November 26-30 there is only one place in the universe for the electronics enthusiast to be — Breadboard '80, at the Royal Horticultural Hall in London. The majority of leading companies will be exhibiting, including all the top monthly magazines in the field. There will be demonstrations on most stands and many feature special offers that are EXCLUSIVE to Breadboard!

All aspects of this fascinating field are catered for, from CB to home computing, so whether you want to buy a soldering iron or a synthesiser — or just keep up to date with your hobby — don't miss Breadboard '80.

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A COMPLETE run down of all the kits and modules which are currently available is listed below. Please note that prices have changed on quite a few of the older established kits to keep pace with price increases on component parts. As the rally season is drawing to a close, now is the time to consider your new project for the winter evenings. We feel sure that you can find something in our range to interest you.

70FMO5TR. A two pcb set to give a 500mW FM transceiver for 70cms. The boards can be bought individually as and when required and both use PF1 crystals which are readily available. The TX has a modulator and limiter included and the receiver a PIN diode aerial switch, crystal filter, noise squelch and 8 Ω output. Both boards are 6" long and less than 1.5" wide. Over 300 sets of these have been sold worldwide and present a simple, cheap way of getting on 70cms. They will also re-tune to most of U-Band including 459MHz.

Kit RX £38.50 Assembled RX £47.25
TX £17.80 TX £25.95

70MCO6TR. When one channel is not enough then by adding this two p.c. set you will have 6 channels on tx/rx including a toneburst and scanner on receive. Size 6 x 1.1" for each board.

Kit RX £18.50 Assembled RX £26.05
TX £11.30 TX £18.10

70PAC. A package price for the above four boards.

Kit £52.00 Assembled £110.00

70FM Power Amplifiers are available to boost your TX from the following possibilities.

Code	Power	Kit	Assembled
70FM1	50mW to 500mW	£6.25	£11.25
70FM3	500mW to 3W	£11.80	£16.80
70FM5	500mW to 5W	£12.75	£17.40
70FM10/3	3W to 10W	£13.95	£18.80
70FM10	500mW to 10W	£20.90	£29.35

70PA2. A small pre-amp (1.25 x 1.1") giving 14dB gain using a TP393 or BFR91 device. Suitable for most equipments and has diode protection on the input.

Kit £11.30 Assembled £6.55

70PA3. A higher gain pre-amp using a MOSFET (3SK88) and with PIN protection of the input.

Kit £6.10 Assembled £7.25

70PA/FM10. A combined version of the 70FM10/70PA2 which fits into a small diecast box. The board has extra facilities for r.f. sensing and PIN changeover and is ideal for mobile use with either our 70FMO5TR or pocket phones, etc.

Kit £30.80 Assembled £38.80

70FIP6. A TVI filter using microstrip techniques and suitable for insertion in your TV down lead.

Kit £3.05 Assembled £3.95

MD05T. Microwave drive source as reviewed earlier this year (June/July RadCom) giving 0.5W on 384MHz. The board has modulation facilities for FM, FSK and CW. We can supply 96MHz or 94-666MHz starting frequency.

Kit £19.25 Assembled £28.38

MD10PA. A power booster for the MD05T to give 10W output. Size 2.75 x 1.0".

Kit £20.90 Assembled £29.35

MD3PA. As above but giving 3W output for the MD05T and slightly smaller 1.75 x 1.0".

Kit £11.80 Assembled £16.80

BPF1296. A small microstrip bandpass filter for 23cms, ideal for cleaning up your local oscillator or as an image filter.

Kit £6.15 Assembled £8.95

144FM2TR. The 2M equivalent of our 70cms system which again can be built separately. The receiver has a MOSFET front end after the PIN switch and a MOSFET mixer. The 25kHz channel spacing crystal

filter is followed by an FM i.f. strip with a noise squelch and then into an 8 Ω output stage. The TX gives 1.5W from a BLX67 device and has a modulator with limiter included. Both boards are single channel and require only the 144SY25B to make the equivalent of most commercial rigs. Sizes are 6 x 1.5" for RX, 5.5 x 1.2" for TX.

Kit RX £40.70 Assembled RX £49.80
TX £21.15 TX £30.25

144SY25B. A two board synthesiser to give 25kHz channels between 144-146MHz including repeater shifts. Channels are thumbwheel selected in channel number. The digital board includes a crystal controlled toneburst and out of lock inhibit. It is plated through for ease of construction. The VCO board gives outputs at either 6, 12 or 24MHz on transmit and either 5.5, 11, 22 or 45MHz on receive. A modulator is included for use with other rigs as well as the 144FM2TRs sizes. 4 x 3.5" (digital), 2 x 3.5" (VCO).

Kit £92.95 Assembled £69.70

SY2T. A shortened version of the TX without modulator or oscillator especially for synthesiser use.

Size 3 x 1.2". Assembled £23.10

Kit £17.25 Assembled £23.10

144PAC. A package price for 144FM2R + SY2T + 144SY25B.

Kit £102.00 Assembled £135.00

144FM10A. A simple 1W to 10W power amplifier for FM use measuring 1.75 x 1.0".

Kit £12.45 Assembled £16.15

144FM10B. A 1W to 10W power amplifier with full automatic changeover by r.f. sensing. The board is transparent to r.f. in either direction with no power supply connected.

Kit £22.90 Assembled £28.90

144LIN10A. A linear amplifier for SSB or FM use having c/o on the output only. The board requires 1W for 8W output and measures 2.25 x 1.5".

Kit £17.65 Assembled £23.35

144LIN10B. A linear version of the 144FM10B for SSB use but retaining all other facilities.

Kit £24.55 Assembled £30.45

144PA2. A general purpose pre-amp for 2M using a 3N204 MOSFET. Gain is 16-18dB and size 1.3 x 1.1".

Kit £6.07 Assembled £7.35

144PA3. For a little bit extra this board uses a 3SK88 or BFR91 device to give >20dB gain with low noise. The input has a PIN protection circuit. Size 1.4 x 1.1".

Kit £6.25 Assembled £7.50

SY25PB. An adapter board for the old Mk1 synthesiser. This removes the 1kHz from the control lines and generally eases control circuitry and layout. The addition of this board which sits 'piggy-back' on the old one gives the old 144SY25A the same abilities as the 144SY25B. It also has a 1.6MHz shift facility for 70cms use.

Kit £8.25 Assembled £10.90

SY25S70. A small board to give a 1.6MHz shift to the 144SY25B.

Kit £3.65 Assembled £5.95

PROSCAN 1. A simple diode matrix memory that is user programmable for the 144SY25B. The board has a scanner included with manual override, inhibit and auto TX enable. The memory is not only for the channel selection but also mode.

Kit £14.75 Assembled £20.10

TB2. A small toneburst (1.5 x 1.5") giving 1750Hz either gated for 500ms or continuous. The tone frequency and level are adjustable.

Kit £3.10 Assembled £6.05

PT1. A small piptone for ssb transmissions at the 'over' end. This version is suitable for 12V PTT lines and requires no battery. Size 0.9 x 2.0".

Kit £3.40 Assembled £6.60

PT2. A piptone for more modern solid state c/o rigs such as the IC211. The board requires a 9V battery but consumes very little power. (2.1 x 1.25").

Kit £3.45 Assembled £6.65

BE1. Battery economiser for the receivers in our range. When on standby the current consumed by the RX is reduced by 30%.

Kit £2.85 Assembled £4.10

REG 1. A small regulator for 1 to 1.5A demand. The nice feature of this board is the very low forward voltage drop needed for stabilisation, typically 500mV. This makes it suitable for mobile supplies on units such as our synthesiser, or handhelds, eg FT207.

Kit £3.70 Assembled £5.95

SSR1. A solid state changeover relay for supplies to the 144FM2TR. A 'ground to transmit' pin gives h.t. c/o with an interlock for synthesiser inhibit lines. (1.2 x 0.8").

Kit £3.16 Assembled £4.85

SSR2. Details as above but with an extra output on receive to enable the PIN switch on the 70FMO5R. The board is slightly larger. (1.5 x 0.8").

Kit £3.22 Assembled £4.90

MPA1. Microphone pre-amp for low impedance inserts when used on our TR's, or VCO, audio strips. (1.0 x 1.0").

Kit £2.50 Assembled £5.15

SLF1. A slope limiting filter for ignition pulses on your receive audio. The board fits in at the volume control and has variable filtering effect on noise spikes.

Kit £3.90 Assembled £5.10

SWR1. A printed microstrip directional coupler with diode detectors to give an indication of forward and reflected power. Basic directivity is 10dB but this can be improved to >20dB for accurate measurements. The kit does not include sockets or meters but just the sensing circuitry. Good for 2M and 70cms, 50W max.

Kit £4.55 Assembled £6.60

BPFs. We have a range of bandpass filters for the following bands and suitable for 10-15W input.

Band	Kit	Assembled
144MHz (lumped)	£2.85	£4.85
144MHz (printed)	£2.50	£2.90
144MHz (lumped)	£2.85	£4.85
384MHz (lumped)	£2.85	£4.85

PS1. PIN switch for aerial changeover of 10W or less r.f. power. The 2M version gives 26dB isolation and 0.5dB insertion loss, the 70cms 16dB and 0.5dB. Prices are the same for either version.

Kit £5.10 Assembled £6.20

This is a brief listing of the current product range as full kits. These cannot be split and sold in component parts. We do have, however, many components that are hard to get for the average amateur which include 23cms pre-amp boards and devices (NE64535), diecast boxes, chip resistors (51 Ω and 100 Ω), PTFE trimmers, Mullard thick film amplifiers (OM335, OM361) etc. A large SAE (A4 size) will bring you the latest lists and new projects. The range is constantly expanding and it is worth giving a call if you have a simply query on TADLEY (07356) 5324 during evenings and weekends. The above prices will be current for 1980 and include VAT at the current rate. Please include 60p on your total order for post and packing. The kits include all pcb components except crystals unless stated otherwise. Suitable boxes and external hardware is not supplied in the kit but some suitable stock is held. Any kit purchased from the range will be gladly serviced but a £2.50 cover charge would be appreciated on larger items. All items in kit form are usually ex-stock either with us or our ally agent J. Birkett of Lincoln. Assembled items unless stock will be 10-14 days from receipt of order, and will be tested and aligned to specification.

A. WOOD, G4EEE

M. P. TELKMAN, G8DCA

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ANTENNAS

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* Does not include 50 ohm coax, cable where required to feed remotely located JOYSTICK VFA.

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GAREX (G3ZV1)

VHF RECEIVERS SR-9 MkII for 2-metres FM with 144-146MHz full coverage VFO, also 11 xtal controlled channels, ideal for fixed, /P and /M use. Built-in LS, 12V DC operation. £47.15. Xtals £2.60 each.

MARINE BAND version, same spec. 156-162MHz £47.15. Xtals £2.95.

MAINS PSU for above, 13.8V regulated £11.55.

HF12 POCKET VHF FM RECEIVER 12ch xtal controlled. 4MHz band-width in range 140-175MHz. With nicad and charger, £57.95. Amateur and marine xtals in stock, prices as SR-9. Wide range available.

AMPLIFIER MODULE new fully assembled 6W IC unit 12V dc low imp. (4-8Ω) in and out for extn speaker amplification. With cct. £2.75.

Integrated circuits: 723 (T05), 75p; SN7660, 75p; CD4001AE, 25p; NE555, 55p; 709 (T05), 30p; 741 (DIL 8), 30p; 7410, 25p; 7472, 25p.

Resistor Kits. E12 series, 22Ω to 1M, 57 values, 5% carbon film, 1W or 1/2W (please state). Replenishments available. Ratings at 70°C.

Starter pack, 5 ea value (285) £3.10. Standard pack, 10 ea (570) £5.55.

Mixed pack, 5 ea 1W + 1/2W (570) £5.55. Giant pack, 25 ea (1425) £13.60.

PL259 UHF Plugs + reducer 75Ω each, 5 +: 67p.

SO239 UHF Socket panel mtg 60p each, 5 +: 50p.

NICAD RECHARGEABLES—physically as zinc carbon: AA(U7) £1.30; C(U11) £3.35; PP3 £5.55. ANY 5 +: less 10%; ANY 10 +: less 20%.

Slide switches, min, DPDT 20p ea; 5 +: 16p; 10 +: 14p.

GAREX FM detector and squelch conversion ready assembled with full fitting instructions. Tailor made, easy-fit design for AM Cambridge, replaces squelch board with minimum of other modifications. £5.75.

Transistor Vanguard (AM25T) version (modified squelch), £6.35.

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420-440MHz. Whip and coil only, £7.90.

420-440MHz with lug to fit hinge base (eg REVCO), £8.48.

420-440MHz with adapter to fit ASP base, £8.48.

420-440MHz complete with hinged base (jrn hole), £11.50.

420-440MHz complete with snap-in base (jrn hole), £11.00.

420-440MHz complete with LM base (jrn hole), £10.60.

450-470MHz versions of above—same prices.

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2N3553	2-5	9	28	175	£1.02
2N5913	2	7	12	470	£1.40
SD1127	4	12	12	175	£2.10 (1)
2N6080	4	12	12	175	£4.10
SD1143	12	10	12	220	£6.00
2N6081	15	6-3	12	175	£6.50
2N6082	25	5-7	12	175	£7.50
2N6084	40	4-5	12	175	£7.50
RF2127	70	6-6	12	175	£21.00 (2)
SD1019-5	100	6+	28	175	£16.00
2N5590	10	5-2	13	175	£5.50
2N5591	25	4-4	13	175	£6.90
SD1428	45	6-5	12	175	£11.55 (2)
2N5944	2	9	12	470	£5.90
2N5945	4	8	12	470	£7.50
SD1135	5	7-5	12	470	£4.50
SD1136	10	5-5	12	470	£6.75
2N5946	10	6	12	470	£9.50
SD1088	25	6-8	12	470	£16.00 (2)
SD1089	40	4-3	12	470	£22.00 (2)
SD1434	45	5-0	12	470	£23.00 (2)

NOTE (1) G.Emit. IC202/215P.A. (2) Controlled "Q" Type

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Sig SD201 4dB N/F at 1-2GHz "D" MOS sin/gate	£2.00
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2835 H.Car 85p. 3080 Pin 85p.

ITT 10-7 Xd Filters for 12-5kHz spacing 910Ω 25pf. £6.00

ITT Xtl Filter for 25kHz spacing 910Ω 25pf. £7.00

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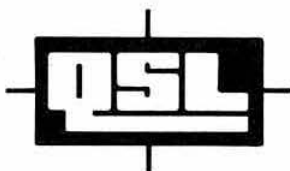
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	4	200 (total)	100 to 999.999 kHz	— £6.00
	5	50	1.00 to 1.499 MHz	£9.00 £6.00
	6	10	1.50 to 1.999 MHz	£4.75 £4.20
	7	10	2.00 to 2.599 MHz	£4.75 £4.00
	8	10	2.60 to 3.999 MHz	£4.55 £3.70
	9	10	4.00 to 20.999 MHz	£4.55 £3.60
	10	10	21.00 to 24.000 MHz	£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.

DELIVERY. Column A 3 to 4 weeks (this service is subject to availability), Column B 6 to 8 weeks.

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 QSL 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 S.A.R.L., Rua General Pimenta de Castro, 15-18, Lisboa 5, Portugal. (Enquiries invited from companies in other countries).

QuartSLab MARKETING LTD
P.O. Box 73
London SE18 3LR

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Cables: QUARTSLAB London SE18

muTek limited

rf technology from G4DGU

We've been extremely amused recently by the attempts of one or two competitors to make 'measurements' of the strong signal performance of our FT221/225GT front-end board using commercially available signal generators. This displays a perhaps not unsurprising ignorance of receiver strong signal characterisation techniques.

Before we first put the board into production we went through the sums very carefully. Our conclusion was that no commercially available signal generator was good enough! We overcame this problem by applying the rf instrumentation design skills which we sell on the professional market and developing some rather special dedicated test equipment.

We've prepared a brief application note on the way in which we test the boards: if you'd like a copy, the usual SAE will bring one.

FT221/225 front-end board

Not only is this board now in use by top vhf-dx'ers and contest groups around the world—yes folks, people are interested in vhf-dx outside Western Europe—but we're starting to get interest from another group of vhf'ers altogether: the repeater builders! They have recognised that the excellent dynamic range properties can provide a 'no compromise' repeater front-end. If any bona-fide repeater group wishes to incorporate our board into their machine we'd be happy to explain the advantages.

Used for the purpose for which it was designed, it will provide significantly better all-round receiver performance than any other commercially available front-end known to us. £53.87

144MHz preamplifier

This preamp uses a noise-matched 3SK88 in a very carefully optimised circuit. Unlike many other 'competitive' devices we have included a proper bandpass filter with a noise bandwidth of around 2.5MHz and 50dB rejection at ± 12 MHz to minimise out of band strong signal problems. The use of an ultra-low noise mosfet allows the use of minimum front-end gain while maintaining the system nf at such a level that external noise limits the system sensitivity. An internal attenuator allows gain-setting, while facilities are also provided for masthead relay control.

As the proper use of preamplifiers is not altogether obvious, we've prepared an application note which is available on request.

If you have an application for an Ina in the 60-200MHz region, we can supply this amplifier retuned to your frequency upon request. Unboxed £10.79. Boxed £17.72

Microwave system components

We've been expanding this product group which is essentially an extension of our 1-3GHz transverter system. This month we are confining ourselves to a listing of those modules which are available ex-stock. Ask for our new Microwave System Component data sheet.

1-3GHz low noise amplifier	£22.72	2-3GHz low noise amplifier	£22.72
1-3GHz gain block	£11.15	2-3GHz gain block	£16.10
1-3GHz bandpass filter	£6.75	350-400MHz source	£18.25
1-3GHz 144MHz mixer-lo board	£22.60		

Kungsimport antenna combiners

A much better approach to stacking antennas than 'phasing harnesses'. Ask for our data sheet!

2-144N	£26.75	4-144N	£29.75
2-432N	£23.50	4-432N	£26.50

Ben is also now producing a dipole/splashplate feed for 1-3GHz dishes. We've no details of price etc as we write but by the time you read this we should know.

TVI filter—It works! Now the wife can watch Crossroads all day. (G4DZU) £1.80

NEC rf and microwave semiconductors

NE12683—gasfet—(£26.08), ND4692 (£3.51), NE64535 (£10.00), NE02137 (£1.91), NE57835 (£6.73), NE73432E (£0.97), 3SK88 (£1.73), 3SK74 (£0.60), ND4991 (£0.40). Don't forget that we have the expertise to help you to learn to use them properly!

Data on request: SAE appreciated. CWO. Please add 50p p&p unless stated, and then VAT. Tnx!

muTek Ltd., PO Box 23, ABINGDON, OX14 4TG (0235) 831330

BRAND NEW COMPONENTS BY RETURN OF POST

VAT inclusive. Postage 15p (free over £5). SAE for list.

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Carbon Film, 1W E24 series 1R to 3MO E12 series to 10MO 1p
Metal Film 1W, 1/2W & 1W E12 Series 10R to 2M2 2p

CAPACITORS

Mullard Submin. ceramics E12 Series. 100V, 2% 1.8pf to 47 pf 3p
2% 56pf to 330pf 4p 10% 390pf to 4700pf 4p

Plate Ceramics 50V working for vertical mounting

E24 Series 22pf to 1,000pf and E6 Series 1K5pf to 47Kpf, 2p
Miniature Polyester 250V working for vertical mounting

.01, .015, .022, .033, .047, .068 4p. 0-15p. 0-15, 0-22 6p
0-33, 0-47 8p. 0-68 11p. 1-0 15p. 1-5 20p. 2-2 22p

Electrolytics, Wire Ended (Mfads/Volts)

47/50 5p	22/16 5p	47/50 6p	150/16 7p	470/25 11p
1-0/50 5p	22/25 5p	100/10 6p	220/16 8p	470/40 16p
2-2/50 5p	22/50 6p	100/16 7p	220/25 8p	1000/15 15p
4-7/50 5p	47/16 5p	100/25 7p	220/50 10p	1000/25 18p
10/50 5p	47/25 5p	100/50 8p	470/16 11p	1000/40 35p

Tag-ended cans 3300/25 20p, 4700/16 25p, 2500+2500/63 £1.00.

Tantalum bead subminiature electrolytics vertical mounting

0-1/35 14p	4-7/6 14p	15/16 20p	22/16 30p	100/3 30p
0-22/35 14p	2-2/35 15p	22/6 20p	22/25 35p	47/10 35p
0-47/35 14p	4-7/25 15p	15/25 35p	47/6 30p	47/16 60p
1-0/35 14p	10/25 29p	15/25 35p	68/3 30p	33/10 30p

Polystyrene 63V working E12 Series long axial wires

10pf to 820pf 3p 1kpf to 10kpf 4p 12kpf 5p

TRANSISTORS

BC107/8/9 10p	BC558B 7p	BCY70 15p	2N2926 5p
BC147/8/9 10p	BC182L 8p	BF194 9p	2N3055 7p
BC157/8/9 10p	BC184L 8p	BF197 9p	BFX88 25p
BC547C/8C/9C 7p	BC212L 8p	BFY50/51/52 18p	BSX19/20 15p
8 pin DIL 1/Cs 741 Op/Amps 18p	555 Timers 24p	Holders 9p	

DIODES (p.i.v./amps)

75/25mA 1N4148 2p	1000/1A 1N4007 7p	60/1-5A 51M1 5p
100/1A 1N4002 4p	1250/1A BY127 10p	30/10mA OA90 6p
800/1A 1N4006 6p	400/3A 1N5404 14p	115/5mA OA91 6p

Zener diodes E12 series 3-9V to 33V 400mW 8p, 1 watt 12p

Light emitting diodes 3 & 5mm. Red 10p, Green & Yellow 14p

Fuses—20mm glass 100mA to 5A, Quick blow 3P, A/Surge 5p

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TA-33 Jr.	3 elements, 10, 15 and 20 metres.	£116.00
TA32 Jr.	2 elements, 10, 15 and 20 metres.	£78.00
TA31 Jr.	Rotary dipole, 10, 15 and 20 metres.	£50.00
ELAN	3 elements, 10 and 15 metres.	£93.00
TD-2	Trap Dipole 40 and 80 metres.	£40.00
TC2-2	Trap Dipole 40 and 80 metres compressed	£50.00
V-3 Jr.	Trap Vertical 10, 15 and 20 metres.	£35.00
Atlas	Trap Vertical 10, 15, 20 and 40 metres.	£60.00

SWL ANTENNAS

SWL-7	Dipole 11, 13, 16, 19, 25, 31 and 49 metres	£35.00
RD-5	Dipole 10, 15, 20, 40 and 80 metres.	£35.00
Orbit	Vertical 11, 13, 16, 19, 25, 31 and 49 metres.	£55.00

Prices correct at time of going to press

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The Datong Morse Tutor (Model D70) is your passport to a full licence. Compact, with internal battery and speaker plus personal earphone it provides unlimited random morse to practice on. With D70 you can practice morse anywhere, anytime and at your own pace. With the Morse Tutor, practice

becomes a pleasure because you get results quickly.



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

MODEL FL2

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
of Rad-Com*

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 Unit £37.00 (£42.55)
MPU (Mains Power Unit) £6.00 (£6.90)		

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



SOMMERKAMP TS 802 Hand portable with auto-search

80 Channels 2 Watts FM Transceiver
Another brand-new 80 channel handy transceiver specially developed for the demanding 2m VHF amateur. Accurate frequency coverage by PLL-synthesizer from 144.025-146.000MHz in 25kHz steps. Its IF is 10.7MHz with X-tal filter, MOSFET in RF—and mixer stage. Frequency stability 0.0005% between -20° and +50°C. With electronic channel selector and switchable automatic reverse scanner, also switchable to searching for occupied frequencies. Built-in repeater shift for channels R0-9 switchable, tone burst for repeater operation and 1750Hz tone call. Battery drain on stand-by position only 18mA digital channel indication and electronic receive/transmit switching. 0.5/2 Watt transmitter power selectable by high/low power switch. Receiver sensitivity better than 0.2uV. Instrument for relative transmitter power and battery indication. With combined on-off and volume control knob, squelch. Connector jacks for external antenna, 12 Volt power supply or car battery, charger, earphone (when inserted disconnects loudspeaker automatically). With 8 pin DIN jack our TS 802 operates with the telephone handset TS 1022, loudspeaker-microphone SM 5732. Big holder for 10 pieces UM 3 or rechargeable batteries. Our TS 802 in the robust and elegant aluminium die-cast is delivered with leather case and flexible rubber-antenna. Frequency range 144-146MHz. Dimensions: 230 x 75 x 40mm. Weight: 1.5Kg. Price £159.00 including charger.

SOMMERKAMP TS 280 FM MOBILE

80 Channels 50 Watts 2m FM Transceiver
From the modern PLL technique benefits our new developed mobile transceiver TS 280 FM for the 2m amateur, which we can offer at a very competitive price. Quick and easy change of channel, also with the vehicle in motion: all 80 channels between 144MHz and 145.975MHz can be selected in 25kHz steps. All 10 European repeater channels are offset automatically and shown with correct digital readout. The final amplifier has an input of 75 Watts, there are 40-50 Watts at the antenna. For short distance contacts or for repeater operation, the power can be reduced to only 2 Watts at the flip of a switch, and all for £199.00 including mobile mount and mic with volume control

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SOMMERKAMP FT 207 RE

800 Channels 2 Watts 2m FM Transceiver
The entire international 2m amateur band ready to be recalled in the palm of your hand—our new SOMMERKAMP FT207 RE leaves nothing to be desired: scanner, frequency memory, touch-pad frequency selection, digital frequency readout, many different frequency shifts, tone burst, built-in rechargeable accumulator, light weight and compact, with a beautifully styled cabinet—the most modern 2m handy of the world! A 4 bit processor generates frequencies from 144-148MHz in 10kHz steps, and a slide switch adding 5kHz makes 800 channels available at 5kHz spacing. £195.00.

SOMMERKAMP FT 227 RAE

800 Channels 10 Watts 2m FM Transceiver with Memory Unit
A unique construction designed with the latest technical features: an optical matching generator selects like a computer the desired channel from the 800 frequencies on the entire international 2m amateur band between 143.5-148MHz. £225.00

SOMMERKAMP FRG 7 HF Receiver SSB/AM £188.00

SOMMERKAMP FRG 7000
Receiver AM/SSB (USB + LSB) CW from 0.25-30MHz. £349.00

SOMMERKAMP FT 901 DM

Transceiver AM/FM/SSB (USB + LSB) CW/FSK. £914.00

SOMMERKAMP FT 307 CBM

Transceiver AM/SSB (USB + LSB) CW/FSK + Marine. Solid state. Complete with AC/DC PS, all filters and memory. £959.00

NEW SOMMERKAMP FT 707 HF MOBILE (= FT 707). £539.00

SOMMERKAMP FT 277 ZD (= FT 101 ZD)

Transceiver AM/SSB (USB + LSB). Developed from the world's most popular amateur transceiver and with digital readout. Features included in the price are: DC/DC converter, CW filter and PA fan. £661.00

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FANTASTIC RX PERFORMANCE is main plus point on new FT101Z & FT707 so dash in and buy one from us. - Short of brass! Get more RX gain and selectivity + super RF Clipper for your old FT101. G3LL FT101 RF Clipper (hundreds sold in USA) **Special Offer £35 inc. VAT** this month UK only. Money back guarantee. Plugs in VFO socket—any idiot can fit it—try!

COMING SOON. Improved double balanced mixer for FT101 Mk. IIB & E. Get almost FT1012D performance with this and our RF Clipper.

DC PSU's. Sample 6 & 20amp units on the way at very low prices. If these are half as good as makers say, no one else is going to be selling 13.8 volt power supplies.

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FT101 VALVES. NEC cut supplies, all list & prices cancelled while we hunt for alternatives—phone for details.

FM UNIT FOR FT101 Mk. 1—E. Send S.A.E. for full details.

LEICESTER SHOW. CB Electronics have been "conned" into putting our equipment on their stand—of course we are too busy to go! Don't disappoint Jack, make him happy by looking at our goods and then buying his!

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PYE BANTAM single channel HB FM with leather case, aerial and mike. £35. **LB AM 3** channel, cloth case, aerial and mike. £30. Used batteries. £8. **AC Chargers** £16. **PYE WESTMINSTER W15AM** HB less attachments. £70. **W30AM LB** Boot, less attachments. £36. **W30AM** mid band, less attachments. £30. **PYE CAMBRIDGE AM10B** Boot HB or LB, less attachments. £21. **AM10D** dash LB with mike. £46. For callers only a few base stations, F27, F30, T470 etc.

POCKETPHONES PF1, Tx and Rx with circuits, £21.25. Car adaptor, receiver plugs in, battery is charged and output taken to 3 watt amplifier into 3 ohm speaker (not supplied). £8.50. Chargers for 12 of each battery. £17.

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TESTMETERS AVO model 7 mk 11, with Power factor scale. Ex Ministry and complete with case and either used AVO leads as they come or new Jap leads. £31. A few **POCKETPHONES** PF70, no attachments, £35. Batteries £10. **PYE COMPACT PF3.** £35.

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Carriage charges are for England and Wales only.

Terms: Cash with order

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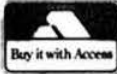
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SENTINEL 2 METRE POWER AMP/PRE-AMPLIFIERS

THEY use the latest power transistors rated for infinite S.W.R. All modes. R.F. switching, STRAIGHT THROUGH when OFF. Highest efficiency and lowest noise. Pre-amp is the same as the Sentinel 2 metre. See below. SO239s. 13.8 volts.
SENTINEL 30—up to 5W in. 10 times power gain £50.00
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SENTINEL 100—up to 16W in. 10 times power gain £126.50
Available less pre-amp for £8.00 less. All ex stock.

NEW! S.E.M. IAMBIC KEYS "I've never been able to use one of these before!" Using the famous CURTIS C. MOS I.C. Need I say more. Internal PP3 £34.50. Ex stock.

S.E.M. EZITUNE is a new concept to tune your A.T.U. without pressing the transmit button. Keeps whistles off the air and saves your P.A.A. noise generator, 50 Ohms bridge and r.f. switch. Just tune for minimum noise in your receiver. £28.75* Ex stock.

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The 2 metre units use a J FET selected for a 1dB N.F. and 18dB gain. They really make the difference between no copy and Q5.

1. SENTINEL AUTO 2 METRE PRE-AMPLIFIER

Connects straight into transceiver aerial lead and the r.f. switch changes over automatically between transmit and receive—any mode. See above for spec. 12V nominal. £20.00* 70cms version £23.00* Ex stock.

2. PA5 AUTOMATIC 2 METRE PRE-AMPLIFIER

Same performance as the SENTINEL AUTO but for 240V mains operation. SO239 sockets. £28.75 Ex stock.

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Same performance but without the r.f. switching. £13.22* 70cm version £16.00* Ex stock.

PA3

Miniature 2 metre PRE-AMPLIFIER. Size 1cu. in to fit inside your transceiver. N.F. 2dB. Gain 18dB. 9V-15V. £8.00 70cm version £10.00 Ex stock.

SENTINEL H.F. WIDEBAND PRE-AMPLIFIERS

2-40MHz. 15dB gain. 9-12V supply. Sizes 2 1/4" x 1 1/4" x 3". We make the following two versions.

1. SENTINEL STANDARD H.F. PRE-AMPLIFIERS

Performance as above £10.00* Ex stock.

2. SENTINEL AUTO H.F. PRE-AMPLIFIERS

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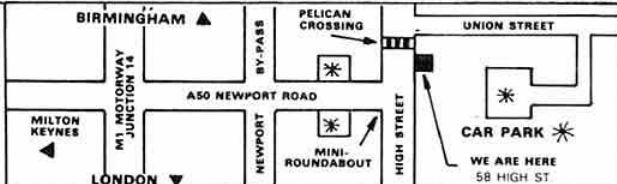
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(Oct/Nov 1977 Rad Com)

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(June 1980 RadCom)

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Most other parts as per Price List.

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NOTE regarding PROM program: The PCBs and programmed PROMs supplied by us make use of a slightly different program sequence resulting in different pin connections to those published in the 'Rad Com' article. Whilst constructors buying PROMs and PCBs from us will have no difficulty, those producing their own PCBs or having PROMs programmed elsewhere should note this important difference. A detailed modification sheet is available with the PCBs.

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