

The SHORT WAVE

Magazine

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APRIL 1980

NUMBER 2



TRIO R1000

£298 inc VAT Carr £4.50

The R-1000 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 1:2.6:6:0dB. Selectable sidebands are available at the touch of a switch.

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

To minimise front end overload, a step RF attenuator is included which gives 0-60dB 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 hard 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.

LOWE ELECTRONICS LTD. CHESTERFIELD ROAD, MATLOCK, DERBYSHIRE.

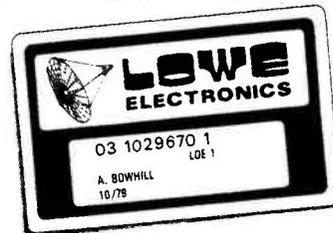
LOWE ELECTRONICS Ltd

PRICE LIST MARCH 1980

	Price inc. VAT	Carriage		Price inc. VAT	Carriage
TRIO EQUIPMENT					
TSB20—160-10m transceiver 200W PEP	£669.30	£4.50	TRIO OSCILLOSCOPES		
DG1—Digital readout to 100Hz	£121.90	£1.50	CS1830—Dual trace 30MHz B/W with delayed sweep	£523.00	£4.50
SP820—Speaker	£37.95	£1.50	CS1577—Dual trace 30MHz with Signal delay	£471.50	£4.50
VFO820—External VFO	£118.45	£4.50	CS1572—New dual trace 30MHz scope designed for VTR servicing	£488.75	£4.50
YG88C—CW filter 8 pole	£36.80	£0.50	CS1566—Dual trace 20MHz	£339.25	£4.50
RB20—The ultimate matching receiver to the TS820	£690.00	£4.50	CS1560A—Dual trace 15MHz 10mV/cm on X and Y	£316.25	£4.50
YG455C—CW filter 500Hz	£58.65	£0.50	CS1562A—Dual trace 10MHz Auto run and trigger TB	£261.05	£4.50
YG455CN—CW filter 250Hz	£60.95	£0.50	CS1352—Dual trace 15MHz portable. Mains or 12v operation	£362.25	£4.50
YG88A—AM filter 6KHz	£34.50	£0.50	The above 7 scopes are complete with matching probes		
TS520SE—160-10m transceiver	£437.00	£4.50	CS1575—Dual trace 4 channel audio scope. 1mV sensitivity	£270.25	£4.50
VFO520S—External VFO	£98.90	£4.50	CO1303D—Single trace 5MHz service/student oscilloscope	£109.25	£4.50
SP520—Speaker	£17.25	£0.50	DM800—Multi purpose dip resonance meter. 700KHz-250Mhz	£51.75	£1.00
YG3395C—8 pole CW filter	£37.95	£0.50	AG203—Sine/square generator. 10Hz-1MHz	£120.75	£4.50
DG5—Digital display/counter	£103.50	£1.50	AG202—Sine/square generator. 20Hz-200KHz	£65.55	£4.50
DK520—Conversion for older TS520	£10.35	£0.75	SG402—Matching service shop RF generator. 100KHz-30MHz	£52.90	£4.50
TS120S—80-10m mobile transceiver 200W PEP	£432.00	£4.50	DL705—Digital Multimeter	£80.50	£4.50
TS120V—80-10m mobile transceiver 20W PEP	£347.30	£4.50	FC756—10Hz-500MHz frequency counter	£258.75	£4.50
PS20—AC power supply for TS120V	£44.85	£4.50			
MB100—Mobile mounting bracket	£17.25	£1.00	LOWE ELECTRONICS LTD.		
YK88C—500Hz CW filter	£28.75	£0.50	Lowe SRX30—Synthesised general coverage receiver	£178.00	£4.50
SP120—External speaker	£25.30	£1.25			
VFO120—External VFO	£89.70	£4.50	NIHON DENGYO		
AT120—Antenna tuner (100W)	£55.20	£1.50	Liner 430—70cm SSB transceiver	£150.00	£4.50
PS30—AC PSU for TS120S	£85.10	£4.50	Belcom 707—70cm fixed/mobile transceiver. All mode	£495.00	£4.50
AT200—1.8-30MHz antenna tuner	£82.80	£1.50	Belcom HC1400—25W 2m FM transceiver with memories	£199.00	£4.50
SM220—Monitor scope	£197.80	£4.50	Belcom LD201—Remote display for HC1400	£26.50	£0.50
BS5—TS520 scanboard for SM220	£48.30	£0.50			
BS8—TS820 scanboard for SM220	£48.30	£0.50	2M PORTABLE TRANSCIVERS		
TL120—80-10m 200W linear	£128.80	£4.50	Mizuho SB-2M 2 metre SSB/CW portable transceiver	£135.00	£4.50
TL922—HF linear amplifier 160-10m/2Kw PEP 2 x 3-500Z tubes	£672.75	£4.50	AR240A—2 metre FM handheld transceiver. New model	£168.00	£4.50
MC50—De luxe desk microphone dual impedance PTT locking bar	£24.15	£1.50	AR240—Carrying case	£4.10	£0.40
MC355—50K fist microphone	£13.80	£1.00	AR240—Helical antenna	£4.10	£0.40
MC30S—500ohm fist microphone	£13.80	£1.00	AR240—12V car battery charger	£4.10	£0.40
LF30A—HF low pass filter 1Kw 90dB, stop band rejection	£18.40	£1.00			
BPF2A—2m band pass filter 144-146MHz 50W rms 100W PEP	£21.85	£1.25	VHF Marine Receivers		
RD300—High power dummy load	£48.30	£1.50	SR9—Tunable/Crystal monitor 156-162MHz	£46.00	£1.50
TS770—2m/70cm all mode dual bander	£690.00	£4.50	FS10—10 channel pocket scanning receiver	£82.00	£1.50
SP70—Matching speaker	£18.40	£1.00	FS10—Fitted 10 channels	£109.25	£1.50
TR7600—2m Synthesised mobile/fixed transceiver	£220.00	£4.50	AMR217B—Scanner with 8 crystals. The best. Mains/Battery	£120.75	£1.50
RM76—Microprocessor control unit	£60.95	£1.50	M100—Digital Scanner 30-50, 144-174, 440-512MHz FM	£192.00	£4.50
TR2300—2m FM portable transceiver PLL with all 80FM channels	£166.75	£4.50			
VB2300—10W booster	£49.45	£1.50	VHF Amateur Receivers		
MB2—Mobile mount	£17.25	£1.00	SR9—Tunable/crystal 2m FM receiver 144-146MHz	£46.00	£1.50
RA1—Helical rubber antenna	£6.90	£0.50	AMR217B—Scanner with 8 crystals. The best. Mains/battery	£120.75	£1.50
PS1200—Power unit and charger TR2300/3200/2200GX	£29.50	£1.50	Crystals for above. Each	£2.50	£0.25
TR2400—2 meter synthesised handheld transceiver	£210.45	£4.50	FS10—10 channel pocket scanning receiver	£82.00	£1.50
ST1—Base Stand and quick charger	£43.70	£1.50	Crystals for FS10 amateur as above	£2.50	£0.25
BC5—12V quick charger	£17.25	£1.50			
SC3—Carrying case	£11.50	£0.50	Airband Receivers		
TS180S—160-10m solid state transceiver	£589.95	£4.50	Regency—Digital Flight Scan. Full band coverage. No crystals required	£230.00	£4.50
TS180S—as above but with digital frequency control	£679.65	£4.50	Low AP12—With batteries and charger	£89.70	£1.50
VFO180—External VFO	£96.60	£1.50	AP12—Fitted 12 crystals	£118.45	£1.50
SP180—Speaker	£36.80	£1.50	AP12—Leatherette case	£2.28	£0.40
DF180—Digital frequency control	£104.65	£1.00	Signal R512—Air band scanner fitted 5 channels	£138.00	£1.50
AT180—1.8-30MHz antenna tuner	£95.45	£4.50	R517—Air band portable, 118-144MHz tunable/xtal	£49.45	£1.00
PS30—AC power unit for TS180S	£85.10	£4.50	Crystals for above. Each	£2.80	£0.25
TR8300—70cm FM mobile transceiver fitted 4 channels	£225.00	£4.50	R517—Soft case	£2.75	£0.50
TR3200—70cm FM handy transceiver fitted with 3 channels	£164.45	£4.50			
MB1A—Matching mobile mount	£9.20	£1.00	Keyers		
PB10—Pack of 10Ni-cad batteries	£10.35	£0.50	TRX3—Practice oscillator	£5.85	£1.00
TR3200/2300—Spare power lead	£1.30	£0.15	Morse Key—Lightweight brass key	£2.80	£0.50
R1000—0.2-30MHz receiver	£297.85	£4.50			
SP100—External speaker	£26.45	£1.50			
R300—General coverage receiver	£149.50	£4.50			
HS5—Communications headphones, tailored response	£21.85	£0.75			
HS4—Communications headphones, tailored response	£10.35	£0.75			

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	Price inc. VAT	Carriage		Price inc. VAT	Carriage
Morse Keys—HK 708	£9.66	£1.00	Screwdriver kit, 6 piece	£1.50	£0.75
Morse Key—Sykes-Robertson standard key	£11.50	£1.00	Punch kit—set of 5 chassis punches and reamer	£8.63	£0.75
Squeeze paddle Deluxe model	£25.00	£1.00	Pearl catch—for picking up small nuts, etc.	£0.98	£0.25
EK150—Katsumi keyer, 240V ac/12V dc operation. Built-in monitor	£78.20	£1.50	Mic. clip—screw fixing	£0.21	£0.25
MK1024—Electronic keyer with 1024 bit memory	£134.00	£1.50	Mic. clip—self adhesive	£0.25	£0.25
HK704—Squeeze paddle	£10.50	£0.50	Mic. clip—magnetic	£0.31	£0.25
Rotators			Station log book	75p inc. p.&p.	
AR40—(5 core cable required)	£54.63	£4.50	HF Mobile Antennas		
FU200—For lightweight 2m beams	£40.39	£4.50	"G" whip tribander helical 20/15/10	£24.73	£1.25
DR7500—Will take 3 element tribander	£108.10	£4.50	"G" whip multimobile 20/15/10	£28.75	£1.25
DR7600—Will take 2 element 40metre beam	£154.10	£4.50	L.F. coils for the above whips (specify whether tribander or multimobile)	£6.56	£0.75
DR7600P—As above but with preset or manual controller	£204.70	£4.50	Telescopic whips for the above	£3.34	£0.75
Mobile Whips etc.			Base mount for all "G" whips	£4.49	£0.75
Hokushin Range—			Extendarod 40" booster	£11.50	£1.25
2E—2m $\frac{1}{2}$, 3.4dB gain, foldover base	£6.50	£1.00	New "M" range of Station Accessories		
2NE—2m $\frac{1}{2}$, 4.5dB gain	£11.00	£1.00	MP1—Panel kit for APM-1	£5.20	£1.00
430E—70cm $\frac{1}{2}$, 5.5dB gain	£10.00	£1.00	AX-1—Station antenna selector box	£27.03	£1.50
320—2m stainless $\frac{1}{4}$ wave on PL259	£1.50	£1.00	KX-2—Antenna coupler 500KHz-30MHz	£29.90	£1.50
HS-F1—2m rubber helical on PL259	£3.95	£0.30	APM-1—Audio peak and notch active filter	£33.00	£1.50
RG4M—Base for all above units inc. coax ready terminated in PL259	£3.00	£0.75	SR-1—Mini rack for "M" range	£14.09	£1.50
G5S—Heavy duty gutter.boot mount to take RG4M base	£3.15	£0.50	SWR Meters		
M85—Mag mount with 5m coax terminated in PL259	£7.95	£1.00	Soar—SWR25 Twin meter	£12.78	£1.00
CBA311—2m gutter clamp aerial * Special Offer *	£6.00	£0.50	SW 110—SWR/power meter 1.8-150MHz, 0.20 and 0-200W	£34.50	£1.25
MA41—2m $\frac{1}{4}$ wave gutter mount aerial complete with whip, clamp, cable etc.	£11.33	£1.00	FS-301—Through line watt meter 3.5-30MHz	£39.10	£1.25
Base station aeriels			CN620—Unique cross pointer meter, 1.8-150MHz	£52.81	£1.25
HF5—Our original success. 80-10m HF vertical, no radials required on ground post	£41.40	£4.50	CN630—140-450MHz	£71.00	£1.25
HF5R—Radial kit for mast mounting	£23.00	£4.50	CN650—1.2-2.5GHz	£95.00	£1.25
MA5—New TRIO 5 band mobile aerial, complete	£85.00	£4.50	RW151D—50ohm load/wattmeter 0-150W, 0-500MHz	£69.00	£1.50
GPV5—High performance 2m base station colinear	£22.00	£4.50	RD300—1KW PEP 50ohm dummy load	£59.80	£1.50
GDX2—3dB gain over the range 50-480MHz	£36.80	£4.50	DL20—20W 50ohm dummy load	£6.04	£0.50
The classic wideband aerial	£11.50	£1.50	Antenna Accessories		
LAB—Air band ground plane			CS201—Two way coax switch 0-500MHz	£11.98	£0.75
Power Supplies. All 220-240V ac input			CX3A—Three way coax switch 0-30MHz	£5.59	£0.75
PS3A—300mA at 6, 7.5, 9V. Dual polarity o/p	£2.85	£1.00	FBB9A—1:1 balun 50ohm 1KW PEP	£11.50	£0.75
PS2—1A at 6, 9, 12V	£15.65	£1.25	Inline Lightning Arrester	£1.15	£0.25
PS1—400mA at 3, 4.5, 6, 9V	£5.65	£1.00	CN1001—Automatic A.T.U.	£130.00	£1.50
PS125—3.5A at 13.8V regulated.	£18.40	£1.25	Egg insulator—small	£0.30	£0.25
PS1207—700mA at 13.8V regulated	£10.93	£1.00	Egg insulator—large	£0.45	£0.36
* NEW *			Egg insulator—strain	£0.35	£0.36
FX1—Station wavemeter 700KHz-250MHz	£28.00	£1.00	Chimney lashing kit (single arm)	£3.45	Callers only
BR85—L.C.R. bridge, marvellous instrument	£39.00	£1.25	Chimney lashing kit (double arm)	£5.75	Callers only
DX450—Desk mic, built in digital clock and transmission timer. <i>The best</i>	£63.00	£1.00	Heavy duty wall brackets (pair)	£6.33	Callers only
SB10—6V dc morse practice oscillator	£0.95	£0.25			
ME221—Station multimeter 20K/V	£16.49	£0.75			
RA144—2 metre receiver preamp	£9.05	£0.25			
FC-5M—5 digit 50MHz counter with i.f. offset	£41.40	£0.50			
FC22A—250MHz counter with i.f. offset	£66.70	£0.75			
DX-008—Fully programmable counter; gives digital readout on any rig	£115.00	£1.25			
LCM-1—500MHz counter 240V/12V	£115.00	£1.25			



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TOP OF THE SHOP



FT-901DM

FT-901DM YAESU's Competition Grade Transceiver – without doubt the ultimate in all-mode HF rigs irrespective of manufacturer. An absolute delight to operate as any user will confirm and the owner can build up a very impressive station by adding from the comprehensive range of interfacing ancillary units.

ALL SOLID STATE FT-107M→

FT-107M. This is the brand-new solid-state HF Transceiver which has just been included in the ever-growing range. The receiver performance is comparable to the FT-901 (which says everything) and a memory option is provided of 12 programmable channels plus fine tuning. Add to this the ease of tuning, 240 PEP input, superb low-profile styling and here is the rig for the Eighties.



YES INDEED – WHEN IT COMES TO AMATEUR RADIO IT MATTERS NOT IF THE SHOP IN QUESTION IS IN BIRMINGHAM OR BOMBAY – THE FINEST RANGE OF EQUIPMENT ON THE SHELF WILL CARRY THE YAESU MUSEN LABEL THE *MARQUE* OF THE WORLD'S LARGEST MANUFACTURER. YAESU'S REPUTATION FOR HIGH TECHNOLOGY ENGINEERING IS LEGENDARY AND WITHIN THE PRODUCT RANGE MAY BE FOUND MODELS TO SUIT EVERY CONCEIVABLE APPLICATION AND BUDGET. THIS MONTH WE FEATURE THREE TOP UNITS FROM THE HF RANGE.

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 ¼ mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose and immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.

FROM NORTH. Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A4040 to the right and within 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.



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AMATEUR ELECTRONICS UK

source for YAESU MUSEN



YAESU FT-101ZD

FT-101ZD. When YAESU first introduced the original FT-101 this was the trend setter of the day and so it has been with each succeeding version of this world famous transceiver. Countless thousands have been purchased around the Globe and the reputation which these rugged rigs earned for performance and reliability operating under every form of adverse condition went a long way towards establishing the YAESU MUSEN name. When the latest model, the FT-101ZD, was launched last year we knew as soon as we saw the first delivery that once again YAESU had a winner and the sales that have followed have proved this beyond any shadow of doubt. There is simply nothing on the market that can match the FT-101Z and FT-101ZD for value for money and — as we keep saying — the performance outstrips many a rig with a fancier price tag.



THE ABOVE IS ONLY PART OF THE YAESU STORY — FOR FULL DETAILS OF ALL THE MODELS 36p IN STAMPS WILL BRING YOU THE LATEST GLOSSY CATALOGUE OF THE FULL PRODUCT RANGE TOGETHER WITH OUR CREDIT VOUCHER FOR £3.60 — A 10-1 WINNING OFFER!



AND WHAT ELSE IS AT AMATEUR ELECTRONICS?

The short answer is 'PLENTY', but the full reply is a very lengthy one indeed these days. Quite apart from the host of accessories and ancillary units stocked we import the superb SWAN range as per our recent advertisements and carry ATLAS equipment and latterly the full ICOM range. Add to these the superb new STANDARD RADIO models and you'll soon see that a visit could be well worth while. If you can't make it, of course, then we shall be pleased to send you all the information you require by return of post. Least you forget! — we carry the full Jaybeam range plus a good choice of mobile aeriols.

ATTENTION BARGAIN HUNTERS! A large SAE will bring you our latest used equipment list and our special offers on discontinued new gear and new demonstration models.

AGENCY APPOINTMENTS

We are pleased to announce that we have extended our service to out-of-town customers with the appointment of two new agents in areas which are, in our view, lacking in amateur sales facilities at the moment. AMATEUR ELECTRONICS UK is now fully represented by the following additional AGENTS and the personnel involved, named or otherwise, are fully licensed operators who have been selected for their interest in and knowledge of, the hobby not to mention their impeccable bona fides.

EAST ANGLIA — Dr. T. THIRST (Tim) G4CTT, NORWICH. 06925 403.

NORTH EAST — NORTH EAST AMATEUR RADIO, DARLINGTON. 0325 55969.

We hope customers in the above areas will avail themselves of the service now offered and we are sure they will derive great benefit from expert local help.

Our existing representatives remain, of course, as below.

- BRANCH: AMATEUR ELECTRONICS, UK — COASTAL, CLIFTONVILLE,
KENT, KEN McINNES, G3FTE, THANET (0843) 291297. 9 a.m.-10.30 p.m.
- BRANCH: AMATEUR ELECTRONICS UK — SCOTLAND, 287 MAIN STREET,
WISHAW, LANARKSHIRE, GORDON McCALLUM, GM3UCI.
TELEPHONE WISHAW 71382. (EVENINGS CARLUKE 70914)
- AGENT: WALES & WEST — ROSS CLARE, GW3NWS, CAERLEON, NEWPORT.
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THE MOBILE OF CHOICE FROM THE WORLD FAMOUS ICOM STABLE — THE IC-255E



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

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

- ★ Crystal controlled Tone Burst
- ★ Full band coverage — extendable to 148 MHz if required
- ★ Four digit LED display
- ★ 25 Watts output or 1W low power. A superb receiver using grounded gate FET front end
- ★ Scanning over a user programmable range
- ★ Memory scan
- ★ Stop on empty or busy channels
- ★ Tuning in 25KHz or 5KHz steps
- ★ 5 Memories — retained while the power is connected to the rig
- ★ Built-in 600 KHz Repeater shift
- ★ Alternative programmable shift
- ★ Reverse Repeater facilities
- ★ RIT (± 3 KHz) for those off channel stations
- ★ 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

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

FROM

THANET

OF COURSE



"NEW" IC251E £479 inc.

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

AFTER YEARS OF SUCCESS THE IC211E HAS NOW BEEN REPLACED BY THE IC251E. 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 detect or Endless System provides out-of-band protection. No variable capacitors or dial gear, giving problem-free use. The IC251E provides FM, USB, LSB, CW coverage in the 144-146 MHz frequency range. Thus the IC251E can be used for mobile, DX, local calls, and satellite work.

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

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

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

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

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



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

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

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

MODES — USB, LSB, CW and FM output.

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

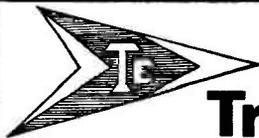
IC-251E Typical Technical Characteristics: General. Numbers of semiconductors: Transistors 99, FETs 12 ICs 37. Diodes 132. Frequency coverage: 144-146 MHz (easily extended to 148 MHz at no extra charge). Frequency resolution: SSB 100 Hz steps FM 5 KHz steps. 1 KHz steps with TS button depressed. Frequency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

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

FROM

THANET

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Tried — Tested and Popular...

The IC-215 is getting more and more popular also as it combines the advantages of a portable, which can be operated anywhere, with the ability to double as a low power base station by virtue of its 3 Watts of output and S0239 antenna connector on the back. Of course there are facilities to operate it from an external power supply, and if it is fitted with Ni-Cads you can arrange to trickle charge these at the same time. The batteries used are of a sensible size being C type (or U11) instead of the 'penlight' batteries used by most of its competitors. This gives at least three times the operating power when you are away from home which you will appreciate if ever you have run out of battery in the middle of QSO! It comes already crystallised up for 12 channels, S20, S22 and all the repeater channels 0 to 9. We think the extra power and larger batteries far outweigh the advantages of having the extra channels produced from a synthesizer.

Less VAT = £140.87 With VAT = £162.00



IC-215
£162 inc.



IC-202S
£169 inc.

ICOM's range of sideband portables has been recently expanded. The well known and tested IC-202E has now been improved in the form of the IC-202S which has lower side band fitted also and provides sidetone on CW. The receiver has been hotted up making it even more suitable for use as a base station, either barefoot or as a prime mover. The new IC-402 is the 70cm version of the 202S giving the same facilities as its 2m cousin over the range 432-435.2 MHz. Both use a very stable VXO circuit, to give fully tuneable coverage of the band at 200 kHz segments and both have extremely clean signals so that using them to drive a linear to the full legal limit presents no problems. We are very impressed with both the 202S and the 402.

IC-202S Less VAT = £148.96 With VAT = £169.00
IC-402 Less VAT = £210.43 With VAT = £242.00



IC-240
£169 inc.



IC-402
£242 inc.

The IC-240 is the ideal mobile rig for most people. Apart from the fact that it is quite a lot cheaper than most, it is, in fact, more suitable than many to use in the car while driving (and let's face it, it is under those conditions that most mobiles are used). It can be operated with ease without taking your eyes off the road and provides up to 22 channels (which is more than you are likely to need). Being synthesized, of course, there are no crystals to buy for extra channels. Full repeat, reverse repeat and automatic tone burst plus a low power facility are selectable from the front panel. By adding a 'Superscan' at a later date you can obtain full scanning facilities over the whole band at a VERY competitive price.

The IC-240 is a superbly built and very reliable piece of equipment as witnessed by the many thousands in use. All Icom equipment is built to a very high standard and the IC-240 is no exception. It has an excellently sensitive receiver and a very clean transmitter and will give you hours of headache-free pleasurable use — so why not get one now before the price goes up again!

Less VAT = £148.96 With VAT = £169.00



IC-280E
£250 inc.

★ WITH SCANNER £260

As usual, ICOM have kept ahead with technology and have produced their revolutionary new IC-280E which uses a microprocessor to produce frequencies throughout the 2m band at the ideal 25kHz spacing required today. The IC-280 has the ideal advantage of being separable into two parts for easy mounting into today's cars which so often forget to leave space for a rig. The removable front panel, with all controls, is only 3" deep and will fit in any convenient spot — in the glove pocket, on the dash or even on the sun visor! The main part of the set can be mounted anywhere within 4 feet — or even further in many cases — under the passenger's seat is quite handy! Display is of frequency on an LED readout and there are three memories for your favourite channels. These are not cleared when the set is switched off as long as it is left connected to the car battery.

Less VAT = £217.50 With VAT = £260

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

Scotland — Jack GM8GEC (031-665 2420)

Wales — Tony GW3FKO (0222 702982) Burnley — (0282 38481) Midlands — Tony G8AVH (021-329 2305)

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ANNOUNCING A NEW COMMUNICATIONS COMPUTER!

TONO

Theta 7000E



£640.00 inc.

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.

Some of the Outstanding Features

COMMUNICATIONS COMPUTER THETA 0-7000E
VHF and Composite Video Output Provided

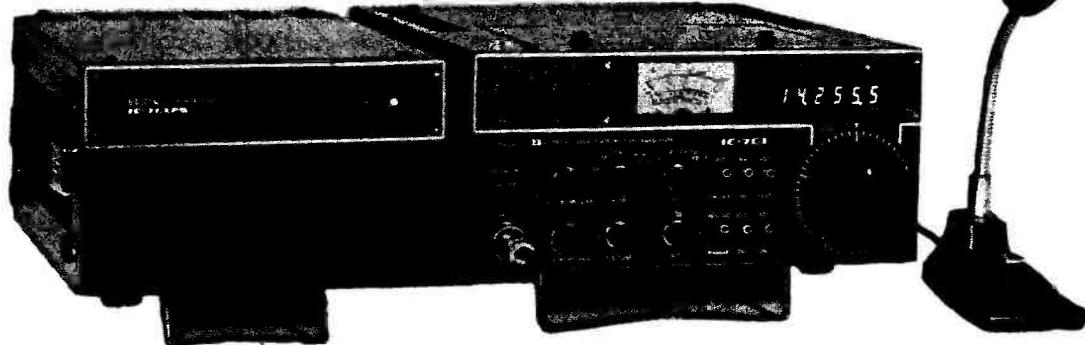
Printer interface.

Wide range of transmitting and receiving speeds — 10CW speeds + 8RTTY.

Built-in demodulator for high performance for 170, 425 and 820 Hz shift.
Crystal controlled modulator for AFSSR — Hi or Lo tone.
Convenient ASCII key arrangement.
Large capacity display memory — 2 pages 32 chr x 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 ASSC11 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).

Computer compatible — the Best!

IC-701 HF £899 inc.



ICOM's superior LSI technology takes the lead in Amateur HF. The extremely compact IC-701 delivers 100 watts output from a completely solid state, no tune (broad band design) final, on all modes and all bands, from 160-10 M. With single knob frequency selection and *built-in dual VFO's*, the LSI controlled IC-701 is the choice in computer compatible, multi-mode Amateur HF transceivers.

The IC-701's single frequency control knob puts fully synthesised instant tuning at a single finger tip. **WIDE** bandwidth, with 100Hz per division and 5kHz per turn, is instantly co-ordinated between the smooth turning knob and the synthesiser's digital read-out with positively no time lag or backlash (no waiting for counter to update: less operator fatigue). And at the push of the electronic high speed tuning button, the synthesiser flies through megacycles at 10kHz per step (500Hz per turn).

The computer compatible IC-701 LSI chip provides input of incremental step

or digit-by-digit programming data from an external source, such as the microprocessor controlled accessory which will also provide remote band selection and other functions.

Full band coverage of all six HF bands, and continuously variable bandwidth on filter widths for SSB, RTTY, and even SSTV, help to make the IC-701 the very best HF transceiver ever made. IC-701 includes two CW widths, all of this standard at no extra cost.

Sold complete with the high quality electret condenser base mic (SM-2), the IC-701 is loaded with many ICOM quality standard features. Standard in every IC-701 are *two independently selectable, digitally synthesised VFO's at no extra cost*. Also standard are a double-balanced schottky diode 1st mixer for excellent receiver IMD, and RF speech processor, separate drop times for voice and CW VOX, optionally continuous RIT, fast/slow AGC, efficient IF noise blanker, fast break-in CW, and full metering capability.

FROM

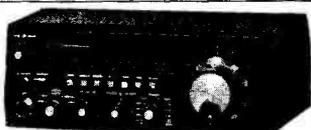
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SMC & YAESU FOR HF — SMC & YAESU FOR HF



FT707

FT707 Transceiver 100W £455.00
FT707S Transceiver 10W £425.00

FV707DM Ext. Dig. VFO £157.00
FC707 Antenna Tower £63.00

FP707 12 Volt P.S.U. £95.00
MR7 Rack Mount Cabinet £11.50

MMB707 Mobile Mounting £12.00
YM35 Scanning Microphone £11.00

FT707 NEW SOLID STATE TRANSCEIVER

The FT707 'The Wayfarer' is an ultra-compact solid-state transceiver covering 80-10m, including 30, 17 and 12m — all factory installed, with 100W output (10W 'S' model) 50% out developed in 3:1 VSWR, digital (bright LED's in mode sensitive counter) and analogue readout, status at a glance (from string LED and single displays) 16 poles of crystal filtering continuously adjustable IF bandwidth 2.4kHz to 300Hz.

Noise blander of most advanced design using local AGC loop, Schottky diode ring module, power transistor buffers, ultra-clean low noise local oscillator are combined to produce, size and price notwithstanding: Probably the best receiver you have ever used.



FT107M

FT107M Transceiver £660.00
MEM/DMS Memory £87.00
FP107E AC PSU Extnl. £92.50
FP107 int. AC PSU T.B.A.

FV107 Ext. VFO £80.00
FC107 Antenna Tuner £92.50
SP107 External Speaker £24.00
FTV107(2) Transverter £181.50

FTV107 Transverter frame £96.50
430-440 70cm module £158.50
144-148 2m module £88.50
50-54 6m module £88.50

YM34 Mic. desk T.B.A.
YM35 Mic. hand. scan T.B.A.
YM36 Mic. noise cancel T.B.A.
YM37 Mic. Hand T.B.A.

FT107M NEW SOLID STATE TRANSCEIVER

All solid state transceiver, 160-10M (+ WWV Rx and 2 Aux). 12V DC. SSB, CW, FSK and AM. 240W PIP. The fan cooled (thermostatically controlled) no tune "broad band" power amplifier delivers 75% power output into 3:1 VSWR. Analogue and digital readout to 100Hz. Sensitive and with excellent dynamic range (hard driven Schottky diode ring mixer). Continuous variable bandwidth 300Hz to 2.4kHz plus optional "basics" of 350/600Hz and 6kHz. Full equipment includes: audio peak/notch filter, full metering including SWR, RF speech processor, advanced noise blander, semi break-in with side tone, VOX, clarifier on Tx, Rx, or both, 20dB attenuator etc. The optional memory system provides 12 stored channels (with fine tuning), and offers scanning from the microphone. The store employs DMS — digital memory shift — to allow tuning, via a photo interrupter of any of the memorised frequencies (equivalent to 13 VFOs!!).



FT901DM

FT901DM Transceiver £800.00
FT901O Transceiver £710.00
FT901OE Transceiver £700.00
YR001 Morse/TTY read £395.00

YVM-1 Video Monitor £125.00
Y0901 Monitorscope £240.00
Y0901P Y0901 with pan £280.00
PAN KIT Mod kit £47.00

FTV901 Transverter £245.00
430-440 70cm module £180.00
50-54 6m module £80.00
70-74 4m module £75.00

FC901 Antenna Tuner £115.00
FL2100Z Linear Amp. £355.00
FV9010M Synth. Ext. VFO £215.00
SP901 External Speaker £24.00

FT901DM THE SUPERB PERFORMER

160-10M (+ WWV Rx), 12 and 234V (PSU Built-in). SSB, AM, CW, FSK and FM (Tx & Rx). 180W. PIP. 80W FL. Analogue 1kHz and digital to 100Hz. Sensitive 1 μ V with AGC controlled Mosfet RF, to push pull FET RF, balance active mixer, push pull IF amp, to crystal filter then noise blander. Continuously variable selectivity 300Hz to 2.4kHz and fixed 350/600Hz, 2.4kHz, 6kHz and 12kHz (at 6dB), 80dB cross mod rejection, 90dB desensitisation immunity (at 20kHz off at 14MHz). Audio Peak and separate notch tuning. Negative RF feedback on 6146B stage (-31dB 3rd order). RF processor, VOX, Curtis electronic keyer, tune button (10sec on full power), PLL VFO with memory for any Tx, Rx or T/Rx frequency. Modular plug-in construction, permeability tuning (for new band allocations) 25kHz calibrator, 20dB switchable attenuator, sidetone, clarifier and an advanced noise blander are all features of the FT901.

FT1012D PERFORMANCE AND ECONOMY

A hybrid HF transceiver, 160-10M (+ WWV Rx + Aux). 234V AC and 12V DC (inbuilt inverter option). SSB, CW and AM. 180W PIP from a pair of 6146B with negative feedback. Analogue and "mode sensitive" digital readout to 100Hz. Continuously variable IF bandwidth 300Hz-2.4kHz plus optional "basic fixed" of 350/600Hz. Full equipment includes: adjustable level RF processor, advanced adjustable level noise blander, front panel adjustable VOX, semi break-in with side tone, 0-10-20dB attenuator, switchable AGC, Slow/fast/off, clarifier (RIT) selectable on Tx, Rx or both, etc.

The FT1012D is compatible with nearly all the FT901 accessories listed above — Morse reader and video display, monitor scope with panadaptor, 3 band transverter, ATU, linears, speakers, and a choice of synthesized or conventional (NEW FV101Z) external VFOs.



FT1012D

FT1012D Transceiver Digital £575.00

FT101Z Transceiver Analogue £500.00

Count Analogue/Dig. kit £80.00

FV101Z £110.00



FT7B & YC7B

FT7B Transceiver £375.00

YC7B Digital Readout £60.00

FP12 12V 12A PSU £67.00

YD148 Desk Mic. £18.50

FT7B MOBILE AND BASE TRANSCEIVER

A compact all solid state HF transceiver, 80-10M (full 2MHz coverage of 10 with optional crystals). USB-LSB CW-AM. 100W PIP (A3j and A1), 25W (A3j). VFO control with clear analogue scale to 1kHz, plus an optional digital readout unit that can be conveniently sited above the transceiver, on the dash or steering column. The front panel remains remarkably uncluttered for a transceiver boasting a: crystal calibrator, vox, clarifier, side tone, and an excellent audio peak filter for CW. A mosfet RF stage for sensitivity, and a Schottky diode ring mixer for dynamic range provides a level of receivers performance that outclasses "competitive" (?) transceivers. Supplied complete with mobile bracket, microphones, leads, plugs, etc. The FT7B provides the economic answer to world wide communications from home or from the car.

PRICES EXCLUDE VAT (15%) BUT INCLUDE DELIVERY — SECURICOR/POST IN THE UK

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GW3TMP Howarth	Pontybodkin	(035287)	846/324
GW4GSW Alan	Swansea	(0792)	24140

Communications Ltd



SMC & YAESU FOR VHF — SMC & YAESU FOR VHF

FT720R NEW 'REMOVABLE'

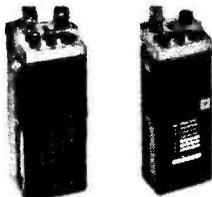


FT720R Control head £130.00
S72 Switching box £47.50

The FT720R is a new concept in mobile FM. Take a neat 'removable' control head (2m or 4m of extension cable and your choice of 2m (10 or 25W) and 70cm 10W main units. Add if you wish a switching box and then both 2 and 70cms are available from the one money and space saving controller. The package offers sophisticated microprocessor PLL control system, optical coupled tuning, 5 memory channels, priority channel, up/down scanning from the mic (stop on busy or empty), auto or man. Tone burst up/down repeater shift and a string of yellow and red leds for power out and S meter etc.

720V Transceiver 10W 2m £148.00 720VH Transceiver 25W, 2m £153.00 720U Transceiver 10W, 70cms £179.00

FT207R — FT202R: 2m HANDHELDS



FT207R Transceiver £173.04
NC-1A Slide in charger £16.50
NC-2 Charger eliminator £34.50

The FT207R is a microprocessor controlled synthesized handheld that offers 12.5kHz channel steps!! 4 memory channels are provided and these may, as can the whole band, be scanned. Any one of the memories can be used as a priority channel. Simply operate as normal on any frequency, designate one of the memories as priority, and every few seconds, for a few milliseconds, the set will check occupancy of the channel. All frequency entry is by the keyboard (which includes touch tone). The readout displays frequencies (to 100Hz), memory channel number and 'P'. Switches are provided for keyboard lock (prevents accidental operation) and display 'time-out'. A 600kHz shift, and any programmable split, is available, both of course plus and minus. Memory back-up is provided but can be switched off for long-term storage. 2.5W + 200mW outputs and a whole host of accessories complete the brief specification of this exciting transceiver.

The FT202R is an economical 6 channel handheld physically similar to the FT207R.

NC-9C Small charger £6.50 YM24 Speaker/mic £14.50 FT202R Transceiver £103.50
NBP-9 Nicad pack spare £14.50 FLCT Heavy duty case T.B.A. NC 1 AC charger/202 £16.50
FBA-1 Pack/charger adaptor T.B.A. AA Nicads, each £0.67 PA-1 12V PSU 202 £16.50

CPU2500 MICROPROCESSOR CONTROLLED



CPU2500R 25W standard £292
CPU2500Si 25W ciw stepper £319

The CPU2500 family are 2 metre FM transceivers available in 25W or 10W output form with keyboard or standard push tune microphones. CPU stands for Central Processing Unit and it is this microprocessor that governs the synthesizer functions. Frequency control is possible either by rotating the main tuning knob (optically coupled), by using the up/down push buttons on the front panel, by using the up/down buttons on the microphone or by tapping in the data on the keyboard microphone. Plus and minus 600kHz repeater shift and any split (up to 4MHz) can be programmed in. Four memory channels with back-up are provided and these may be scanned, as can the whole band, the scanner stopping at the first vacant or occupied channel. The SMC stepper (St) provides 25kHz steps between 145-146MHz (and entry of 5kHz direct from the keyboard) rather than the 10kHz (+ 5 up) synthesizer steps only, when it is switched into circuit.

CPU2500RKS 10W key mic £292 CPU2500RK 25W key mic £308 CPU2500S 10W standard £272
CPU2500RKSSt 10W key, stepper £319 CPU2500RKSSt 25W key, stepper £335 CPU2500RSt 10W ciw stepper £279

FT227 SYNTHESIZED MOBILE TRANSCEIVER



FT227RXS Transceiver £252.17

The FT227s are 10W output 2 metre transceivers whose receiver performance — sensitivity and immunity to overload has become the standard against which others are compared. They use a signal knob (photo interrupter) to control the synthesiser, which basically turns in 10kHz steps with a 5kHz 'fill in' oscillator. FT227RXS is an FT227R fitted with SMC's scanner. This maintains all the normal features of the 227 but the neat internal installation provides automatic tuning from 145 to 146 in 25kHz steps. When finding an occupied frequency the scanner pauses for about seven seconds and if not held will move on. A flick of the P.P.T. will lock out one (or all) unwanted channels next scan around. FT227RBSt is an FT227RB fitted with SMC's stepper. A four channel memory is provided in this model and tuning may also be accomplished by push buttons on the microphone. A single push moves the transceiver 25kHz, hold the button down for 1/2 second and it scans the band until a station is found.

FR227RBSt Transceiver £247.83 FP4 12V 4A PSU £35.00 YD148 Desk mic £18.50

FT225RD MULTIMODE 2 METRE TRANSCEIVER



FT225RD Transceiver £485.00

FT225R Transceiver £445.00 MEM memory option £85.00 COUNT Counter R/R0 £50.00

144-146-148MHz, USB, LSB, AM, FM, CW (semi-break-in with side tone). Smooth dual speed VFD control and 11 (x 4) crystal channels. Simplex and (auto tone burst) repeater. 600kHz and auxiliary shifts both up and down. Single signal mix, with phase locked conversion oscillator, for spurious free output. Mains 234-100V 50/60Hz and 12V DC for world wide portability. Excellent selectivity, SSB 2.4kHz with 1.75:1 SF, FM 12kHz at -6dB. High sensitivity with modern MOSFET RF stage. Good strong signal handling by careful gain distribution, mixer and crystal filter design. High power output 10W AM, 1-25W CW and FM, SSB 25W + + with great reliability and low IMD's. Mode sensitive digital readout to 100Hz and easy to service superior plug in board construction. Front panel controls for: SSB mic gain, FM power, squelch, Vox/Mox sensitivity, noise blanker, AGC, readout brightness, meter functions I/centre plus relative power) etc., Digital and Analogue versions and memory option.

PRICES EXCLUDE VAT (15%) BUT INCLUDE DELIVERY — SECURICOR/POST IN THE UK



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South Midlands

SMC FOR MICROWAVE MODULES

TRANSVERTORS



MMT 432/28S

MMT 1296/144	23cm/2m IF 1.3w 3.5dB NF	£139.00
MMT 432/144R	70m/2m IF 10w 1.6MHz shift	£151.00
MMT 432/28S	70m/10m IF 10w 432-436MHz	£119.00
MMT 144/28	2m/10m IF 10w 2.5dB NF	£79.00
MMT 70/144	4m/2m IF 10w 2.5dB NF	£86.00
MMT 28/144	10m/2m IF 10w	£79.00

LINEARS



MML 432/50



MML 144/25

MML 432/100	70cm 100w out, 10w Drive	£199.00
MML 432/50	70cm 50w out, 10w Drive, RX Pre Amp	£99.00
MML 144/100	2M 100w out, 10w Drive	£124.00
MML 144/40		£80.00
MML 144/25	2M 25w out, 2w Drive, RX Pre Amp	£42.00
MML 70/100	4M 100w out, 10w Drive	£125.00

CONVERTORS



MMC 432/28S

MMC 1296/144	23cm/2m IF Low noise	£52.00
MMC 1296/144	23cm/2m IF Ring mixer	£28.00
MMC 1296/28	23cm/10m IF Ring mixer	£28.00
MMC 435/51	70cm/Band I ATV Connector	£26.00
MMC 432/144S	70cm/2m IF 432/4, 434/6 MHz	£26.00
MMC 432/28S	70cm/10m IF 432/4, 434/6 MHz	£26.00
MMC 156/28	Marine/10m IF	£20.00
MMC 144/28	2cm/10m IF	£19.00
MMC 144/286D	2cm/10m IF LO output	£21.00
MMC 136/28	Satellite/10m IF	£20.00
MMC 113/24WB	VOR/20-30MHz	£20.00
MMC 70/28	4M/10m IF	£19.00
MMC 70/28L0	4M/10cm IF LO output	£21.00
MMC 28/144	10M/2cm IF	£19.00

PRE AMPS



MMA 1296



MMA 144

The MMA 1296 features a two stage microstrip amplifier with excellent interstage filtering. Gain 18dB, and a noise factor better than 2.9dB. The MMA 144/V is a 2M Mosfet pre amp with a noise figure of typically 1.4dB. Pin diode switching and RF Vox 100w of through power.

MMA 1296	23cm 2.9dB NF, 18dB gain	£22.50
MMA 432		TBA
MMA 432/V		TBA
MMA 144	2m Dual output	£13.00
MMA 144/V	2m RF switching, 1.5dB NF, 100w Thou	£21.70
MMA 70	4m Dual output	£13.00
MMA 28	10m Dual output	£13.00

SOURCES



MMS 384

MMS 384—Source 5-500m W c/w FM modulator	£24.00
MMV 1296—Varactor tripler to 23cms	£30.00
MMV 1152—Varactor tripler	£31.00

COUNTERS



MMC 50/500

MMD050/500—Digital counter 500MHz	£60.00
MMP500P—Prescaler + 10	£20.00
MMDP2—Probe, 28FY90 pre-amp	£10.00

PRICES EXCLUDE VAT BUT INCLUDE POSTAGE WORLDWIDE

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Tel: Totton (0703) 867333

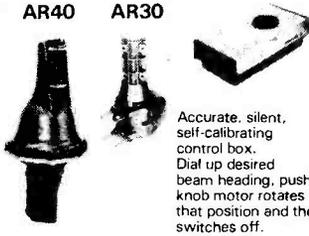
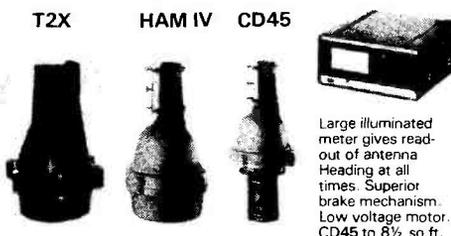
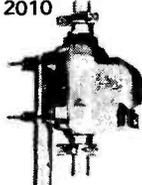
AGENTS STOCK AND SALES

G3ZUL	Brian	Stourbridge	(03843)	5917
G13KDR	John	Bangor	(0247)	55162
GMBGEC	Jack	Edinburgh	(031665)	2420
G13WVY	Mervyn	Tandragee	(0762)	840656
GW3TMP	Howarth	Pontybodkin	(035287)	846/324
GW4GSW	Alan	Swansea	(0792)	24140

Communications Ltd



CDE and STOLLE – ROTATORS – SMC for CHOICE

<p>AR40 AR30</p>  <p>Accurate, silent, self-calibrating control box. Dial up desired beam heading, push knob motor rotates to that position and then switches off.</p> <p>AR30 UHF QRP VHF AR40 VHF QRP HF</p> <p>£52 + VAT 41 + VAT Post and packing Free.</p>	<p>BT1</p>  <p>Four position preset plus normal manual controls. Handles aerials up to 5 sq ft of wind area. Supplied (as AR40) with lower mast fit casting etc.</p> <p>£79.50 + VAT Post & packing Free.</p>	<p>T2X HAM IV CD45</p>  <p>Large illuminated meter gives read-out of antenna heading at all times. Superior brake mechanism. Low voltage motor. CD45 to 8 1/2 sq ft. HAM IV 15 sq ft. T2X to 30 sq. ft.</p> <p>£99 + VAT £145 + VAT £199 + VAT Carriage by Securicor Free (UK Mainland)</p>
<p>RZ100 2050</p>  <p>Upper Support rotary bearing. £10.00 (45p)</p> <p>Memomatic control with moving light. That gives beam heading during rotation. Rotor is similar to 2010. Uses inexpensive 3 core cable.</p> <p>£35 + VAT Post & packing Free.</p>	<p>2010</p>  <p>Automatic control box. Dial desired direction and the rotator turns to the position and stops. Turning shaft (up to 1 1/4") passes through rotator.</p> <p>£45.83 + VAT Post & packing Free.</p>	

ROTATOR ACCESSORIES

Carriage in brackets. Prices exclude VAT.

AK121 Adaptor Kit CDE 'Bell' rotor to tower plate (45p) £5.75
 CD562 Alignment bearing for CDE AR(10, 20, 30) (55p) £6.75
 RC3W 3 core cable (2050) (p&p extra) per metre £
 RC4W 4 core cable AR(10, 20, 40) (p&p extra) per metre £0.22
 RC5W 5 core cable AR(30, 40, 33) BT1 all Stolle (p&p extra) per metre £0.27
 RC8W 8 core cable CD(44, 45) Ham's, T2X (p&p extra) per metre £0.39

ROTATOR BARGAINS

Offers subject to availability, please phone for stock position

AR10 Similar AR30 solenoid control special price £26.22
 AR33 Similar AR40 plus 4 pre sets (DRRP £70.80) £45.22
 CD44 Similar CD45 (DRRP £114.00) £90.00
 2031 Similar 2010 plus 7 pre sets (DRRP £102.60) £60.00

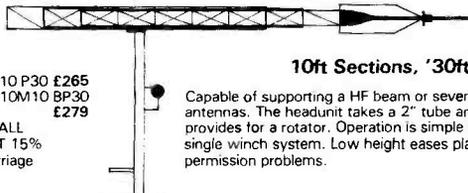
Prices exclude VAT 15% but include carriage (UK).

VERSATOWERS

Telescopic for planning permission, and tiltover for antenna installation and maintenance. 12 years of development — 50 models: 25-120 ft, post, wall, base plate or fixed base.

Contact SMC for further details of the range.

13M20 P40 £323.50, 13M20 P60 £392.50, 16M20 P40 £476.50, 16M20 P60 £541.00



10M10 P30 £265
 10M10 BP30 £279

N.B. ALL
 + VAT 15%
 + Carriage

10ft Sections, '30ft'

Capable of supporting a HF beam or several VHF antennas. The headunit takes a 2" tube and provides for a rotator. Operation is simple with single winch system. Low height eases planning permission problems.

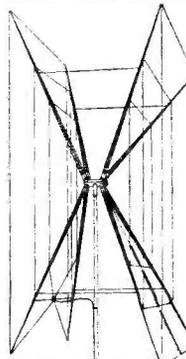
GEM QUAD

A light strong, boomless, quad antenna covering 10-15-20 metres. The centre spider is aluminium and the spreader arms (13.6' and 2.2lbs) are of a glass fibre tri-rectic construction. (Thin rods forming a triangle with tape criss-crossing for light, rigid, low wind resistance structure.)

GQ2E 18' x 18' x 9.5' 8dB Gain
 GQ3E As 2 ele plus 6.5' Boom
 GQ4E As 2 ele plus 13' Boom
 All prices exclude VAT and delv. ()

GQ2E 2 ele quad (£3.75) £124.00
 GQ3E 3 ele quad (£6.45) £187.00
 GQ4E 4 ele quad (£7.05) £249.00

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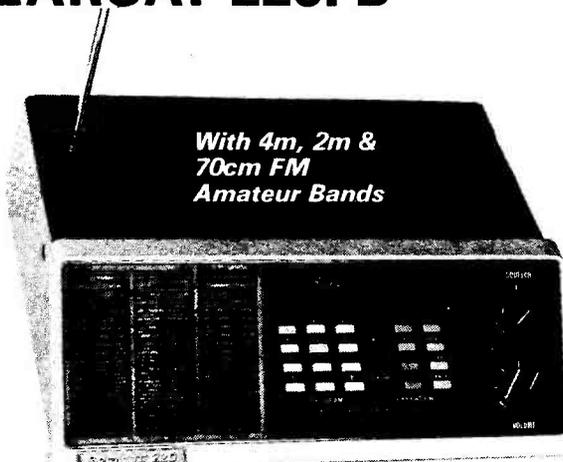
RADIO SHACK for BEARCAT 220

THE VERSATILE BEARCAT 220FB

Bearcat® 220FB

Features:

- **20 Channels/2 banks** — Scan up to 20 frequencies at once or either of two banks of 10 channels.
- **7 Band Coverage** — Includes Low, High, UHF, UHF-Gov't and UHF-T public service bands, the 2-meter amateur (Ham) band, plus the aircraft band.
- **Automatic Search** — Seek and find new, exciting frequencies.
- **Aircraft Search** — Automatically search the entire Aircraft Band.
- **Marine Search** — Automatically search Marine frequencies by pressing one button.
- **Priority** — Samples designated priority frequency on channel 1 every 2 seconds.
- **Limit** — Sets upper and lower frequencies of search range.
- **Speed** — Choice of either 5 or 15 channels per second scan and search speed for closer monitoring of desired frequencies.
- **Automatic Lockout** — Locks out channels and "skips" frequencies not of current interest.
- **Selective Scan Delay** — Adds a two-second delay on desired channels to prevent missing transmissions when "calls" and "answers" are on the same frequency. Patented by Electra.
- **Simple Programming** — Simply punch in the frequency you wish to monitor.
- **Decimal Display** — The large decimal display shows channels and frequency as well as features selected.
- **Patented Track Tuning** — Receive frequencies across the full band without adjustment. Circuitry is automatically aligned to each frequency monitored.
- **Crystalless** — Without ever buying a crystal you can select from all local frequencies.
- **Automatic Squelch** — Factory-set squelch automatically blocks out unwanted noise.
- **Direct Channel Access** — Move directly to desired channel without stepping through all channels.
- **Deluxe Keyboard** — Makes frequency and feature selection easy for simple programming.
- **Space age Circuitry** — Custom integrated circuits . . . a Bearcat tradition in scanning radios.
- **Rolling Zeros** — This Bearcat exclusive tells you which channels your scanner is monitoring.
- **AC/DC** — Operates at home or in authorised vehicle.
- **UL Listed/FCC Certified** — Tested for sale, quality design and manufacture.



Bearcat 220 £210.00 ex. £241.50 inc.

Bearcat® 220FB Specifications

Frequency Range:

Low Band Mobile	66- 88MHz
Aircraft	118-136MHz
Amateur Band	144-148MHz
Public Services & Marine	148-174MHz
UHF Amateur	420-450MHz
UHF Band	450-470MHz
UHF Band	470-512MHz

Size:

10 $\frac{3}{8}$ " W x 3" H x 7 $\frac{1}{8}$ " D

Weight:

5 lbs.

Power Requirements:

240V AC, 50 Hz.
12-15V DC, 8 Watts

Audio Output:

2.0 W rms.

Antenna:

Telescoping (Supplied)

Sensitivity:

0.6 μ v for 12dB SdB on L and H bands
 μ bands slightly less
1.0 μ v for 10dB S/N on aircraft

Scan Rate:

5 or 15 channels per second

Connectors:

External antenna, external speaker,
AC power, DC power

Accessories (included):

Mounting bracket and hardware;
DC cord

Hear It All With One Antenna

Total Frequency Coverage

— 40 To 700 MHz

DISCONE

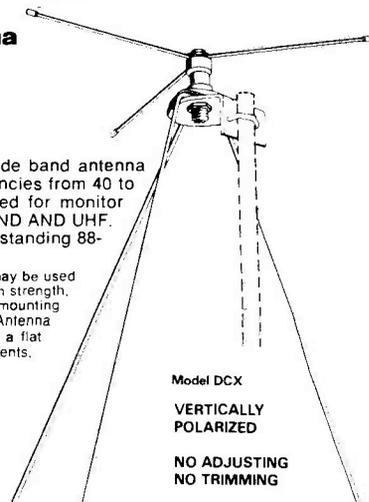
The Hustler Discone Model DCX is a wide band antenna and has complete coverage of all frequencies from 40 to 700 MHz. This design is especially suited for monitor radio reception of LOW-BAND, HIGH-BAND AND UHF. As a plus feature, use the Discone for outstanding 88-108 MHz, FM stereo reception.

The Discone is easy to assemble and install and may be used with any length coax cable. Manufactured from high strength, solid aluminum rod, zinc plated hardware and mounting assembly, complete with SO-239 connector. Antenna mounts on vertical support up to 1 $\frac{1}{4}$ " O.D. or on a flat surface. Cone elements, 55" in length. Disc elements, 20" in length. Shipping Wt. 2.5 lbs. **£13.80**

Discone With Cable

Discone antenna supplied with 50' coax and factory installed connectors. PL-259 one end and monitor pin plug type on the other. Shipping Wt. 4.5 lbs.

£20.70



RADIO SHACK LIMITED

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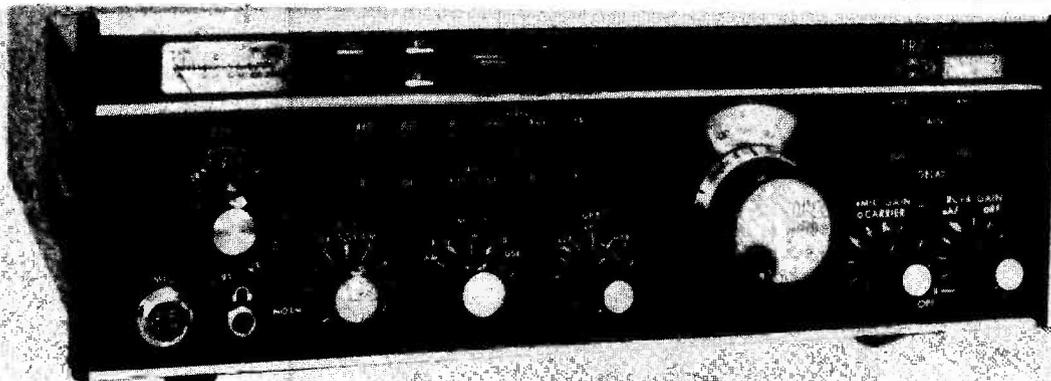
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DRAKE PRICES

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TR-7/DR-7	Transceiver, gen. cov. receiver & Digital	897.00
PS-7	Power Supply 120/240v for TR-7	158.70
RV-7	Remote VFO for TR-7	126.50
MS-7	Matching Speaker for TR-7 & R-7	25.30
R-7/DR-7	Receiver 0-30 MHz	833.75
SL-300	CW Filter for TR-7 & R-7 (300Hz)	39.10
SL-500	CW Filter for TR-7 & R-7 (500Hz)	39.10
SL-1800	SSB/RTTY Filter for TR-7 & R-7 (1800Hz)	39.10
SL-4000	AM Filter (4000Hz) for R-7 Receiver	39.10
SL-6000	AM Filter for TR-7 & R-7 (6000Hz)	39.10
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RRM-7	Range receive modules (500kHz) for AUX-7	5.52
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MN-2700	ATU/RF Wattmeter 160-10m, 2kw	197.80
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34-PNB	Plug in Noise Blanker for TR-4CW	73.60
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7072	Hand microphone for TR-4CW	13.80
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DL-1000	Dummy Load, 1000 watts	37.95
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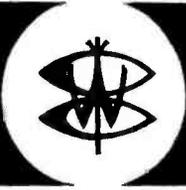


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A high class general coverage (0.2 to 30 Mhz) receiver with digital and analogue display. Built-in quartz clock, selectable bandwidth, simple operation, well finished, lightweight and compact.

Price **£289**

DCK-1 (DC kit) **£6.95**

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TS-9000 Miniature 2m MULTIMODE – A WINNER!



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- ★ Latest in a famous line of HF transceivers
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- ★ Analogue FT-101Z available

FT-101Z £550; FT-101ZD £639



FRG-7

ANOTHER WELL KNOWN
YAESU PERFORMER

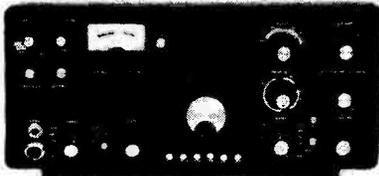
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£199

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The general coverage receiver for the SWL with a limited budget.
Good all-round performance at a down-to-earth price.

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FT-227RB 2m FM mobile Down to **£229**
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Electronics (UK) Ltd



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We Can't Blame You — in view of the insinuations and misleading information put about by others.

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ARE authorised to supply Trio-Kenwood equipment
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 DO NOT supply equipment unsuitable for the UK (would we be so daft?!)
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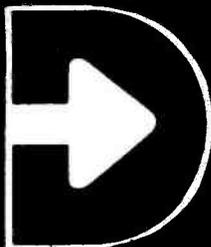
Opening hours:

LOUTH: 9-12: 1-5pm Mon-Fri. By appointment Sat 9-12.

LEICESTER: May's Hi-Fi, Churchgate (Tel: 0533-58662).

Mon-Sat 9-6pm; closed Thurs.



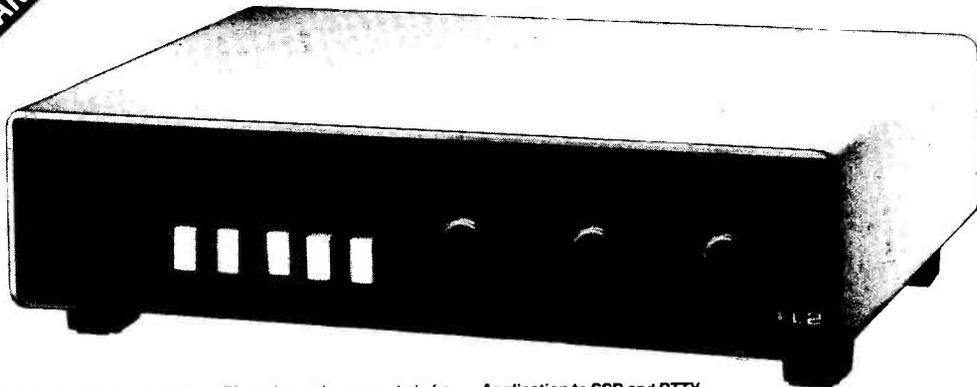


DATONG ELECTRONICS LIMITED

**NEW PRODUCT
ANNOUNCEMENT**

MULTI-MODE AUDIO FILTER MODEL FL2

**Adds knife-edge variable selectivity to any receiver.
Superb for all modes but especially for SSB.**



Today's crowded H.F. band conditions demand more control of a receiver's selectivity than most receivers provide. Conventional fixed bandwidth crystal filters are quite inadequate to cope with problems such as partially overlapping SSB stations, over-modulation splatter, very close-spaced CW stations, RTTY reception through interference, heterodyne whistles. Model FL2 offers a new high standard of performance under these critical conditions. **It gives the user full control of upper and lower pass-band edges and even beats most crystal filters for the sharpness of its pass-band edges.** It also contains a separate variable notch filter.

- Extremely steep skirt responses from a pair of 5-pole elliptic function active filters. Gives remarkable rejection of close-spaced interference in SSB, CW, RTTY.
- Superb "rectangular" pass-band out-performs crystal filters for close-in interference rejection.
- For SSB, AM and SSTV contains independent low-pass, high-pass and notch filters. Each continuously tuneable from 200 to 3500 Hz.
- For CW and RTTY the filters combine to give a pass-band variable from 40 Hz to 1750 Hz, with selectable peaked or 'flat' response shape and independent control of centre frequency and bandwidth.
- Convenient push-button selection of operating mode, and colour coded panel labelling for ease of use.
- Connects between loudspeaker and receiver audio output. Two-watt power amplifier built-in.

A new data sheet is available free on request.

Price: £78 plus V.A.T. at 15% = £89.70

Application to SSB and RTTY

Model FL2's ultra sharp skirts wipe out "monkey chatter" interference from adjacent off-tune SSB stations (HF or LF). With minimal effect on the desired signal.

Interference rejection is superior to "IF shift" or "Pass-band tuning" techniques and of course Model FL2 works with any receiver.

The notch filter can be switched in or out as required without affecting the low and high-pass filter settings.

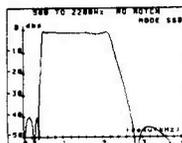
Application to CW

The main CW mode uses 12-poles of filtering to give remarkable skirt selectivity together with peaked response for easy tuning. With minimum bandwidth selected, the response is typically 40 Hz at -3 db and only 280 Hz at -40 db.

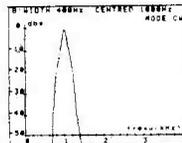
A second CW mode ("CW(2)") using 10-poles of filtering has a 'flat' response instead of peaked. This is useful for net operations.

Model FL2 requires an external DC supply of between 10 and 20 volts. It contains 21 integrated circuits and is built to high standards using close tolerance parts for the filter sections and a double sided epoxy-glass printed circuit board.

Computer simulated frequency response curves for Model FL2.



Response in "SSB" mode showing the very steep pass-band edges and the ideal "rectangular" response shape.



Response in "CW" mode. Note the remarkable skirt response.

DATONG ELECTRONICS LIMITED

Spence Mills, Mill Lane, Bramley, 16-17, U.S.3, 3HE, England. Telephone: (0532) 552461

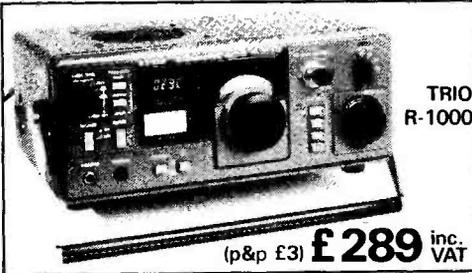
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Brenda (G8 SXY) and Bernie (G4 AOG) invite you to the only shop in London where you can see and try all the leading makes of Amateur Radio Equipment under one roof . . . YAESU, ICOM, TRIO, STANDARD . . . compare them all . . . and have a cup of Brenda's coffee too!

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TRIO
R-1000

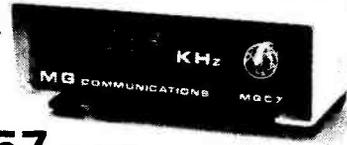
(p&p £3) **£289** inc. VAT

STAR OFFER

JUST LOOK AT OUR PRICE

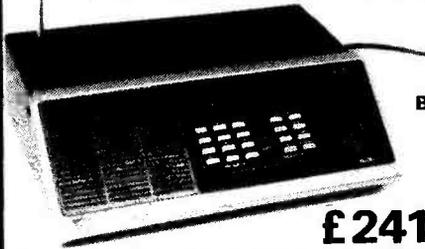
A MUST for the serious FRG-7 owner

Free-standing external digital display giving accurate frequency readout while still retaining the analogue tuning facility.



PRICE **£57** inc. VAT

Something different, the fabulous new synthesised VHF/UHF BEARCAT 220FB receiver from the USA. Covers three amateur bands plus aircraft, marine and public service bands on these frequencies: 66-88MHz, 118-136MHz, 144-148MHz, 148-174MHz and 420-512MHz. Scans between any two pre-set channels, and also offers a priority-channel signal-finder and a lock-out facility. Operates on mains or 12V, so use at home, in the car, or on the boat.



BEARCAT
220 FB

£241.50 inc. VAT

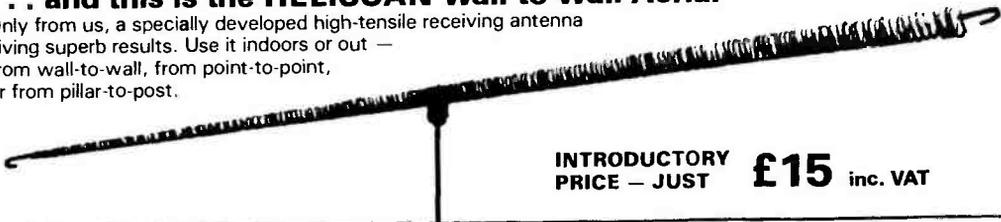


At its price you won't find a better communications receiver than the YAESU FRG-7. We like to summarise its specification by saying that the FRG-7 hears things that other receivers don't even know exist . . . all the way from 500kc to 30MHz. So come and try it, and see for yourself why it still represents the finest value-for-money in the communications receiver market today.

YAESU **£199** inc. VAT and free
(p&p £3) FRG-7 HELISCAN Aerial

. . . and this is the HELISCAN Wall-to-Wall Aerial

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The SHORT-WAVE Magazine

EDITORIAL

Citizen's Band — Again!

In recent weeks some 10,000 illegal CB radios have been smuggled into the country, and as a result the amount of police activity to find this gear — and prosecute the operators — has considerably increased. This is particularly the case in London and Essex where there have been countless instances of *bona fide* amateurs being delayed or held while gear and status were checked. In an attempt to minimise this disruption in their neck of the woods, Harlow and Bishops Stortford amateurs arranged a meeting with the local police, the result of which was an agreement that local amateurs will carry a *copy* of the front sheet of their licence, their driving licence and/or RSGB card; club secretaries will give the police a list of local names, addresses and call-signs; and there will be a copy of the *Callbook* in the police station.

This is what has happened in Harlow: we hope it will serve as an example of what can be done if things become difficult elsewhere.

We have no particular axe to grind for or against CB, but at the same time it must be pointed out that if it had not been for the arrant twaddle published by the so-called "Citizen's Band Association", smuggling of CB sets on this scale would never have happened. The result is that many an innocent lorry-driver, say, is now about £200 lighter and awaiting the dealings of Justice — because someone told him it was "all right"; and any ham who has bought one can ponder the fact that he has broken the law *and* been ripped-off.

Article Competition

Having considered the matter very carefully, we feel that the prize of £50 should go to A.P. Ashton, G3XAP, for his series "Antennas — The Weak Link". Because of a lot of reader feedback, we know this series (now virtually at an end) has clarified and revealed the importance of a much-misunderstood, yet vital, facet of amateur radio: and this surely is the best reason for awarding the prize.

A.P. Ashton
G3KFE.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

As your scribe begins this piece again he is still minus the main aerials, erection of which has been held up for one reason and another — work was ever the curse of the hamming classes. On the other hand there has been some entertainment, too. Only today I was slung an old reel-to-reel tape recorder and informed that the owner's XYL thought seven tape recorders in the workshop was a bit much, so would I take this one away and play with it — he had had it for ten years and never switched it on. I lifted the lid and behold — a four-speed deck, no less: mechanically it seemed a bit reluctant, but the ever-useful little bottle of *Arkhone* resolved that problem — and lo! — it spoke, and indeed sang too. Not loud, you understand, but enough to produce the “clicked again” reaction. Then I realised it was dark and the aerial-business still not done!

Oh well, dry the tears away and get on with the aerials available, at least until this *CDXN* is out of the way. So — let us circum-ambulate the bands.

Coming, going, gone

Which is where we chronicle the adrenalin-generating activities mentioned in the Bulletins. The *DX Bulletin* continues to improve as the grip on things is tightened; but while they were quite right to mention the various China propositions, they should have reserved judgement. At this moment, your scribe is of the opinion that a BY operation is out of court — and anyone who publicises their proposal before they have got the licence, the visa, and the aeroplane ticket reserved, is very likely to “lay an egg” as it does seem the Chinese authorities are cautious in opening up amateur radio activity in their country. So far the writer has not heard anything of ZL1ADI from China; JA6HOZ hopes to be on from there sometime soon, and VE7BC also has plans.

Burma is mentioned in the *DX Bulletin* Issue 26, with a statement that VE3FXT will be in Rangoon with a medical team from April 15 to June 15, and he has hopes of a licence, for

one frequency on 21 MHz and under the supervision of the authorities.

From the *DX Bulletin* we turn to Geoff Watts' *DX News Sheet*. And it seems Geoff has a problem . . . a letter ordering a Prefix List, post-marked Bromley, Kent, signed with a flourish that *might* be read as G. Lawrence but overlooked the matter of *his own address*, and Geoff would like to hear from him by letter or telephone so he can clear this problem from the file.

Another Geoff Watts publication is now available and it is a list of QSL Managers, over 2000 DX-stations having their managers listed during the last 18 months. The *QSL Managers Directory* comes from Geoff from his usual address of 62 Belmore Road, Norwich NR7 0PU, and the price is 50p or two dollars, or 6 IRCs to overseas by airmail.

Turning to our copies of *DXNS*, we note that with A22GW, Diana of G4EZI has now worked YLs in some 184 countries.

If you hear EA0JC on the air, he is King Juan-Carlos. And G5ATM is of course JY1 using his reciprocal call: King Hussein of Jordan has done much for amateur radio, and world peace too.

Looking well ahead, we have a notice of the International Police Association Contest and their “Sherlock Holmes” Award. Details on both these matters are available from R. A. Ridley, G3UTX, 23 Green Acre, Worlebury, Weston-super-Mare, Avon.

Those readers interested in /MM operators and their doings will be saddened to hear that G3RSP and G3ZGC both lost the ships they had served on for years, when the contract between the radio company and the owners was cancelled, so now they look to be on a different ship each voyage. G3ZGC/MM got his permission through to operate aboard a ship named *Cast Osprey*, of 106,000 tons deadweight carrying oil to the States from the North Sea and returning with grain from Mississippi. With such work about half the time is spent in harbour

and so much less time is available for operations.

Forty

An odd place to start into the correspondence but a good one — if you can connect with DX here you can call yourself an operator! As far as the writer is concerned the absence of suitable aerials for the moment has stopped activity and even listening, but another few days will, if all goes well (optimist!) see him back on all bands.

The first letter to mention the band comes from Tim Charles, G4EZA, who like quite a few others is a refugee from the VHF bands. Activity occurs from his Colchester address, rather than Kingston where he is studying in the week. Gear in use (and well used) includes a Lowe SRX-30 used for a bit OF SWL-ing at Kingston, and an FT-200 at home; the latter being, on occasion, the driver stage for either 200 milliwatts with the driver and PA plug pulled out or, for five watts, a home brew machine with a BD123 in the output stage. Aerials are not by any means easy in a terrace house with nothing outside allowed, but on the other hand a bit of mild bending of the rules plus a ten-metre beam firing at VK in the loft have all added to the totals. Full power CW on Forty gave QSOs with VE3JUP, VP2ML, and ZL4AV, and the 200 milliwatts level served for working G3LYX, G3TQD, and G4GZG.

Jack at G3PKS (Wells) has, after six years, finally pulled down his Pyramid, and built himself an ATU which can cope with all bands. Outside there are now a pair of vertical loops, roughly Delta shaped, and each fed through some six feet of open-wire feeder. Jack is now amusing himself with various combinations, such as N/S axis or E/W axis, or two in parallel, or the same again with one pair of feeders reversed (that made the ATU cough a bit!). They can also be connected in series, again connections reversed, and finally all feeders strapped together for Top Band operation. So far, the thing seems to tune nicely and flat from 7 MHz upwards,

and produces signals on all six bands, although it must be admitted that there was only "local-net" QSOs entered in the log. Changing tack we like the tale about G30TK operating 1 watt in the contest in the first week of March on ten metres: several times he was told by continentals and Ws that "No we don't want your serial number of 1" followed by a stunned silence when he told them that the '1' referred to the power in use!

Let's see next what Chris Page, G4BUE (Upper Beeding) has been up to, he having taken to this QRP lark like the proverbial duck to water. The

W2BA, W2SR, W1DA, N3EA, K41EX, W4WJ, and W4ELM.

GM4ELV (Arrochar) is now back in operation, after being QRT since July 24, 1979, mainly on Forty but with the odd foray elsewhere. David worked AA7C for Oregon, and remarks on the aerial farm this station runs: 6-element monobanders for 14/21/28, 4-elements on 7 MHz and a small array like eight Hygain towers, 50 feet high, arranged in two rows of four, and phased for 7-28 MHz! David's only SSB contact on this band was with UK7LAR, but CW went out to VP2KAH, W3RJ, CO8CO, AA7C,

hunter's delight! On 7 MHz we notice ONs, DJs, DFs, assorted Gs, and so on, including a ragchew with DJ6ZF that lasted 50 minutes; and if you've heard George rattling along on his key, then a lot passed in each direction.

Eighty

Nice to hear again after quite a while from W3HQO/G3XNV, who is the Gen. Sec/Treasurer of the Ex-G Club — "For Radio Amateurs born in the U.K. and Domiciled Abroad." The Ex-G Club *Bulletin* is somewhere on its way to us, but meantime, eligible amateurs should note the address as 519 Lincoln Avenue, Hulmeville, PA 19047, U.S.A.; and others could do to recall that when travelling abroad there is usually a member in the country they are going to, and of course this applies with double force in U.S.A.

On now to G4EAN, who has at last got his tower to take RF, albeit with a poor SWR, but the FT-101B doesn't seem to mind; to prove the point he worked G5VO on Eighty. This last month has seen two pieces of new gear in the shack, namely a Datong frequency-agile filter and a KW-1000 on test for the Nottingham club; both seem to be doing their job quite nicely. As far as the linears go, the big snag is the price of the PA bottles — 572Bs are about £25 + tax. (That is why your scribe's 'big pair of boots' is on one side here, and the smaller KW-600 is the only one in regular use, until we save our pocket-money is saved for the two 572Bs already ordered.)



"using flea power here, OM"

ARRL CW weekend was the main target, and some 1045 contacts run up in the weekend of which 574 were W/VE types, and some 52 DXCC countries. On Forty the two slopers worked nicely, with 63 Ws, TF31RA, VE1ANU, UL7CAL, and UK0SAW. The Argonaut certainly works for its living!

Last month, G2HKU (Sheppey) reckons, saw conditions on Ten dropping off, and he also asks for some kind soul to blow up the Poltava Gas engine. No hope: it probably runs on the hot air fed it by politicians worldwide! CW found TF3KCN, W4ELM,

WA4DOH, W4YL, N4CL, K8GG, W9YT and W2LPE. The GM4ELV machinery comprises a trap dipole for 7 and 3.5 MHz, and delta loops for the HF bands albeit these are down at the moment; in the shack there is an Argonaut 509 and an NEC CQ-110E.

One always likes to see a log from G3CED/G3VFA, with his two watts and Joystick aeriels, because it is so full of humour — the covering letter indicates the log was posted on his 72nd birthday, and the comment that he'd stopped playing the numbers game! We liked also his definition of 7 MHz — beautiful QRM, a QRM-

G8RY (Newmarket) has to be an RTTY buff with a call like that, and indeed he is. Since November last, Frank has been knocking off the countries on the 'printer and now has thirty booked in. The main aerial is a trap dipole for 80-10, but there are some phased verticals and an inverted-vee for Ten fed from the feedpoint of the trap job. Frank has a beef about the people who persist in coming down into the CW-end of the 3.5 MHz band. The only good way to deal with the nuisance is to sit on them and have a QSO, or even call CQ on top of them until they can't finish *their* QSOs. It's hitting below the belt, but hard luck; alternatively, creep in one dark night and drop their aeriels, leaving a little note as to why.

The G-QRP Club Winter Sports

seems to have been a very fine show this year, with lots of club members and lots more in the 6-15 watt level, says G8PG. He comments that while there was quite a lot of activity on the HF's there were still lots of people on 7 and 3.5 MHz. Angus heard G4BUE running 45 milliwatts output on 21 MHz, and believes it was a case of round-the-world propagation.

G2NJ (Peterborough) continues to report on the odd QSO on this band; G5NX working CW while driving his car was worked three times in eight days. Other QSOs were with G3HLL in Skipton, running a TCS-13 transmitter made by Hamilton in 1944 and owning a mating receiver. G4VF in Chelmsford was using a Marconi "Seaspan" of the 1950 era.

A look at the 3.5 MHz CW contacts of G3CED (Broadstairs) shows, rather than one would expect for a predominantly day-time operator, about an even balance of Gs and Europeans; the remarks columns are always interesting and against the call G3JJH is the note "QRT 17 years"!

A nice even mix of QRP and QRO for G2HKU, who keyed his HW-8 with YU1OPG, I1XKV, DL1GA, LX2FT, SP1JM, SP1ECY and PAOKRT, while the FT-101X saw to VE1ALJ and ZL4JO.

G3PKS is rather enamoured of the band over the past couple of months, commenting on the Ws heard at dawn and the improvement in daylight conditions. However he didn't work any DX owing to net commitments and work; but these Ws — he could have had a ball with 'em!

In discussing his total in the ARRL DX CW 'Test, G4BUE mentions one QSO in passing when he remarks that his QRP entry included contacts with K2NG on all five bands; so Chris would rather like to know how they train their ears! An interesting comparison on scores is between G4BUE and Al Slater, G3FXB, about ten miles away on QRO. G4BUE made 1045 QSOs with a multiplier of 121 and 52 DXCC countries for a claimed score of a hair over 400K; while G3FXB ran up some 2500 QSOs with a multiplier of 210 in the same contest.

Top Band

Well, *what* about it? It's becoming popular again, that's what! If you can work UA9 or UA0 on Top Band it makes a Top Band WAC almost a pushover.

G2HKU is now using an FT-101Z; he has heard UD6 and UA9 on Top Band, and has found out that one watt of Top Band RF, or even the teletype from GNF, is practically enough to upset the Thorn and JVC video-recorders which price out at £700 a throw! Returning to the QSOs, CW found it's way to PA0INA, PA0LOU, DL8AN, GD4BEG, YU2RTW, DJ4SO and E19J.

G3PKS is the other one who reckons the band is showing more signs of popularity; he made some 30 QSOs on it during the month, but failed to get any response whatever to CQ calls. Contacts mentioned included a nice evening one with G3PU in Weymouth (about 45 miles), and on the Sunday morning with GU2FRO on Sark which must be getting on for the 100 mile distant mark.

Ten Metres

Not as good in mid-winter as in spring and autumn, of course, but value for money none-the-less.

G4ITL (Harlow) continues his peaceful way; the ten-metre dipole now also has a 21 MHz bit on the same feeder, and it is soon to be joined by a 14 MHz brother, again all on the same feeder. As for countries, Bernard is taking them as they come, having heard people with DXCC saying how they overlooked the QRM for new countries! The only snag to emerge is a complete absence of African stations at times when he could operate — mornings and lunchtimes; that is a pity, because it would complete his clutch of countries for a WAC award. It is sad that Africa is, in amateur radio terms, a Dark Continent. Even the chaps with the beams are finding it hard to run them to earth, and yet they should be about on one band or another more or less continuously. On the other hand, G4ITL found a VP5 and worked him one lunchtime, and didn't realise that he had just broken into and through his first pile-up!

G4EZA is a multimode type; CW gave him HZ1AB, PY6JAG, while the SSB came up with A4XGY, JX9WT, TF3YH, VS6EZ, VU2BX, and 9K2DR.

G4HZW (Knutsford) passed the RAE back in 1969, but various traumas of life meant interest was lost until a friend re-introduced him to the pleasures of the bands late in 1978. A G8 ticket was obtained, and 3 QSOs on VHF was enough to say "not my

scene" and get down to the Morse which was passed in four months. The rig was a cheapie against everyone's advice in the form of an FT-75 plus AC and DC power supplies, and VFO. It was connected to a dipole and G4HZW talked to 'Alex' and 'Vlad', plus the odd W, but all short QSOs as people weren't copying any too well at the far end. As 28 MHz was the favourite band, a home-brew two-element Quad was put up, using scrap scaffold poles to make a 24-foot mast and bits of an old vacuum cleaner for the boom. The total cost of the Quad was 58p, and it has totally transformed the situation: the QSOs can last for hours, and they queue up to come back to a CQ. Lots of Ws in all call areas, including WB1CDL/M with two watts to a bumper-mounted aerial, plus VP5WJR, VE3BVD/ST2, OK3TAB/D2A, HC1LH, VK4NR, LU5HDJ, PY2XB, 9V1UH, VU2DPK, ZS6PS, CE5BSSHM3UJ, LU9EK, DK6NN/C6A, VK4NMW, C5AAS, EP2TY, CX4BA, CP8CB, CO7AM, H44WH, VK6NMH, VK6NFI, J3AAG, OA4YQ, YV5AL, HV3SJ, HC1HY, HK3YH, PY1ZAE, LUJHE, 8P6KY, YV5USB, VO2CW, VE8MTF, VP1A, and all states. At the time of his first letter, Tony had them all in bar KH6, and his second letter indicated he had connected with a couple of *them* plus another KL7. So that's what a beam does for you!

'CDXX' deadlines for the next three months—

May issue—April 4th
June issue—May 1st
July issue—June 5th

Please be sure to note these dates.

G4IDU (Kingswinford) is a refugee from Justin Cooper, and of course that means he has been an active SWL for quite a while and knows the game. There is an FT-101E and a home-brew keyer for CW, an all-band end-fed wire, and a dipole for 21 MHz. CW on Ten accounted for YV5GAB, PY1ZAE, W6RR/7, and WB1CBO who was worked using just the driver stage of the FT-101, and WB2PVO on a two-transistor QRP rig.

G3NOF (Yeovil) found the band open on occasion from 0730 right through to 2200. In the mornings the long path to VK/ZL/JA has been good, changing to short path as early as 0930. USA signals have been heard from 1100 till band closure which has been as late as 2230. Africa was *not* very obvious in the signals. Don made it with SSB to A4XIU, A4XVK, AP2FI, C6ACY, CT2DF, CX7BF, EA8OR, H31LR, JA5JTE, JA6BGA, JA8RCA, JF1VVR, K7LR for Idaho, K0RF in Colorado, VE5ADA, VE6LU, VE6MP, VE6WQ, VE7BJN, VE7BSM, VE7CVM, VE7DX1, VE7BIV, VE7HN, VK2VEX, VK2VHC, VK4NMW, VK6PS, VP1A, VP2A, VP2KAH, VP2ML, VP5EE, VS6GY, W1BIH/PJ2, W6RO aboard the old *Queen Mary*, W6LKT/7, W6POC/7, W7JDF, W0ZV, WA0QBN, 9K2DR, 9V1UH, 9Y4VU, 6Y5YM, and N6YK/VP2A.

G4EAN mentions just two QSOs on the band, he having been playing with microprocessors too much; K4VMG and G4GXL were the favoured ones.

Just the two watts to a Joystick were in use at G3CED/G3VFA, and on Ten this is quite a good combination. One Sunday session yielded QSOs with four Ws, a brace of UB5s, a UA9, and UA1ASM from Leningrad who had 20 watts to a two-element beam and putting out a potent signal with it.

Ten for G4BUE included UJ8JQCQ, VP2KAH, UH8HAI, EA8TY, ZE4JS, and YV1NX, all with his five watts of CW in the ARRL Contest weekend.

At G2HKU we note a longish list for the band, unusually so for Ted, including UA9QAS, W9VNE, W7NCO, EA8QO, 9J2BO, ZS6ME, W0SMV, K7NHV, VP2MFC, W6VD, K7RQ, VE7NH, W6CF, W6TZD, and K6DDO.

The ten-metre log at G3PKS includes SSB with W2FRW, and WD0HMF, who was 'way above 29 MHz as late as 1830 on the clock. PY2DLK, PY2BTR, PY6HL, YV1AD, WA6PVC, WD6GTT, W1PWK, ZS1AF, RZ2ABH, WB0KLU, VK6NDJ, VE3BFB, HH2VP, W9GX, N7ARA; all these were worked with CW.

Fifteen

Almost an anti-climax after the way Ten has been showing at sensible times; but of course it is nice to have 21 MHz to fall back on when Ten dies for any reason. It is an eminently

civilised band these days, nice and quiet but plenty of DX — and we can hardly blame the band for the Poltava Pestilence.

G2HKU of course normally stops at this band for a quick look, and his quick look found — with the flea-power rig — SM5AHK, while the big rig keyed to W6TZD, WD8LXX, and K8EJ.

The QRP entry in the contest by G4BUE shows he had CW contacts on this band with VP2MOC, UK8MAA, UH8HAI, KG6DX, W3NX/KP4, and PY1ARS/4.

It seems that with all the stuff on Ten, G3CED didn't have time for 21 MHz, and there was just one QSO noted, that with YU7VR, in which 589 reports were exchanged.

We had to chuckle at G4EAN's log on 21 MHz: just four VEs — just like London buses, all in a line!

At G3NOF, the JA/VK/ZL path has been open long-path from about 0730 then the short way round from 1000; the Ws have been in evidence from about 1100 till 2300, and again the dearth of African signals has been noted. For Don it meant SSB QSOs with A22GV, A7XA, CP6EL, EL2AV, K6LL/7, K7HCD, K0ST1, N4HX/TT8, N7RO, N0YC/7 (Utah), SU1AL, VE4ADV, VE6CU, VE7TL, VP1A, VP1CS, W4JFE/7, W7BNH, WB0YVY, YB0ACL, 3B8CF, 9Q5GB, and 9Y4NP.

G4IDU uses, it seems, about equal quantities of SSB and CW, and the CW made it to PY7DA, N6GJ, VE7AGC, VP2MFC, VK5NJU, JAS, UA0SAO in Zone 32, and PY0MAG; while the SSB was used to work A9XBE, A5XIQ, EP2TY, W7XA, WA6EKL, 7Z2AP, and EA9IE in Spanish Morocco.

G4EZA next, and he managed to work one five-watt QSO on the band, with OE3WZ.

G8RY complements the comments elsewhere in this piece about the Ex-G Club by mentioning that he has phased verticals on 21416 KHz for the club net in which he takes part almost daily.

Twenty

GM4ELV used his QRP rig to work PJ2MI on SSB, and also found W6DOT/LX for another SSB QSO.

G3ZGC/MM used 14 MHz for his 1815z skeds for some of the time; from the Gulf of Mexico it was so bad that it was a lucky shot that got the

words "try Ten" through; Ten continued best until past the Azores when 14 MHz was satisfactory, while coming up the English Channel a switch to Forty was felt to be in order.

A quick look-see by G3PKS raised W3CBM and a pleasant chat with GM3BXV, while the list of those heard included some good DX from all continents.

At G2HKU there was the usual sked in the mornings for SSB to reach ZL1VN, ZL3SE, ZL3RS, and ZL4HB, and the trusty key made the path work to KL7MF, WA7JRL/SU, W5XJ, EL0AN/MM, IT9AGA, HI3PC, JE1DVM, ZP5CA, and VK4ACU.

Still with his QRP list in the contest, G4BUE mentions EA6CL, UG6GAF, VP2KAH, YV1NX, and VP2ML.

The short list from G4EAN includes W2JHQ and W7ZLA.

Now we press on to G3NOF, who like all the others has not much to report on 14 MHz; Don says that from Yeovil the mornings have shown *without* the usual VK/ZL stations, and only a very few contracts were made, among which we noted C5AAP, C5ABK, JY3ZH, ZS1DL, and ZS1DZ.

A slightly longer list is entered by G4IDU, who found his CW could get through to VE7BEY, WA7VHO, W7IZO, UI8IAJ, W7ZR, WB7FDQ, PY6HU, PY6RU, VP2ML, VP2KAM, KV4AA, and W6VPH.

Another one who has some mordant comments on his log is G4EZA; for him it was CW all the way save for his SSB contact with ZL2RS of which he notes "all my own work!" The CW mentioned includes KP4DSY, KV4AA, DK0JA, F6FLB, HB9NE, and UB5NBF, the last four all being at the five-watt level.

So — there it is for another time. Thanks for all those letters and we hope to hear from you (and more!) again; and it would be nice to hear again from some of the OTs to this piece. Note the deadlines in the 'box' in the piece, and send your mail — and what about some table entries??? — to "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

Stop Press

The China operation by ZL1ADI is off — apparently he's an American citizen!

THE "S.C.D.", PART III

CONCLUDING THE LOW COST, LOW TECHNOLOGY, QRP TRANSCEIVER PROJECT

REV. G. C. DOBBS, G3RJV

THE S.C.D. is a complete transceiver for QRP CW operation on the amateur bands designed for simple home construction at low cost. In *Part I* and *Part II* the basic transceiver was described. This third, and final section, goes on to describe various additions which will enhance the operation of this simple rig; as in the previous parts, the circuits are described fully, but are open to adaptation and experimentation depending on the ability or pocket of the constructor.

Receiver Incremental Tuning

Part II of these articles described how the S.C.D. could be amended for VFO operation by the use of a tuned circuit in the oscillator stage. This was accompanied by a warning about the main problem of transceiver operation with a common VFO for transmitter and direct conversion receiver operation — the problem being that of transmitting and receiving on the same frequency. The VFO will have a frequency offset when keyed on transmit, and the operator must ensure he can listen on the frequency offset when keyed on transmitter output. Although this technique can be simple and gained by experience, a distinct advantage can be gained by having independent receiver tuning.

Receiver independent tuning adjustment is common in commercial transceivers and is often called "offset tuning". The author prefers the term Receiver Incremental Tuning, or RIT, and abhors the American "clarifier" so beloved in CB equipment.

The object is to provide a small degree of additional tuning on receive only so that a comfortable listening pitch can be obtained. (Old hands may say it's for chasing drifting UA signals up and down the band, but we'll ignore that!). In a simple transceiver like the S.C.D., the incremental tuning control will enable the operator to listen on the exact frequency of his transmission and obtain a comfortable pitch without tuning the VFO which would also alter his transmitting frequency.

Fig 1 shows the RIT circuit used in the S.C.D. Again it is a very simple circuit. C1 and D1 form a varicap circuit such that the capacitance across C1/D1 can be changed slightly by a voltage change at D1. This voltage change is provided by VR1 which forms a potential divider across the 12 volt line. As VR1 is turned clockwise, D1 sees an increasing voltage through R1. The increasing voltage raises the capacitance across C1/D1 and, if they are connected across a tuned circuit, the frequency will lower. C1 goes to the top of the VFO tuned circuit.

Construction

C1 and D1 must be placed across the VFO tuned circuit (L2, TC1, VC2). In practice it is easiest to mount C1, D1 and R1 very close to the socket arrangement into which the VFO tuned circuit is plugged, as described in *Part II*. D1 is named as the 1N914, but several junk box unmarked diodes were tried in the prototype and gave good results. Since the RIT works at RF it is also useful to have VR1 close to the rest of the circuit. If the lead between R1 and the slider of VR1 is to be more than a couple of inches, it may be a good idea to slip on a couple of ferrite beads to help decouple RF.

Operation

When the RIT circuitry has been connected, try the S.C.D. as a VFO receiver, without 12 volts at the top of VR1: the receiver should operate in the normal way. Connect 12 volts to VR1 and swing the control. It should become apparent that VR1 now provides a useful amount of fine tuning which will aid the reception of CW signals. If the VFO tuned circuit allows the receiver to tune onto the SSB portion of the band, it should now be very easy to resolve SSB signals with clarity. If VR1 is turned fully anticlockwise, that is down to ground, and the 12 volts is removed from VR1, there should be an imperceptible change in frequency. At this stage the RIT offset can be checked by listening to the VFO on another receiver and noting the frequency change between VR1 at minimum and maximum; there should be a several KHz change. If the change is thought to be too small, C1 can be raised or other junk box diodes tried to give a larger swing.

In theory it is now possible to use the RIT with the transceiver. The only problem is that it is connected on both transmit and receive and will, therefore, provide offset in both modes. One could use it by returning the VR1 control to ground on transmit, advancing it to a suitable point when receiving. This is clumsy and inconvenient and the RIT is best switched out on transmit as described below.

Transmit-Receive Switching

The original S.C.D. circuit has a diode arrangement in the receiver front-end to provide protection on transmit and no transmit-receive switch was used. This did give a slight problem with keying thumps in the receiver during transmit and an additional problem is now present with the RIT being in circuit on transmit: these problems can both be solved by adding a simple switching circuit. It would be possible to add electronic switching to the S.C.D. but in line with the simple construction and circuitry techniques a single switch will be used for this facility.

The transmit-receive switching circuit is shown in Fig 2. A single pole change-over switch provides all that is

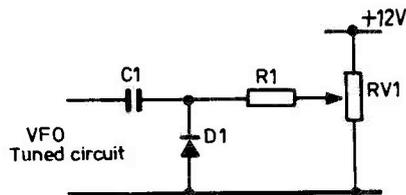


Fig. 1 R.I.T. CIRCUIT

D
482

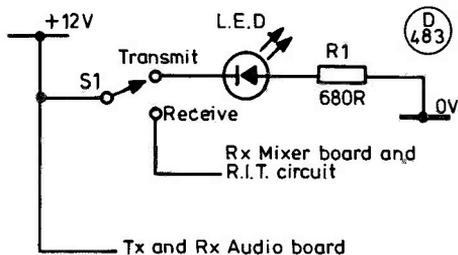


Fig. 2 SIMPLE TRANSMIT/RECEIVE CIRCUIT

required. Follow through the 12 volt power supply as it is used in this circuit. The 12 volt supply is connected to the centre of the change-over switch; also connected to the supply all the time are the transmitter board and the receiver audio board. As the transmitter is on all the time care has to be taken not to press the key when on 'receive'. This will not damage the receiver as the diodes on the input provide protection, but RF will be transmitted and those awful thumps will appear in the receiver.

On 'receive', the receiver mixer board is switched on with the RIT circuit. This allows for full receiver operation, including RIT. It is pointless to switch the transmitter off at the same time as the oscillator is used on receive and is part of the transmit board.

On 'transmit', the receiver mixer board is switched off which relieves the keying thump, and the RIT is off allowing the VFO to be at its normal frequency. The audio board to the receiver is still on, so the sidetone oscillator will be heard in the headphones. The transmit side of the switch does not switch any circuit boards and, so as not to waste the switch position, a transmit indicator has been added. On transmit the LED is switched on. This LED may be any cheap type and the value of R1 can be lowered to increase its brightness. The author has used values as low as 100 ohms, but bear in mind that an LED is not intended for shack illumination and they may not like dissipating too much current! The constructor may like to use another LED to indicate receive, which could be added to the receive switch position. Perhaps a green LED could be used which would indicate that the transceiver was on all the time — and enhance the front panel.

Operation

In these days when break-in operation is common, it may seem a regression to use a switch to control transmit-receive functions, but in practice the single operation of a switch proves no real handicap when operating the transceiver. The prototype used a miniature switch with a long toggle which was convenient to flick over. Slide switches, although cheap, are not recommended as they are often prone to poor contacts. The operator must learn to use the RIT to find the exact frequency of the transmitter: this can be checked by listening to the VFO on 'transmit' and 'receive' and noting where the RIT control has to be placed for good netting of the signals. Bear in mind that this will vary according to the band in use and also with the antenna in use. The actual use of the RIT is best confirmed by practice on the bands. Since the RIT tunes to a lower frequency by adding capacitance, operate the receiver by tuning high-to-low on the band.

Audio Filter

Because of the inherent lack of tuned circuits in a direct conversion receiver, the selectivity is somewhat less than a conventional superhet. It is usual to add selectivity at the audio stages, by using a sharp bandpass filter to enhance an audio signal of the required VW pitch. Passive filters may be used, but these involve the use of critical R-C or L-C circuits. The simple active audio filter of Fig 3 may be added to the S.C.D.

The 741 integrated circuit op-amp functions as an audio amplifier with selective feedback, controlled by C1-C2-R5 tuning it to accept the frequency governed by their values. The resistor network R2-R4 enables a single rail to be used with the op-amp. This circuit provides a bandwidth of some 110 Hz at a frequency of about 800 Hz. C1 and C2 should be close tolerance components.

Construction

The prototype audio filter was built on a printed circuit board, but it would be easy to construct it on 0.1 inch perforated matrix board (*Veroboard* without the strips) with interconnecting wires on the underside; a layout is shown in Fig 4. By using small physical components, quite a neat layout may be obtained. The circuit and layout is identical to the filter used in the Direx Receiver, a project by the author in the April 1978 issue of *Short Wave Magazine*.

Operation

The audio filter is inserted into the receiver circuit between the mixer board and the audio amplifier board. Screened leads may be used if the filter is not close to either boards, but ideally it should be placed between the two. The output from the mixer board (C7 on that board) goes to R1 of the filter; the output goes *via* C4 to the volume control VR1 of the audio amplifier board. The filter may give a very slight reduction in audio output within the receiver, but the overall audio gain of the receiver is more than enough to cope with such a minor reduction. Upon inserting the filter, an immediate improvement in selectivity should be heard. Some receivers arrange for the filter to be switched in and out, and this could be done by putting a single-pole switch between the input to R1 of the filter and the output of C4. Since this transceiver is only used for CW operation it is best to leave the filter in circuit.

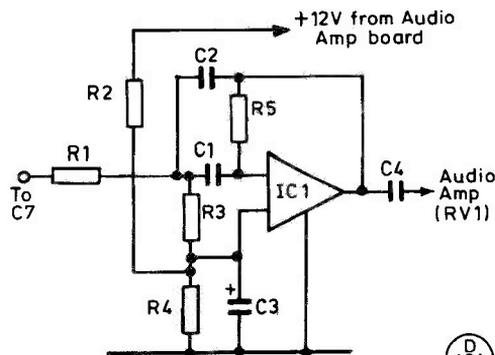


Fig. 3 AUDIO FILTER CIRCUIT

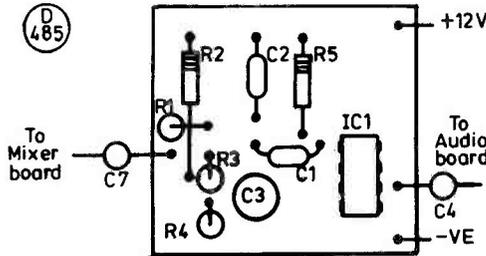


Fig. 4 AUDIO FILTER LAYOUT

The transceiver is now complete for reasonable use on the bands, but naturally with such low power full use must be made of the RF output from the transmitter. QRP transmitters are difficult to tune-up for reliable use by the usual method of monitoring the DC input to the transmitter PA. This transceiver is simpler than most, having no tuneable circuits in the output from the PA; but good matching should be ensured into the antenna. The operator may be using his favourite ATU — if a tuned antenna is not in use — so good matching is vital. Few seasoned QRP operators would be happy about matching their low output to the antenna without some indication of any standing waves that might be present. A basic Standing Wave Ratio Indicator is a valuable aid for the QRP operator.

Tables of Values
Fig. 1

- R1 = 100K
- RV1 = 50K linear
- C1 = 47 pF
- D1 = 1N914

Fig. 3

- R1 = 38K
- R2, R4 = 27K
- R3 = 24K
- R5 = 1.8M
- C1, C2 = 0.001 μ F, 2%
- C3 = 10 μ F elec.
- C4 = 0.01 μ F
- IC1 = 741

Fig. 5

- R1, R2 = 100 ohm
- C1 = 100 pF s/m
- C2 = 0.01 μ F
- RV1 = 10K linear
- TC1, TC2 = 20 pF compression
- D1 = OA91
- RFC = 1.5 mH RF choke
- L1, L2 = see figure
- S1 = single-pole changeover
- M1 = see text

SWR Bridge

This is no place to go into the theory of transmission lines, even if the author considered himself competent so to do! It is sufficient to say that with such low powers the operator wishes to avoid much reflected RF power returning down the line to reduce his signal level. The basic SWR bridge circuit shown in Fig 5 is a version of the famous design by Bruene. It could be calibrated for actual SWR values, but in this application a relative reading is all that the operator requires.

The signal passes through L2, a small but substantial coil, straight out without much loss; L1 takes a sample of the signal and small RF signals 90 degrees out of phase appear across the load resistors R1 and R2, representing the forward and reverse RF power in the line. S1 can check either end of the L2 circuit. The signal is rectified by D1 and read on the meter M1; C2 decouples RF at the meter and VR1 provides a meter sensitivity control.

Construction

The layout of the bridge is shown in Fig. 6. This may be a printed circuit board, a small panel of paxolin or a matrix board. The windings for L1 and L2 are shown, and the layout is best symmetrically arranged. The SWR bridge

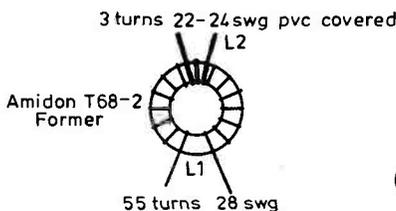
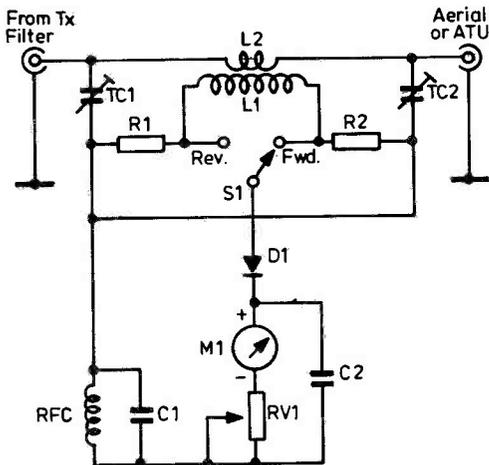


Fig.5 SWR BRIDGE CIRCUIT & COIL DATA

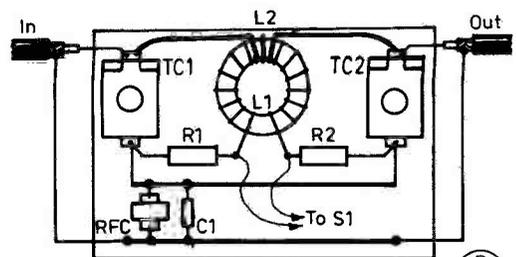


Fig. 6 SWR BRIDGE LAYOUT

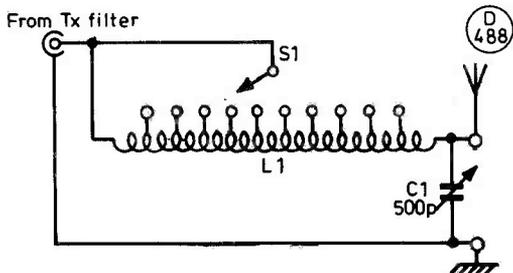


Fig. 7 ATU CIRCUIT

may be built into the transceiver, in which case screened leads go in and out as shown. The prototype was built externally in a small screened box with phono sockets on each end; this enables the bridge to be used with other transmitters. The meter should be as inexpensive as possible, and an old tape recorder level meter was used in the prototype; this had a full scale deflection of some 200 μ A, but any meter up to about 1 mA could be used. The sensitivity control VR1 is simply adjusted for the meter to be used.

The bridge should be nulled before it is used. This can be done by using a dummy load — a 50 ohm (or so) 2 watt resistor; this load is connected between the output and ground. Apply transmitter power to the input of the bridge. Adjust VR1 for full scale meter reading with S1 in the 'forward' position (FWD). Then, set S1 in the 'reverse' position (REV) and adjust TC1 for the lowest meter reading. Reverse the dummy load and transmitter output to use the bridge the other way round. Repeat the process, this time adjusting TC2 for minimum reading. (Remember that the FWD and REV position are reversed on this test). The fastidious may repeat the process several times to get the best overall settings.

Operation

Always use the SWR bridge between the transmitter and the ATU (Antenna Tuning Unit). The purpose of the ATU is to take the odd impedance of the antenna and "show it" as a 50 ohm load to the transmitter output. The best rule of thumb is to work to the lowest reflected reading (REV). Set the ATU to its usual setting for the band in question. If this is not known, it can be checked roughly by seeing which settings give the best receiver results. Apply the transmitter power and check that the forward reading is high and set it to full scale on the meter with VR1. Switch to REV and adjust the ATU for the lowest reading of the meter; re-check that the forward reading is still high. It is possible to get false ATU settings which give either a high output but with a high reflected power or a low reflected power with a low output: check which gives the best overall compromise and note the ATU settings for future use on each band.

It is convenient to be able to use a tuned antenna for operation. This eliminates problems of antenna tuning and certainly a tuned antenna such as a simple dipole will give good results on QRP. Sadly few of us have the space for dipoles on the lower bands. The prototype S.C.D. gave good results using about 90 feet of end-fed wire and a basic L-match ATU. This ATU is described below.

Antenna Tuning Unit

The ATU coils may be adversely affected by metal screens, so construction in a plastic case or wooden box is advised. The prototype, which the author has used for 15 years, is built on a wood base plate, with a tinplate front panel, and otherwise open for the world to see. L1 is shown clearly in Fig. 8 and may be wound on any former with a diameter around 1 1/4 inches; S1 is a 10-way wafer switch, but this was a late addition to the unit which originally had a crocodile clip which fastened onto the required tap. A 12-way switch would also serve, using more tappings. The tappings are spaced out over the whole winding in about the ratio stated on the diagram.

C1 is a 500 pF variable capacitor (half of a dual 500 pF tuning capacitor from an old broadcast valve receiver would do). A large component with airspacing is best for C1, although the author has a portable version of this ATU which uses a miniature solid dielectric variable for a Japanese transistor radio, and this appears to work well.

Stout wiring and short leads are helpful in ATU construction. Two large, easy-to-handle knobs should be used for S1 and C1 and a simple calibration should be provided for both to help locate settings. When building ATU's, junk-box hunting is the order of the day and any spending good money on an ATU should hang his head in shame!

Operation

Follow the outline for operation of the SWR bridge in the section above. Approximate settings for S1 can be found with the receiver, but the final adjustment should be made with the SWR bridge.

This ATU has been used with various QRP transmitters including the SCD with end-fed bits of wire of lengths from 40 feet to 200 feet. If the shack has a good earth, then it is ideal to load the antenna against earth. But if the earth is in the slightest suspect or the earth lead-in is long, the author would advise the use of a counterpoise.

An article on a transceiver is no place for a treatise on the author's preference for counterpoises over an earth, but if in doubt, or getting poor results, try one. The S.C.D. has

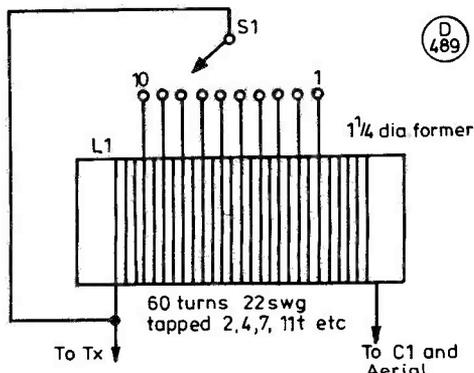


Fig. 8 ATU COIL

been used with end fed-wires and the L-match ATU against quarter wave counterpoises for the band in operation. Suitable lengths for counterpoises are:

80 metres — 63'0"
 40 metres — 32'6"
 20 metres — 16'6"
 15 metres — 11'0"

Such counterpoises should not be underground, but raised slightly above ground. Experts quibble, but the author has put counterpoise wires all over the place and with reasonable results: under stair carpets, down the outside of house walls, along garden fences and walls. The only common denominator is that they have rarely managed to fit into a straight line! The simplest way is to get some cheap PVC covered copper wire and try it.

Conclusion

The purpose of describing the S.C.D. in these three articles is to bring back a little of the fun into our hobby:

Amateur Radio is too serious and expensive these days. It is up to the reader to use as much or as little of these circuits for his individual entertainment, have fun, avoid spending money and be surprised at what simple circuits can do. You may even be able to look the XYL straight in the eye as you tell her how much this transceiver cost. But he warned QRP — is addictive!

Components:

Amidon Coils by *T.M.P. Electronics*. Other components — *J. Birkett* can supply most for those with shallow junk boxes. (Both advertise in *S.W.M.*).

Bibliography:

SPRAT, Journal of the G-QRP Club (Secretary, Rev G.C. Dobbs, 17 Aspen Drive, Chelmsley Wood, Birmingham B37). "*Solid State Design for the Radio Amateur*" (ARRL) is a mine of a circuit ideas, available from the Publications Dept. of *Short Wave Magazine*.

CORRECTION

The article "Digital Frequency Readout and Other Improvements for the Yaesu Musen FRG-7 Receiver, Part II" which appeared in the February 1980 issue, contained some errors and omissions. Fig. 8, p.675, was without its caption, which should have read: "1. Gate opens after down counter is present to 4550. 2. Times after which 4 digit counter counts down to zero for first time. 3. Times after which 4 digit counter counts down to zero for second time. 4. Times after which 4 digit counter counts down to zero for third time. 5. Gate closes; the reading remaining in the 4 digit counter is displayed. 6. Times after which 4 digit counter would count down to zero for fourth time if gate were still open; this actually happens in one case only, when the input frequency is 3.455 MHz. Readings displayed are proportional to the lengths of the horizontal dashed lines". P.677 para 1 line 11 read reset, not 'rest'; p.679 para 2 line 26 read switch, not 'which'; p.680 para 3 line 10 read PLL, not 'PPL'; Fig. 13, p.679, is upside down.

The author, Robert Dawson, informs us (as many readers will have already found out) that the filters used in the design are no longer available. However, *Ambit International Ltd.* can supply the MFH51-T 5 kHz filter or the CFG-4551 4 kHz filter. The former is directly interchangeable with the MFH41-T used in the original, but neither give quite as good results as the MFH41-T; the PLL BFO works well with them if they are used for SSB. *Ambit* will also shortly be able to supply an alternative SSB filter, and an s.a.e. to them will bring details when available (200 North Service Road, Brentwood, Essex). Mr Dawson also mentions that the version of the counter chip used is the Intersil 7217 IJ1.

MORE MOBILE RALLIES

The following updates the list published in the February issue. **May 18**, Northern Mobile Rally, Victoria Park Hall, Keighley, 11.30 to 5.30, talk-in on 2m. FM S22 and 70cm. FM SU8; contact G8DFZ (QTHR) for details. **May 25**, Plymouth Mobile Rally, Tamar Secondary School; contact R v Hooper, G3SCW (QTHR) for details. **July 13**, Upton Mobile Rally, Upton-on-Severn; full details from G8NSL, QTHR. **Sept. 7**, Vange Mobile Rally, St. Nicholas School, St. Nicholas Lane, Basildon, from 10 a.m.; contact A. Smith, G4FMK, QTHR, for details. **Sept. 28**, Harlow A.R.S. Mobile Rally, at Netteswell Comprehensive School; details from A. Keeble, G4HPU, QTHR. **Special Event Stations: May 24, 25, 26**, St. Helens and District A.R.C. will be operating GB2RST ('Rainhill Steam Trials') from Rainhill Cricket and Tennis Club to mark the 150th Anniversary of the Liverpool-Manchester Railway; operation will be on HF and VHF/UHF, and there will be a special QSL card for all contacts. Full details from club sec. Paul Gaskell, G8PQD (Tel: St. Helens 25472). **May 29, 30, 31**, Exeter A.R.S. will be operating GB2EXE and GB8EXE at the Royal Albert Memorial Museum, Exeter, to mark the City of Exeter 1900-Year Festival; talk-in on 2m., and all-bands working.

May issue will appear on Friday, April 25th

TRAVIS FM DISCRIMINATOR FOR THE EDDYSTONE 730/4, ETC.

F. G. RAYER, T.ENG(CEI), G30GR

FOR a long time FM reception has been with a 2m. converter and an Eddystone 730/4, 888A, or 840. With these and similar communications receivers adequate voice quality is obtained by slope detection. Nevertheless, this results in two slightly separated tuning positions and a loss of that excellent quality obtainable with a receiver intended for FM. It was thus decided to make an add-on FM detector.

After some trials, the Travis, with semiconductor diodes, was chosen — it does not need a tapped or 3-winding transformer, nor any power supply. A unit with valves or transistors would give increased sensitivity, but in view of the gain of the receiver with which the unit is employed, the diodes were adequate.

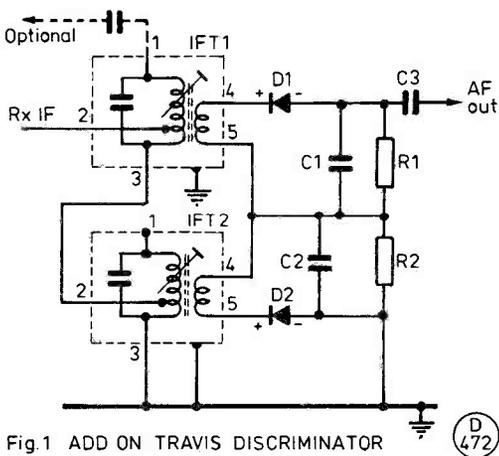


Fig.1 ADD ON TRAVIS DISCRIMINATOR

Travis Circuit

IFT1 and IFT2 are in series, Fig. 1, completely separate and screened from each other. IFT1 is tuned slightly above the unmodulated carrier frequency, and IFT2 slightly below the carrier frequency. The secondaries are reversed in phase. In the presence of FM, this balance is upset, producing audio at C3.

The 730/4 has a back IF output socket, and IF signals are taken from this by a short screened lead. This receiver IF is about 450 kHz, and Denco transistor type IFTs are suitable.

It need not be said that IFT1 and IFT2 must be tunable to the receiver IF, so check this is about 450-470 kHz.

With other receivers it would be necessary to take the IF signal from the final IFT, via a small coupling capacitor. AF has to go back into the receiver audio amplifier, or into a separate amplifier. Some Eddystone models have suitable PU audio input terminals which might be adapted; otherwise a 2-way switch to take C3 or the usual receiver detector to the receiver audio circuit is called for.

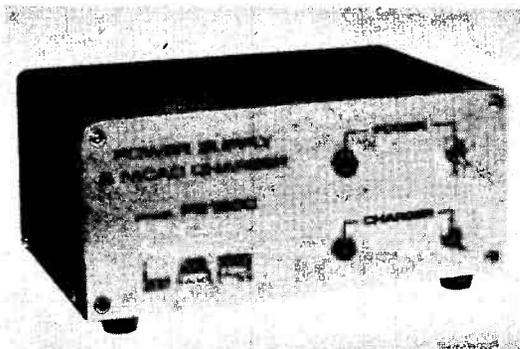
The components are easily assembled on a perforated board, about 1½in. square.

Table of Values Fig. 1

R1, R2 = 4K7	IFT1, IFT2 = Denco IFT-13
C1, C2 = 220 pF	D1, D2 = OA47 (or equivalent)
C3 = 0.1 μF	

Adjustment

This is best with two suitable core adjusting tools. Short 4 and 5 of IFT1 and peak IFT2 on an AM signal. Similarly peak IFT1 with 4 and 5 of IFT2 shorted. Then screw IFT1 core out a turn or so, and IFT2 core in a turn or so, and make adjustments with an FM signal, for best volume, maximum speech quality, and poorest response to AM. A notable improvement in speech quality should be found.



The PS1200 Power Supply and Nicad Charger manufactured by LAR Modules Ltd. This new unit, designed primarily for use with transceivers such as the TR-2200GX, TR-2300, IC-402, etc., enables the operator to use his transceiver with mains power and charge the batteries simultaneously; switching is automatic, and inbuilt protection circuits are provided. Price of the PS1200 is £30.75 including VAT and post/packing, and it is obtainable direct from the manufacturers at 27 Cookridge Street, Leeds LS2 3AG, or from dealers.



"yeah man, using pot core inductances here"

A stabilised power supply and indicators, to show which bands were selected for transmission and reception, were also to be provided in the same cabinet.

At the time of writing, most of these requirements have been fulfilled, although more work needs to be done on the transverters to optimise their performance: hopefully, therefore, they will form the subject of a separate article later, when the author has more experience with GaAsFETS. However, since the transverters were built in the same size die-cast boxes as the popular *Microwave Modules* units (and in fact were made to be directly interchangeable with them), It occurred to the author that it would be worthwhile to describe the system as first built, using the *Microwave Modules* units for 2m. and 70cm. and a rather deaf 4m. version home-brewed as a stop-gap. Only one modification is required to the *MM* units to use with the IC-701 in this system: because the IC-701 requires 8v. at the transverter input/output socket on "receive" as part of the aforementioned control voltage, a small three-terminal regulator providing 8.2v. is installed in each *MM* transverter and its output fed to the "28 MHz output" socket via an RF choke. DC is isolated from the internal link winding by a 0.01 μ F ceramic capacitor.

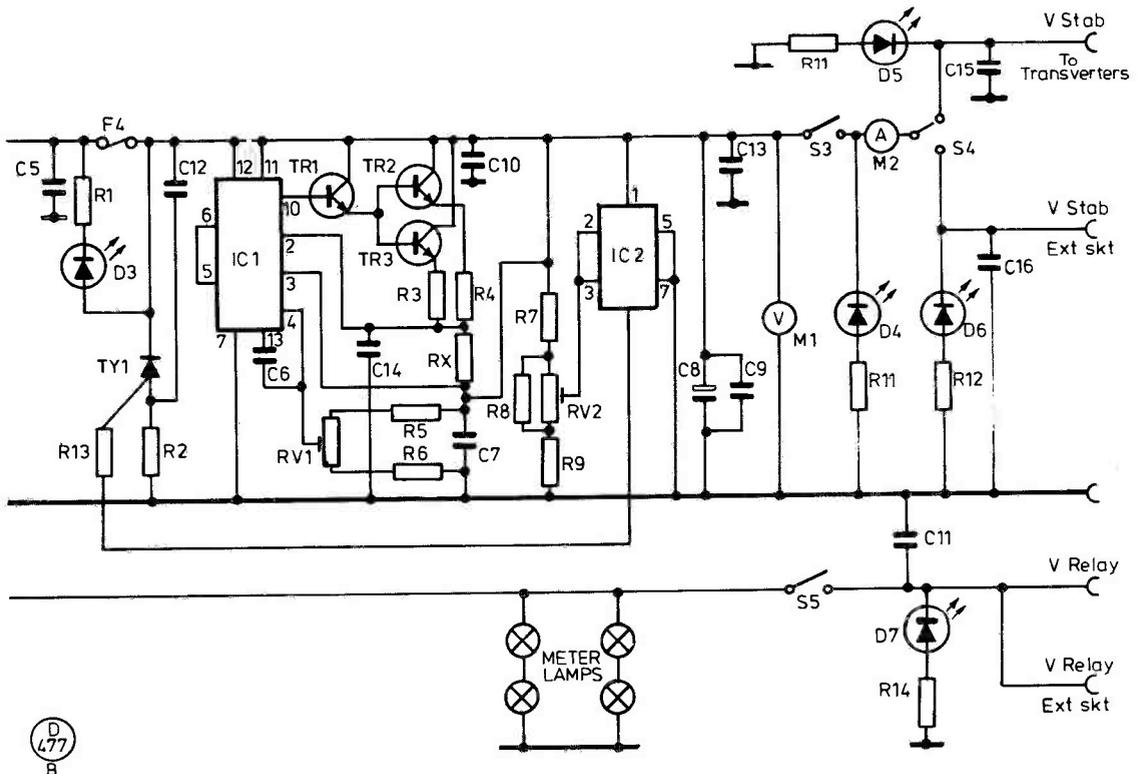
It is not suggested, therefore, that this article embodies anything new or revolutionary; what it represents is one man's way of solving simple problems set by a particular operational requirement for his station, given a small

toolbox, little skill and no patience, the floor of a bed-sitter and a rather sparsely filled junk-box!

Power Supply

The "G4FRX transverter system" falls into two main sections, the power supply and the switching and control circuitry, and we consider first the power supply, Fig. 1. Both the *Microwave Modules* and the home-brew transverters require 2A or so at 12v., which must be stabilised, and it was decided to make the power supply capable of about 5A and able to be used independently of the transverters for general purposes in the shack. As power supplies go it is quite conventional, but a description will be given to illustrate some points that arise during its design and construction.

Mains enters via the IEC socket, SF1, which incorporates a mains filter (this happens to be a stock *Radiospares* item salvaged from a colleague's defunct project!). The thermistor TH1 in series with the transformer primary is there because the author has a congenital aversion to the "thud" that a large transformer produces when trying to feed 47000 μ F electrolytics on switch-on — they represent practically a short-circuit, and the Society for the Prevention of Cruelty to Transformers is not best pleased. The transformer itself is a large ex-service component of a type which are quite common on the surplus market at the



supply switched externally, relay supply in use. NE1, D4, D5, D7 located above S2, S3, S4, S5 on front panel. TR1 is on PCB; TR2, TR3 and R3, R4 are on heatsink on rear panel. For value of R_x see text.

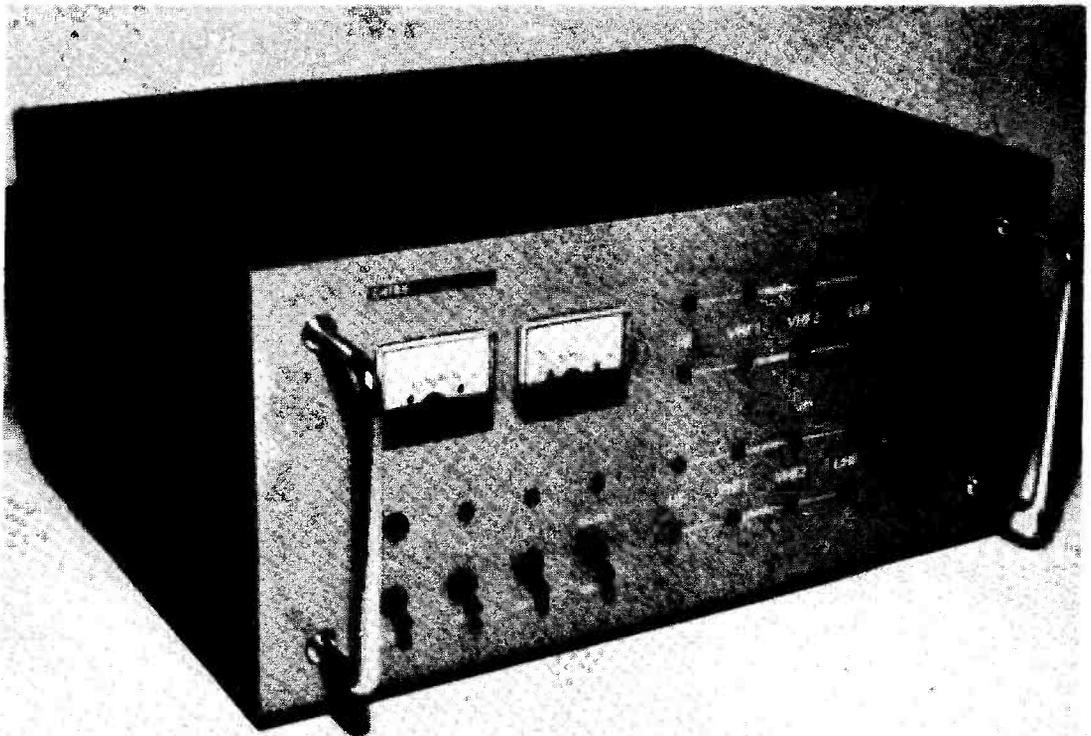
moment. It has two 10A secondaries tapped in 2v. steps from 10-22v. and several lower-current windings and, like most transformers of its ilk, one imagines that these ratings are rather conservative. This one is very under-run in this application, but this is good for reliability, and the author would rather use this kind of component (which would probably cost a small fortune to buy new) than a modern transformer perhaps more suitable for the job in terms of size but costing more, and nothing like as mechanically or electrically well made.

The thermistor is bypassed about 10 seconds after switch-on by switch S1, and it is a simple matter to remember to restore it at the end of an operating session. Another benefit of this approach is that it becomes possible to use a 500 mA quick-blow fuse, F1, in the transformer primary instead of the 5A anti-surge variety that is otherwise needed to cope with the switch-on surge, and the value of the improved protection for an irreplaceable transformer is considerable! if anything, it is preferable always to fuse the primary of any mains transformer and not just its secondary circuits. The reason is that if, for instance, a fault were to develop in one of the rectifiers or smoothing capacitors in the circuit diagram (assuming of course that F2 and F3 were not present) causing the secondary to look into a short-circuit, one of the net effects is that the inductance of the primary winding is effectively cancelled, and the mains "sees" only the few ohms DC resistance of

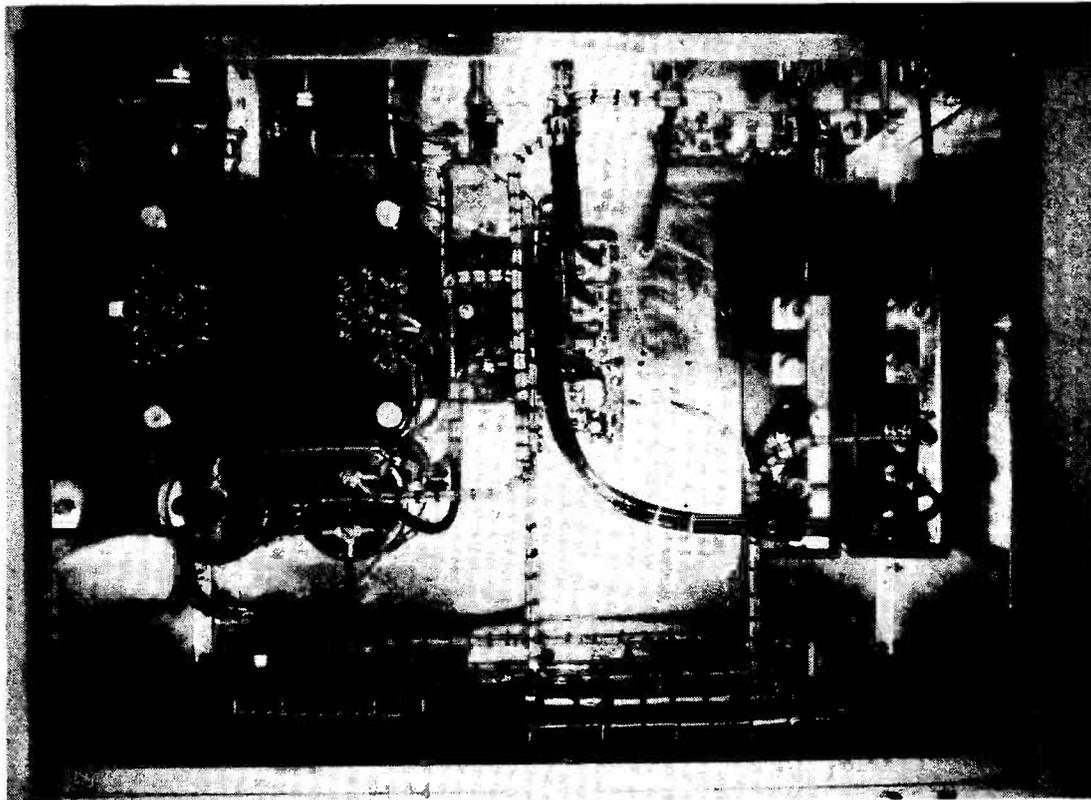
Table of Values
Fig. 1.

R1 = 2.2K	TY1 = 500v., 40A
R2 = 1 ohm, 25w.	F1 = 0.5A
R3, R4 = 0.25 ohm, 10w.	F2 = 10A
R5 = 2K	F3 = 3A
R6 = 3K	F4 = 7.5A
R7 = 3.9K	LP1 = 12v., 18w.
R8 = 560 ohm	NE1 = mains neon
R9 to R12, R14 = 1K	VR1, VR2 = 1K helipot
R13 = 4.7 ohm	IC1 = μ A 723
C1, C2 = 47000 μ F, 25v.	IC2 = μ A 3423
C3, C4, C7, C13 = 0.01 μ F, cer.	TR1 = BFX85
C5 = 0.1 μ F, tant.	TR2, TR3 = 2N3771
C8 = 1 μ F, tant.	VDR = see text
C6 = 470 pF, poly.	D1, D2 = 400v., 30A bridge
C9, C10, C14, C15, C16 = 100 pF, cer.	T1 = see text
C11, C12 = 0.1 μ F, cer.	R _x = see text
TH1 = CZ4	SF1 = Radiospares 6 amp. IEC socket/filter (no. 238-429)
M1 = 0-25v.	S1 to S4 = toggle switches as required.
M2 = 0-5A	

Note: Heatsink needed for TR2, TR3 (size calculated as shown in text). Standard DIL sockets may be used for IC1 and IC2. All fuses 'quick-blow'.



General view of the G4FRX transverter system.



General interior view, with 4m. transverter removed for clarity. The two rectifiers are adjacent to the transformer, with the RF switching relays to the right of the rectifiers and RLD driver board below RF relays; PSU board is on stand-offs on the cabinet rear. S1 and thermistor is seen at top left.

the winding; the result, clearly, is destructively high current if no fuses are present, which will destroy the primary instantly.

Also out of love for the transformer and rectifiers, a VDR is placed across the primary winding and its value chosen to conduct above 380v. peak. The reason for this can easily be seen if the bands are quiet one evening and you have nothing to do for ten minutes or so — simply connect any suitable low-voltage transformer to the mains supply and look at the output of its secondary with an oscilloscope; the result may well frighten you. Certainly 1.5 kV spikes lasting a few microseconds are not at all uncommon at G4FRX, and local thermostats, solid-state drill controllers and the like produce quite bizarre displays on the 'scope. PIV ratings of rectifiers become matters of rather more than academic importance in such circumstances! Also, of course, dV/dT suggests a bandwidth of many megahertz for such phenomena, so that decoupling capacitors, and capacitors across rectifiers, should be of quite low value to minimize their reactance and maximize their effectiveness. The VDR mops up the worst of the unwanted noise and spikes and, significantly, gets quite warm. Hence, also, the reason for the mains filter, which helps to reject some of the spurious mains-borne transients.

The rectifiers used for both the stabilised supply and relay/control voltage lines (one derived from each secondary) are 400v. 30A devices, which again represent some degree of overkill but were used in the interests of reliability and also because they were available. In passing, the author likes to test home-built equipment for 250 hours continuously at full load, in the belief that if it will stand that then a 24 hour contest will present no problem! The smoothing capacitors are 47000 μF 25v. units ex-computer power supply. Their working voltage needs to be chosen bearing in mind that the kind of regulator circuit used requires about 3v. more at its input than the regulated output required, *i.e.* for 12v. stabilised output a minimum of 15v. is needed. A 15v. winding on a transformer feeding a bridge rectifier and smoothing capacitor will produce around 15×1.414 (approx. 21.2v.) off load at the capacitor. So 25v. working is a good value for the capacitors. Too high a working voltage, however, does not produce any increase in reliability, since the capacitor tends to "form" at the voltage presented to it and with low-voltage high-capacity units a voltage much less than their specified working voltage tends to induce an apparent drastic loss of capacitance. In the present system, a secondary tapping of 16v. is used in fact, but the transformer primary is used at the 250v. tapping; the mains

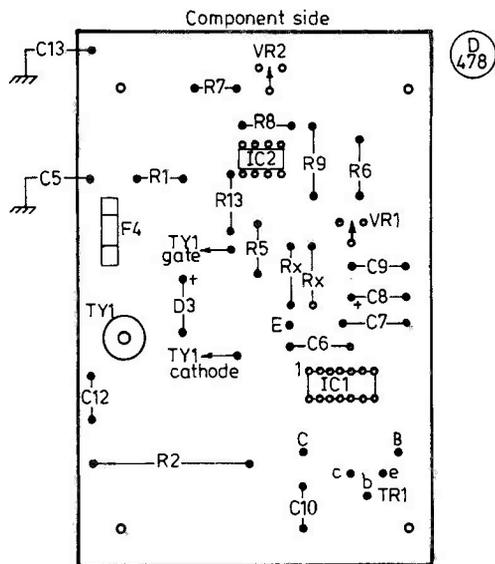


Fig. 2 POWER SUPPLY STABILISER BOARD

Points labelled C, B, E, on board connect to 2N3771's on rear heatsink.

at G4FRX are not quite that, so the secondary output is in practice about 15.5v on load. This still comes out nicely within the 25v. working voltage of the capacitors.

Stabiliser

We now come to the stabiliser unit, which is built on a printed circuit board, Figs. 2 and 3. Again, it is fairly conventional, but as always there is something to learn. The well-tried 723-plus-pass-transistor approach is used, with the basic circuit cribbed from the manufacturer's data sheet: an extra transistor is connected to form a Darlington pair with the pass devices. This is necessary because (and I apologise for perhaps labouring this point, but I have heard several people wondering *why* a supposedly stabilised supply is anything but — and overlooking it) the maximum output current of the 723 is 150 mA and the output current required is about 5A. This implies a current gain in the pass device of about 35, *i.e.* $5 \div 0.15$ (in fact, two devices are used in parallel here, simply because a heatsink with the pair already mounted was purchased at a rally for 50p — but this does not affect the reasoning). Now the specified current gain for a typical series pass transistor that one might use in this application, such as the popular 2N3055 or the 2N3771 used here is listed as "20-70". The essential point here is that at 4 or 5A the current gain is certainly going to be nearer 20 than 70, and indeed the highest figure out of a sample of twelve 2N3055 transistors measured at 12v. and 4A was 22. Hence simply connecting a 723 to a 2N3055 and expecting it to regulate to 10A will lead to some dismay! It might manage 1A with good regulation, but no more. So another transistor, in this case a BFX85 with an hFE of 70 is used in a Darlington pair configuration with the two parallel pass transistors, giving a total current gain

of approximately 70×20 , *i.e.* about 1400. This gives ample margin and excellent regulation, even at 5A. The figure for current limiting is arrived at by adjusting the value of R_x in the circuit diagram in accordance with the formula 'I' Limit = $0.65v. \div 'R'$ Limit; for 5A this suggests a value of 0.13 ohms. The author used two 0.25 ohm 3W wirewound resistors in parallel, which gives a value of 0.125 ohms (no doubt the extra resistance of the printed circuit board track and the author's soldering provides the other 0.005 ohms!). Whatever the truth of that assertion, the shack *Avo* on its 10A range, when placed across the output of the supply, indicates a needle-width under 5A, so the current limiting works well. In fact, the voltage does not drop at all until the load exceeds just over 4.8A, so, provided that heavy-gauge wire is used to convey the volts from the supply to the transverters, their 2A peak load is well within the capacity of the supply.

One logical question, especially since the reader will have noted the size and capacity of the transformer and rectifiers and the fact that the pass transistors used here are 2X2N3771 30A devices is "why limit the supply to 5A? Wouldn't it be a lot more useful if it could supply a higher current?" The reason is simply one of size and thermal conductivity of the heatsink and the maximum junction temperature of the pass transistors; these are the parameters that fix the current capability of a stabilised power supply much more definitely than the current rating of the devices. For most TO3 transistors which could be used in this circuit, the absolute maximum junction temperature is 200°C with, allowing for some safety factor, about 150°C as a sort of everyday do-not-exceed figure. Now even a fairly substantial heatsink of the *Redpoint* variety as used by the author has a thermal coefficient of 1.1 degrees C/W — in other words, if the ambient temperature is 20 degrees

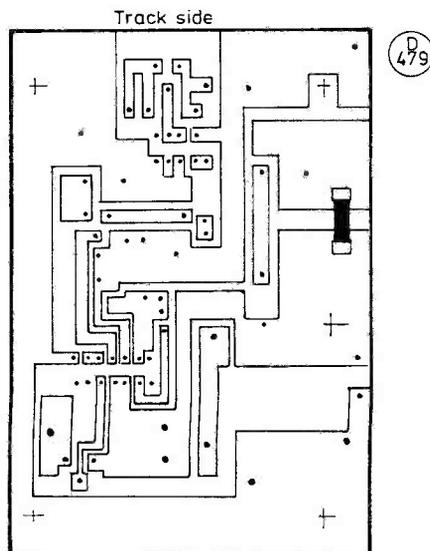
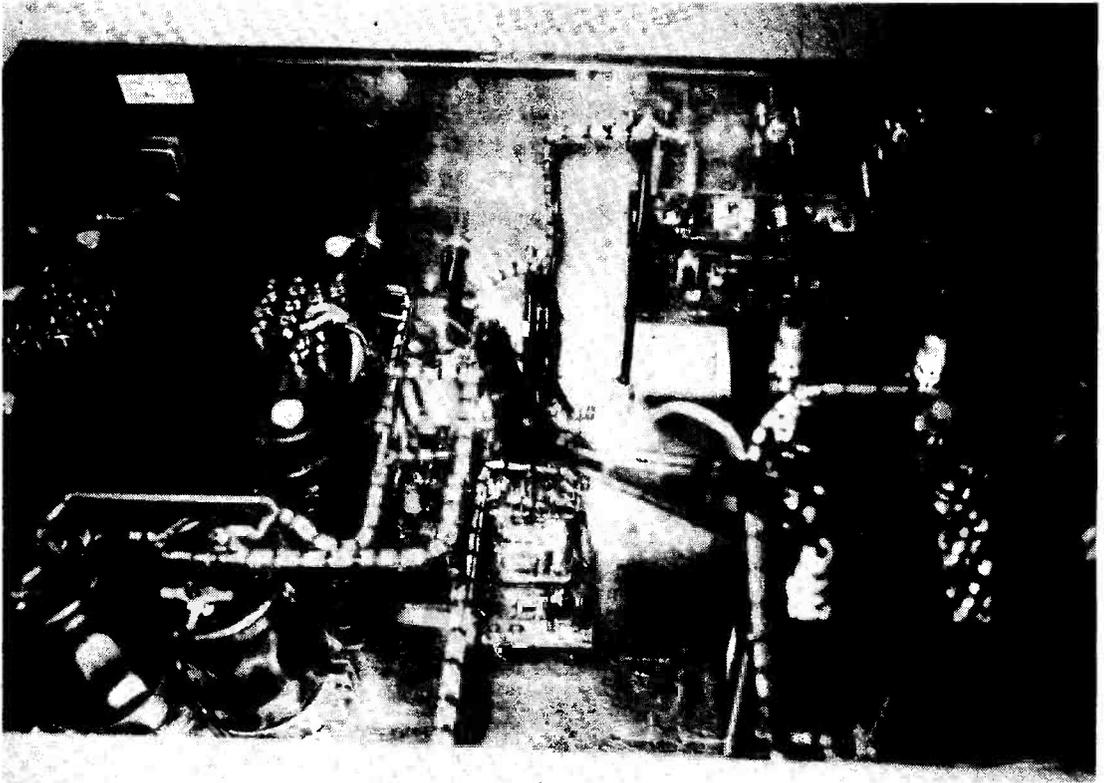


Fig. 3 POWER SUPPLY STABILISER BOARD

Black dots represent holes for component leads.



Inside view looking towards rear panel. Note PSU stabiliser board on stand-offs, with 1-ohm 25w. thyristor series resistor at top right of board. Holes in baseplate are for mounting AM transverter.

the allowable temperature rise of the heatsink is 130 degrees, which corresponds to a dissipation figure of $130/1.1 = 118W$. This is the absolute maximum that the output device can handle before its junction temperature will exceed 150 degrees, and note that this figure is *not related* to how much current the output device is listed as being capable of handling.

In practice, owing to the fact that the thermal connexion between the transistors and the heatsink is not perfect, its thermal coefficient may be degraded by its method of mounting, and also the fact that the ambient temperature in the back of a van on a summer afternoon half-way through VHF Field Day may well be nearer 30 degrees, this figure of 118W could well be derated. For the sake of the argument, let us assume that we have a figure of 100W to work with: in other words, that our 1.1 degree/W heatsink will permit that degree of dissipation before the pass transistors exceed their junction temperature ratings, or at least a safe figure. Now the worst case for the series-pass device is the short-circuit current-limiting condition (*i.e.* the 'Avo'-on-10A-range test previously mentioned). Here the transistor has to drop practically the total input voltage to the regulator

across itself at the limiting value of short-circuit current chosen by the designer. In this design, the input rail falls to about 16v. on full load, and it follows that the maximum available current would be $100W/16v. = 6.25A$. Note again that this figure has nothing whatsoever to do with the *current rating* of the transistor and everything to do with its maximum *junction temperature rating*. Therefore if, as here, a figure of 5A is chosen, the transistor has to handle 5A multiplied by about 17v. (*i.e.* the input rail voltage at 5A load) which is about 85W. This is well within the rating of the 2N3055 (115W) or the 2N3771 (150W) (let alone the two 2N3771's used here) so a single 2N3055 could quite well have gone on the same size heatsink as that used. VR1 is used to set the output volts — and in the interests of precision can be a helipot.

to be concluded

CLUBS ROUNDUP

By "Club Secretary"

A WEEK or two ago, the Old Man got a letter, in which the writer (an SWL, by the way) made it clear that he thought *Short Wave Magazine* would go down the pan unless we dropped "VHF Bands", "Clubs" and "CDXN" from our pages, in favour of lots of constructional articles with all the details on how to lay out the *Veroboard* and why Ohms Law applied to this and so on and so forth. Now this chap has been at SWL for a long time we reckon, and so it has probably escaped his notice that AM has disappeared in favour of SSB — which very effectively removes the old way in to the hobby, which was to have a listen to the short waves and then find a local operating amateur.

Thus, it is more than ever vital that we should have a piece for the SWL's and a piece for the clubs: indeed the latter is read from beginning to end by a very large number of readers (which the writer will admit to finding, in a way, a bit surprising). So . . . "Clubs Roundup" and "SWL" is primarily, but not exclusively, for the newcomer; "VHF Bands" and "CDXN" is intended mainly for the licensed operator, be he a 'raw recruit' or an old hand at the game.

Though we accept that a proportion of radio amateurs are, and always will be, loners, we also believe that the strength of the amateur radio movement, in this or any other country, is directly measurable by the number of clubs per million head of the population or some like ratio; and it is our duty to support these clubs as best we can, albeit of course within our limitations.

So — on to the letters!

Up North

Northern Heights have a place at Bradshaw Tavern, Illingworth, Halifax, every Wednesday evening.

At **Edinburgh**, the venue is the City Observatory, Calton Hill, where they are to be found on Tuesday evenings.

Scarborough have their place at the Cricket Club, North Marine Road, on Mondays; the first Monday is always a Surplus Sale, two are given over to talks or some such activity, and one to operating the club station.

In **York**, if their letters are anything to go by, they are a happy group of kindred spirits; they are booked in for each Friday evening except the *third* at the United Services Club, 61 Micklegate, York.

Back over the Border again, this time to **West of Scotland** who are based at 22 Robertson Street, Glasgow G2. They foregather on Friday evenings, alternating talks with chat-nights; and we understand their club shack has gear for both HF and VHF available.

Helensburgh are on a basis of first and third Wednesdays of each month, starting at 7.30 at East Clyde Street School.

The group known as **White Rose** is now based at Moor-town R.U.F.C., Moss Valley, King Lane, Leeds 17. The new Hq has paid off handsomely with the membership up to 125 now; they have a shack with rotary arrays for both VHF and HF, gear to match, and workshop facilities. Also,

of course the White Rose Rally at Lawnswood School starts the rally year off on March 30.

International

Here our first port of call just has to be with the **Ex-G Radio Club**, members of which are those born in UK but now domiciled abroad. If you come into that category, or know of anyone who does, you will be doing a good turn by joining — the Secretary's address is in the Panel.

Now **AMSAT-UK**; AMSAT is the group who get those *Oscars* up in the sky, and of course AMSAT-UK is the British arm of the group. Details from the Hon. Sec. at the address in the Panel.

RAIBC is the one that looks after all the blind and invalid folk who are in the hobby, either licensed or other SWL; these are the "full" members, but the other bit that matters is the Supporter and the Representative grade of member — the commitment can vary from nothing save the sub., right through to such tasks as taping 'Radial' or teaching RAE, servicing some gear, giving some of your surplus gear, or setting a full member with a shiny new licence into an operational condition by putting up aerials and so forth. Ask the Hon. Sec. — she knows!

Deadlines for "Clubs" for the next three months—

(May issue—March 28th)

June issue—April 25th

July issue—May 30th

August issue—June 27th

Please be sure to note these dates!

Next we have the **Royal Navy**, and the name is pretty well self-explanatory, except to add that the Merchant Navy or members of other navies are acceptable as associates. The *Newsletter* is one of the best and most consistent to cross this desk over the years, despite several changes in the editorship as RN affairs have dictated. Details from the Hon. Sec. — see Panel.

BARTG covers the devotees of RTTY on the amateur bands, whether as SWL or licensed; there is an annual convention, and of course the newsletter, which is a very good one. Again, the Hon. Sec.'s name and address is in the Panel.

"CQ-TV" is the title of the publication put out by **BATC**, in the interests of all those who are involved in amateur television, whether fast-scan or slow-scan, closed-circuit or over the air, black-and-white or colour, or even the "Narrow Band TV" of Baird and the BBC between about 1930 and 1935. If you are into this sort of world, you should really be a member.

West End

Plymouth first, and we hear they meet at Whitleigh Methodist School on alternate Mondays; and of course the Plymouth Rally on May 25 at Tamar Secondary School is occupying many of their thoughts at the moment.

Now to **Yeovil** at Building 101, Houndstone camp; they have a pretty comprehensive set of gear for the club call

G3CMH, a library of amateur radio books, and a lecture room for the talks which they aim to set up for each Thursday of the month (save for the final meeting in the month which is always set aside for a natter).

It's the second and fourth Wednesdays for **North Devon**; the former meeting is at the Pilton Community Centre, Barnstaple, while the latter one is *chez* G2FKO, 38 Clovelly Road, Bideford. Other interests of the group are Raynet and a local repeater group.

Loughor have Hq at Loughor Boating Club on the second Monday in each month; for details, please contact the Hon. Sec. at the address in the Panel.

At **Jersey** the venue is Quennevais Communicare Centre, and on April 9 there is a slide show to be watched.

Over to **North Bristol**, who have changed their venue; they now have a place at S.H.E.7, Braemar Crescent, Northville, Bristol 7 where, in addition to meetings, they have RAE and Morse classes. Incidentally, we note that the S.H.E. stands for Self Help Enterprise.

One group that always seems to have a good attendance is **Cornish**, at the SWEB Club Room, Pool, Camborne, on the first Thursday in each month: for April there is a talk by G3XFL on System Protection, set down to follow the AGM.

Over the water now; first we go to EI and the **IRTS Newsletter**, which tells all about the goings-on in the Emerald Isle — the Hon. Sec. will be pleased, we are sure, to help with information on the clubs and activities in EI. His address can be found in the Panel. Incidentally, if you want to know where all the EIs are, IRTS have just put out a full callbook of their own at 50p.

Into GI now, and a new formation called **Lagan Valley** Radio Society and operating from their Hq in the Scout Hall, Dromore. The routine is to have a formal meeting there on the second Monday, starting with a short talk or film, then a natter, ending with a session with the club HF gear.

Midlands

This is a large area to cover, and any geographical slips must be forgiven — though we try not to put clubs into the wrong area, we do sometimes come unstuck!

Let us pick up the thread on Merseyside, and first with **Liverpool**, who are to be found at the Conservative Rooms, Church Road, Wavertree every Tuesday evening. April 1 sees a talk by one "BF39" — doubtless it will have some theme suitable to the date! April 8 sees a Quiz and on 15th, the G6CJ tape-and-slide lecture on aerials will provide food for thought. April 22 sees a talk called "How I won the Constructional Contest," by the winner, and on 29th DJOPC/G4IHS will be telling the history of German amateur radio.

Now we come to the problem — two different clubs who both call themselves "Wirral". To avoid bias we will look at the older-established **Wirral** group, who are based on the Sports Centre, Grange Road West, Birkenhead, on the first and third Wednesdays of the month. April 2 is down for pre-NFD planning, and on 16th the date is to be decided.

The other group is based on the **West Kirby** Sports Complex on the second and fourth Wednesdays of each month, and programme details can be obtained from the Hon. Sec. at the address in the Panel. For clarity this club is down in our files as "Wirral (West Kirby)" but we do wish the two groups would get together to sort out the confusion

over titles, if only because one can imagine a newcomer wondering which is which!

It's not long since the **Malvern Hills** set-up came into existence, and we are informed they have a nice snug Hq at "The Star" in Cowleigh Road, North Malvern. Details from the Hon. Sec. (see Panel) as to what happens there on the second Tuesday of each month.

Every Thursday evening the **Nottingham** chaps crowd into their place at Sherwood Community Centre, Mansfield Road (which is opposite Woodthorpe Drive), the start time being 7.30. Two regular favourites are the Forum and the Activity Night, cropping up as they do each month in between the lectures, film-shows and whatever.

At **Ormskirk** they have a place in the Over-60's Hut, on Tuesdays, this venue being in Liverpool Road and opposite Christ Church.

Solihull were a bit unlucky with the post last time out and so we don't have the latest information. Not to worry though, we can tell you they have a place at the Manor House, High Street, Solihull, on the third Tuesday of each month — we guess their lecture on Microprocessors by G8KGV was quite an interesting one.

Over to **Worcester**, and the Old Pheasant Inn, New Street on the first Monday of each month — we understand the room has been getting better filled of late, so the gang must like the programme set out for them. It is an interesting thing that with many clubs we can sense which way things are heading when we read the first letter from a new Hon. Sec.

G2FKS writes to mention **Cambridge**, who have Fridays at the ATC Hq, 730 Newmarket Road. In general, lectures are alternated with informals, and an attempt is being made to cater specially for beginners and new members.

Although we have the dates for **Ipswich**, namely April 2, 9, 16, 23 and 30, we can't be sure where they are being held, as the School premises they use will be closed; so . . . the Hon. Sec., and his name and address are in the Panel.

Just as it is everywhere else, it is Spring in **Melton Mowbray**, by which time the members will be putting the finishing touches to their entries for the Construction Contest on April 18, at the St Johns Ambulance Hall, Asfordby Hill, Melton Mowbray.

We have often disagreed with the words of G3LEQ of the **UK FM Group Western**, but the current issue of their newsletter is both interesting and a breakthrough. It appears there has been some bother with piracy on GB3MP; and it seems that someone has had the savvy to talk to the pirates and why they pirate. This line has been taken to the length that in the current issue they are publishing a letter from a pirate saying just *why* he pirated — and although he was ready to put his name on the letter, UKFMGW stuck to its normal practice of just initials. In addition to that, an RAE class has been organised for these chaps, to the extent that any pirate who wishes to attend will not be barred by virtue of his piracy. We at "Short Wave Magazine" would like to see a copy of this newsletter's relevant parts *circulated to all clubs and RSGB groups*. To turn to the matter of UKFMGW themselves, they share Hq with the Warrington club, at Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Warrington, on the first Thursday of each month.

Kidderminster have just turned out their first issue of a newsletter, which is looking to be of the sort that lasts — the over-ambitious ones usually come unstuck. They meet

on alternate Tuesdays at Aggborough Sports and Social Centre, Hoo Road, and the start is at 8 p.m. *sharp*. Informals every Monday evening from 9.30 to closing time at Bellmans Cross Inn, Shatterford, and the strong ones go on to the local chinese restaurant afterwards.

119 Green Lane is the Hq address of the **Derby** group, where they are to be found on Wednesdays. April 2 is the monthly Junk Sale night, and on 9th they will have film and slide of the decade in retrospect. On 16th, an RSGB rep. will be talking about the RSGB and the members: we hope he doesn't forget G2CVV in the back row! April 23 is a "Night on the Air", and on 30th G4FFH will be talking about the use and abuse of rechargeable batteries.

Over to **Stourbridge** who are based on Longlands School, Brook Street, Stourbridge. They are a bit unlucky in having to scrub round the April 7 date which falls on Easter Monday, but they will be back in action for the main meeting on April 21.

Years ago, the **Norwich** club used to call themselves Norfolk, and we recall them as having a superbly produced newsletter, and of gatherings at "The Brickmakers Arms". Nowadays the venue is Crome Centre, Telegraph Lane East (which is not far from the railway station, on the A47 out to Great Yarmouth). G8TTB wrote in on their behalf, but says he is not the Hon. Sec. — so can we have the current Hon. Sec.'s name, address and phone number for the file, please? Meantime, drop in on them from about 7.30 onwards.

Now we head a bit to the North to **Bury** — we always wonder whether they should be north or Midlands — and their Hq at Mosses Youth and Community Centre, Cecil Street, Bury, every Tuesday, with a "special event" on the second Tuesday of each month. April 8 is down for a TVI seminar.

The **Cheltenham** crowd get together at the Old Bakery in Chester Walk, Clarence Street, where they may be found on the first Thursday and the third Friday in each month. This gives April 3 for G4CLF to talk about CB and the progress to date, and April 18 for a natter session.

At **Hereford**, the Hq is at the Civil Defence Headquarters in Gaol Street, Hereford on the first and third Friday in each month.

S.E. England

Acton, Brentford & Chiswick are pleased to find that nothing of their's was lost during the fire which demolished their Hq recently. They now are based on Chiswick Town Hall, where on April 15 they will have a talk on Workshop Constructional Aids by G3JGM.

Now **Salisbury** where the venue is the Activity Centre, every Tuesday. Incidentally, their records go back to 1924, when Sir Oliver Lodge was their Foundation Patron.

For **Maidenhead** we need an up-date; but the last date on the list in front of us shows an AGM so, maybe, a new committee will be setting to work on a new programme. Hq is still at the Red Cross Hall, The Crescent, Maidenhead. Not too easy for the stranger to find — from the A4 find a roundabout with 'Aegis House' on the Northerly side; turn off the roundabout to leave said House on your left, and the Crescent is on your left.

For **Reigate** we have it that they have their AGM on April 15, at the Conservative and Constitutional Centre, Warwick Road, Redhill.

At **Harlow** the place is Mark Hall Barn, First Avenue, every Tuesday evening. April 1 is given a boost with an All Fools Day Junk Sale; entry of £1 entitles one to take away any of the junk on display and similarly to sell one's own junk — privately only of course, not for the traders.

Barking next; Hq is at Westbury Recreation Centre, Westbury School, Ripple Road, Barking, on Thursdays. We haven't had an update so we can't tell you any more — but the Hon. Sec. appears in the Panel!

Would you believe it, but **Cheshunt** haven't sent in an update, and yet they have persuaded the Old Man to visit and give a talk — shame on you! Again, the Hon. Sec.'s name and address appear in the Panel.

Over to **Mid-Sussex**, and April 17 when they will be listening to a talk by G8SC, at Marle Place Further Education Centre, Leylands Road, Burgess Hill.

At **West Kent** they have a place in the Adult Education Centre, Monson Road, Tunbridge Wells; April 25 is the AGM. Informals are also held at the Drill Hall in Victoria Road on alternate Tuesday evenings.

Vange is the name of a group in **Basildon** who seem to enjoy their amateur radio without reporting their doings very much. However, in the course of a letter on their mobile rally date (September 7, St. Nicholas School) they mention that the Hq address is at Bastle Community Centre, Long Riding, Basildon, every Thursday evening.

Now to **Stevenage**, and their Hq at the British Aerospace Site B Senior Staff Canteen on the first and third Thursday of each month — more details from the Hon. Sec. at the address in the Panel.

100-plus paid-up members is the proud boast of the **Harrow** club; every Friday they foregather at the Harrow Arts Centre, High Road, Harrow Weald; it must be quite a large room or a tight squeeze! On a different note, a temporary editor produced the *Newsletter*, and we must say we haven't seen a better typing effort anywhere, and the reproduction does it justice, too.

On now to **Edgware** where they are to be found on the second and fourth Thursday in each month, at Watling Community Centre, 145 East Hill Road, Burnt Oak.

April 20 is the date for **East London RSGB** to foregather at Wanstead House, The Green, Wanstead at 3 p.m. on the third Sunday in each month, to listen to G3AMF talking about the early days of radio.

Next we go to **SE Kent YMCA Radio Club**, which seems to be synonymous with **Dover**. April 2 is the AGM, with a natter evening on 9th. April 16 sees Part 2 of a lecture on Test Gear by G8EGT, April 23 is an Activity Night, with the idea of working some of the Ws, and on April 30 they have a Fox Hunt.

It is some time since last we heard from **Clifton**, but we understand they still meet at 225 New Cross Road, which is opposite New Cross Bus Garage, every Friday.

Gradually digging into the pile, we come next to **Surrey** and their Hq at **T.S. Terra Nova**, 34 The Waldrons, South Croydon, where the AGM takes place on April 4. The informal will be at the same venue on 18th.

The April 30 programme for **Chiltern** was still to be settled at the time their *Newsletter* was being printed and we have no more recent 'gen'. However, we can tell you the Hq address which is the canteen of the John Hawkins Ltd. factory in Victoria Street, which is off that part of the A40 known as the West Wycombe Road.

Names and Addresses of Club Secretaries reporting in this issue:

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3 8LB. (01-992 3778)
- AMSAT-UK: R. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ
- AYLESBURY VALE REPEATER: R. E. Piper, G3MEH, 26 Finmere Crescent, Aylesbury HP21 7DG.
- BARKING: A. Sammons, G8IZN, 80 Lyndhurst Gardens, Barking, Essex IG11 5BZ. (01-594 2471)
- B.A.R.T.G.: J. Binning, G3AJS, 293 Perry Street, Billericay, Essex.
- B.A.T.C.: M. Cox, G8HUA, 13 Dane Close, Broughton, Brigg, South Humberside
- BOURNEMOUTH: G. R. Freeth, G4HFQ, 9 South Avenue, New Milton, Hants BH25 6EY. (New Milton 618092)
- BURNHAM BEECHES: Mrs. J. Britton, 12 Bulkeley Avenue, Windsor, Berks. (Windsor 61723)
- BURY: M. Bainbridge, G4GSY, 7 Rothbury Close, Bury, Lancs. BL8 2TT. (061-761 5083)
- CAMBRIDGE: D. Wilcocks, G2FKS, 19 Cavendish Avenue, Cambridge CB1 4UP. (Cambridge 47220)
- CHELTENHAM: G. Cratchley, G4ILI, 47 Golden Miller Road, Prestbury, Cheltenham. (Cheltenham 43891)
- CHESHUNT: R. E. Chastell, G8LNM, 4 Fairley Way, Cheshunt, Herts. EN7 6LG. (Waltham Cross 35393)
- CHILTERN: B. Catterall, G4IWC, 78 Fairacres, Prestwood, Gt. Missenden, Bucks. (Gt. Missenden 4504)
- CLIFTON: R. A. Hinton, 42 Sutcliffe Road, Welling, Kent.
- CORNISH: S. T. S. Evans, G3VGO, "Glengormley", Carnon Downs, Truro, Cornwall. (Deveran 864255)
- CRAWLEY: D. L. Hill, G4IQM, 6 Reigate Close, Pound Hill, Crawley, West Sussex RH10 3TZ. (Crawley 882641)
- CRAY VALLEY: P. J. Clark, G4FUG, 42 Shooters Hill Road, London SE3. (01-858 3703)
- CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London SE23 3BN (01-699 6940)
- DERBY: Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. (0332 56875)
- DOVER: K. A. Crouch, G8KEN, 14 Victoria Road, Capel-le-Ferne, Folkestone, Kent CT18 7HB (Folkestone 55241)
- EAST LONDON RSGB: R. Holmes, G3PKQ, 92 Dunedin Road, Leyton, London E10 5NJ (01-558 2928)
- EDGWARE: D. L. Lisney, G3MNO, 119 Draycott Avenue, Kenton, Harrow HA3 0DA. (01-907 1237)
- EDINBURGH: M. Darke, GM3KGG, 44 Inverleith Row, Edinburgh. (031-552 4593)
- EX-G CLUB: F. W. Fletcher, G2FUX, 53 St. Ives Park, Ringwood, Hants.
- FARNBOROUGH: I. Ireland, G4BJQ, 118 Mychett Road, Mychett, Camberley, Surrey.
- GUILDFORD: L. Bright, 4 Dagley Farm, Shalford, Guildford, Surrey. (Guildford 76375)
- HARLOW: A. C. Keeble, G4HPU, 4 Manor Cottages, Debden, Saffron Walden. Essex CB11 3JY.
- HARROW: C. D. Friel, G4AUF, 17 Clitheroe Avenue, Harrow, Middx. HA2 9UU. (01-868 5002)
- HELENSBURGH: A. McCudden, GM4DLU, Cruachan, 1 Balloch Road, Balloch G83 8SR. (Alexandria 56118)
- HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. (Hereford 3237)
- IPSWICH: J. Tootill, G4IFF, 76 Firecroft Road, Ipswich, Suffolk IP1 6PX. (Ipswich 44047)
- I.R.T.S.: G. Gervin, EI8CC, 185 Elton Court, Leixlip, Co. Kildare.
- JERSEY: C. I.: S. Smith, G3EZA, 19 Parade Road, St. Helier, Jersey, C.I. (Jersey 23249)
- KIDDERMINSTER: R. Manton, G4ILQ, 7 Osborne Close, Offmore Farm Estate, Kidderminster, Worcs. DY10 3YY. (Kidderminster 4930)
- LAGAN VALLEY: R. McClurg, G14ASR, 4 Alfred Terrace, Dollingstown, Craigavon, N. Ireland. (Lurgan 3173)
- LIVERPOOL: A. Neilson, G4CVZ, 79 Ackers Hall Avenue, Liverpool L14 2EA. (051 220 5470)
- LOUGHOR: T. Griffin-Thomas, GW8TYS, 'Riverside Manor', 77 Castle Street, Loughor, Nr. Swansea, W. Glamorgan. (Swansea 893392)
- MAIDENHEAD: J. Patrick, G3TWG, Bedford Lodge, Camden Place, Bourne End, Bucks. (Bourne End 25275)
- MALVERN HILLS: Hugh C. Nash, G8JAO, 3 Wilton Road, Great Malvern.
- MELTON MOWBRAY: R. Winters, G3NVK, 32 Redwood Avenue, Melton Mowbray, Leics. LE13 ITZ. (Melton Mowbray 3369)
- MID-SUSSEX: J. Brooker, G3JMB, 20 Farnham Avenue, Hassocks, Sussex.
- NORTH BRISTOL: W. G. R. Wilby, G2BSU, 10 Wolsley Road, Bristol BS7 8EN.
- NORTH DEVON: H. G. Hughes, G4CG, Crinnis, High Wall, Sticklepath, Barnstaple, Devon EX31 2DP.
- NORTHERN HEIGHTS: M. Topham, G8NUC, 1200 Great Horton Road, Bradford. (Bradford 73271)
- NORFOLK: P. W. Foster, G3VWQ, 12 Thor Road, Thorpe-St-Andrew, Norwich NR7 0JS. (Norwich 37709)
- NOTTINGHAM: M. C. Shaw, G4EKW, 30 White Road, Nottingham NG5 1JR.
- ORMSKIRK: J. K. Higgins, G4IGX, 8 Delph Top, Greetby Hill, Ormskirk L39 2DX. (Ormskirk 75546)
- PLYMOUTH: R. Hooper, G3SCW, Station House, Tavistock North, Tavistock, Devon PL19 0EW.
- R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 9 Rannoch Court, Adelaide Road, Surbiton, KT6 4TE.
- REIGATE: J. S. Roberts, G8FDJ, 15 Bakehouse Road, off Horley Row, Horley, Surrey.
- ROYAL NAVY: M. Puttick, G3LTK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants. PO8 8SQ. (Waterlooville 55880)
- SALISBURY: A. C. A. Newman, G2FIX, 74 Victoria Road, Wilton, Nr. Salisbury, Wilts. SP2 0DY.
- SCARBOROUGH: Mrs. M. A. Crofts, G4JQA, 43 Broadlands Drive, East Ayton, Scarborough, N. Yorks YO13 9ET.
- SOLIHULL: R. A. Hancock, G4BBT, 80 Ulleries Road, Solihull, West Midlands, B92 8EE.
- SOUTHGATE: J. Fitch, G8EWG, 16 Kent Drive, Cockfosters EN4 0AP. (01-440 7353)
- STEVENAGE: E. Godfrey, 94 Common View, Letchworth. (Letchworth 72184)
- STOURBRIDGE: C. Williamson G4IEB, 14 Lawn Street, Stourbridge. (Stourbridge 2006)
- SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR. (01-642 9871)
- SUTTON & CHEAM: G. Brind, 26 Grange Meadow, Banstead. UK FM GROUP (Western): G. L. Adams, G3LEQ, 2 Ash Grove, Knutsford, Cheshire WA16 8BB.
- VANGE: Mrs. D. Thompson, 10 Feering Row, Basildon, Essex.
- VERULAM: A. Clarke, G8MAE, 24 Kiln Ground, Hemel Hempstead, Herts. HP3 8EZ. (Hemel Hempstead 64751)
- WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent. (Sevenoaks 56708)
- WEST OF SCOTLAND: I. E. McGarvie, 3 Kelso Avenue, Paisley PA2 9JE.
- WHITE ROSE: R. R. Hughes, G4DZI, 3 Primley Park Crescent, Leeds LS17 7HY.
- WIRRAL: H. Crofts, G3DLF, 3 Barmouth Road, Wallasey. (051-638 2515)
- WIRRAL (West Kirby): I. Brooks, G8PMW, 59 Mosslands Drive, Wallasey, Merseyside L45 8PF.
- WORCESTER: M. Tittensor, G4EKG, 16 Durcott Road, Evesham, Worcs. WR11 6EQ. (Evesham 41105)
- YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

Sutton & Cheam have their AGM on Friday April 25, at Sutton College of Liberal Arts.

It seems a long time since last we heard from the gang at **Farnborough**; they still are based on the Railway Enthusiasts Club on the second and fourth Wednesdays, the start being, it would seem around 7.30, when the bar opens! The Hq is in Access Road, which in turn is off Hawley Lane, near the M3 Bridge. More details from the Hon. Sec. — see Panel.

That familiar duplicator tells us instantly that we are looking at the **Crystal Palace** newsletter; from it we glean the information that on Saturday 19 April they will be listening to Mike Bues, G8AAI, explaining how all this amateur television is done, and doubtless finding a way to demonstrate it.

It is odd that this month we find ourselves in the surprising position of having to refer you to **Verulam's** Hon. Sec. — see Panel — for dates and details of the April doings. The forms for this group are now at the Jubilee Hall, Catherine Street, St. Albans.

On to **Crawley** where we have a new Hon. Sec. to whom we can refer you to for the details on their activities at Trinity United Reformed Church Hall after the informal on April 9 — which is where the list stops!

We seem to have got ourselves into the doghouse with the **Bournemouth** Hon. Sec., and not unreasonably, as we got his call wrong! Sorry, Bob, we can't read our own writing! Anyway, we see from the newsletter that on April 4 there is a natter night or a VHF D/F by G8MCQ, while on April 18 there are all the amateur films to be shown — they must have amateur *radio* interest, it is noted!

At **Guildford**, we see a Junk Sale down for April 11, and the AGM on April 25, the venue being the Model Engineers Club in Stoke Park. Incidentally the gang are very much into the activity between the twin towns, Guildford and Freiburg, and members are looking out for Freiburg QSOs as and when they can.

For **Cray Valley** the latest *Newsletter* we have covers the AGM, on April 3, at Christchurch Centre, Eltham High Street, while the one on April 17 will be held in a pub called "The Greyhound". Work — then relax!

Many moon ago we heard once of **Burnham Beeches** club, and then — nothing. However, they still proceed quietly on their way on the first Thursday of each month at the St. Johns Ambulance Service Hall in Slough.

Southgate are to be found at the Scout Hut in Wilson Street, Winchmore Hill Green, on the second Thursday of each month, and this time it should be good fun, as Junk Sales always are! For this group it is one of the highlights of the year.

Our final letter is to mention the formation of the **Aylesbury Vale Repeater Group** and, as one of their projects, the formation of an amateur radio club. If anyone is interested, please contact the Hon. Sec. — see Panel.

Finis

For another month; and we would like to remind all Club scribes of the need for regular updating of information, and for the notification of any changes in Hon. Sec. for the Panel. All details to arrive by the date shown in the 'box' in the piece, addressed as always to "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts AL6 9EQ.

BOOK REVIEW

"TWO METRE ANTENNA HANDBOOK"

THESE days it is increasingly rare to meet a radio amateur who is using home designed and built equipment. In this affluent society the great majority buy items from the extensive range of excellent commercial gear and accessories. However, aerials remain one area where the challenge to develop a new concept and squeeze an extra dB. of gain here and there is still rife. Any book on the subject is worth reviewing.

VHF enthusiasts will be interested in Fred Judd's, G2BCX, *Two Metre Antenna Handbook* which comprises five chapters and a useful index. The first section deals with "Wave Propagation and Fundamentals," and is pretty basic stuff. Chapter 2, "Omnidirectional Antennas," includes the well-known *halo* and ground plane designs, the J-matched half wave and colinear aerials and the author's popular *Slim Jim*, the "Jim" derived from J-Integrated Match. This section would be of main interest to repeater and FM addicts who use vertical radiators.

The third chapter, "Directional Antennas," includes G2BCX's *ZL-Special* concept, originally developed for the HF bands in the 1950's. The basic two element version is described, along with the later five, seven and twelve element versions, the latter having a claimed gain of 13.5 dBd from a boom length of only 3.2 metres. These aerials are well suited to home construction and are excellently illustrated. *Quads*, *Yagis* and end-fire arrays and slot-fed aerials are covered, too, but a disappointing omission is any reference to the *Quagi* approach.

Chapter 4 entitled, "Matching and Feed Cables," covers the fundamentals of transmission lines and illustrates the common matching and *balun* ideas. A comprehensive table of coaxial cable data is included with cross references between BICC, Uniradio and Military numbers. Many people make a mess of fixing plugs to cables so the blow-by-blow account of preparing thin and thick coaxial cable for soldering to the "PL" type of VHF plug is a worthwhile inclusion. However, the plug shown is a PL-259, not PL-295.

The last chapter is called, "Antenna Performance" in which the author describes and illustrates his test equipment for evaluating aerial designs, which he does at 650 MHz. It includes a revealing graph showing the real VSWR readings *versus* indicated values, taking into account feed line loss. For example, if a 2:1 VSWR is indicated and the line loss about 3 dB., the real VSWR is 5:1.

The book is very readable, concise and authoritatively written and is to be recommended on its technical merit. The format is pocket-sized, 7 $\frac{1}{2}$ " x 4 $\frac{1}{2}$ ", with 157 pages and is one of the *Newnes Technical Book* series. The problem is the price, £4.35 including post/packing (from Publications Dept., S.W.M.), which seems far too high for such a production. After all, for £7.20, one can buy the complete *RSGB VHF/UHF Manual* in hardback, covering all VHF/UHF topics including a comprehensive chapter on aerials. The only really original material in Mr. Judd's book are his *Slim Jim* and *ZL-Special* designs.

N.A.S.F.

VHF BANDS

NORMAN FITCH, G3FPK

Award News

BRYN Llewellyn, G4DEZ, receives 2m. VHF Century Club Certificate No. 316 for operation from his latest Essex QTH. The necessary 100 QSL's were collected in just six months compared with the two years it took to accumulate those for his first award from a previous location. Initially, Bryn's station at Hullbridge comprised a Yaesu FT-225RD and Nag 144XL amplifiers feeding two, bayed 16-ele. Tonna aerials. The present set-up still uses the FT-225RD with muTek front end board, but the amplifier is now the Tempo 6N2, while only one Yagi at 35 feet is in use.

Gabri Hoek, PE1CHF, from St. Maartensdijk in Holland has been awarded 2m. VHFCC Certificate No. 317. Gabri was first licensed in July 1978 and is a student studying agriculture. Operation is restricted to weekends and holidays from his quiet, farm QTH with the nearest neighbours about one kilometre away. He uses a Yaesu FT-221R modified on the receive side with a BF900 and J310. Although he has good results working UK DX with his 15 watts and aerial only 10m. a.s.l. — the QTH is 2m. below sea level — he finds he gets a paltry 20% QSL return rate from stations up to 350 kms. distance. Those further away shown an 80% return. He is looking for E1, G1 and GM stations and the "X" squares.

All outstanding QTH Squares certificates have been issued although the stickers are still awaited by your scribe.

Beacon Notes

The Wrotham beacon GB3VHF (AL52j) on 144.925 MHz vanished on the evening of Feb. 21 due to a blown fuse in its power supply. It was back

on the air the following day. The Home Office has granted permission for the RSGB to establish a 50 MHz beacon in Anglesey but it will only be allowed to operate outside TV hours.

Satellite News

Satellite buffs are getting all ready for the launch of the first of the AMSAT Phase 3 birds, destined to become *Oscar 9*. The launch date is now given as May 20, between 1500 and 1800 UTC. It is planned to broadcast full coverage of the event from the station of WA2LQQ who will come on 28.880 MHz at 1400. If 10m. propagation is poor, the net will QSY to 21.280 or 14.280 MHz. He will have a direct line to Kourou in French Guiana.

A-O-9 now weighs 85kg. so the *perigee* of the final orbit will be between 1,500 and 3,000 kms. It arrived in Toulouse from Washington on Feb. 25 for integration with the *ARIANE* rocket. The journey to South America is due to start on April 9. After launch, *A-O-9* will be placed in a transfer orbit and it could be only 2½ weeks before the *Thiokol* single kick motor is fired to put it into its final orbit. Once a stable orbit is confirmed, AMSAT-UK will produce transparent overlays at modest cost as are available for *O-7* and *O-8*. By the time you are reading this, calendars of *O-7*, *O-8* and the weather satellites for April through June should be obtainable from AMSAT. The cost is £1.27 post free from AMSAT-UK at 94 Herongate Road, London, E12 5EQ.

Repeaters

At the time of writing, the Glasgow relay, GB3GL, on RB14 is off the air due to damage to its feeder. UHF repeaters GB3HO (Horsham) on RB14; GB3LC (Louth) on RB13; GB3MW (Leamington Spa) on RB10 and GB3WN (Wolverhampton) on RB0 were all due to commence operation in Feb. or early March. GB3MR (Park Moor) on RB14 was taken out of service on Feb. 29 for a complete rebuild. GB3NK on RB4 is now operational from its new, Wrotham location. GB3NX (East Grinstead) on RB2 is now back again after a rebuild. The Weymouth repeater, GB3SD, on RB14 has been re-located on higher ground, north of the town and is providing much better coverage. Finally, VHF relay GB3WT (Omagh

area) in Ulster on R7 is now back with its proper aerials.

Contests

Results; — The CW 70 MHz Contest on Jan. 20 was won by G3UKV with 209 points from 32 contacts. Runner up was G3XBY whose 34 QSO's were worth 160 pts., while G3BA came third with 131 pts. from 31 exchanges. There were 19 entries.

Coming events; — April 12 from 1600 to 2400 GMT sees the 1,296 MHz Contest. It is for either single operator or multi-operator entrants with scoring at one point per kilometre. The 432 MHz event takes place the following day from 0900-1700 GMT under the same rules except that radial ring scoring is to be used. This is an s.w.l. contest as well.

Teletype fans will be at it the following weekend, April 19/20, from 1800-1200 GMT in the first Spring BARTG VHF/UHF Contest. Exchanges to consist of; — Time of start of QSO in GMT, RST report, message number starting at 001 and continuing in sequence, QTH locator and QTH; e.g. 3 kms NW of Stafford. Radial ring scoring system. Bands are 144 and 432 MHz but no cross-band, repeater or satellite QSO's.

The weekend May 3/4 sees the 144, 432 and 1,296 MHz Contest from 1600 to 1600 GMT. Only one callsign may be used and simultaneous operation on two or three bands is not allowed. This is a single-op. and multi-op. event with single operators having to take a consecutive six hour break. Radial ring scoring on 144 and 432, but one point per km. on 1,296 MHz.

Amateur Television

Kevin McMahon, G8JJR (S. Yorks.) told your scribe of keen and growing interest in fast scan TV in the area. In S. Yorks., Notts. and Lincs. he reports four transmitting stations active on 70 cm. and that 144.4 MHz is used for multi-mode talk-back.

Four Metres

Jim Whittle, G3EKP (Lancs.) enters the annual table after an absence of several years and is one of several readers who report on the encouraging level of Sunday morning activity on 4m. He uses SSB. Ray Elliott, G4ERX (Essex) also mentions, "... evenings at about 8.00 p.m." He has added three more counties since

last month, G2OAK (Glos.), G3PWK (Cams.) and G4APA (Berks.).

Dave Thorpe, G4FKI (Essex) has now worked 100 stations on the band since last year and is looking for the QSL's for the VHFCC Award. During Feb., Arthur Breese, GD2HDZ, added another 5 counties and 2 countries for 1980 in the shape of G2AOK, G3EKP, G3IKR (Hereford); GM3WOJ (Dumfries) and GW4DRR (Gwynedd).

John Baker, GW3MHW (Dyfed) says, "Friday night is 4m. activity night." He mentions that G3LIT (Glos.) has ordered a new transverter so should be back on the band after a few years break. John asks us to mention again his nightly sked. at 2000 on 70.205 MHz with G2AOK and says they welcome all "breakers." He suggests the increasing activity could be due to growing disillusionment with 2m. Whatever the cause, it is important that the band is well used in a responsible way so that there is a sound case for its retention by the amateur service. On a practical note, having had his PA bias supply transformer go open circuit on the primary, John passes along the tip that frame output trannies from old valve TV sets make useful bias supply components. 240v. across the plate winding typically produce 30v. across the secondary. G3MOT is now back on the band, as are GW4BCD, G3PSP, G3BA, G4HRV, G3SPJ, G3BOC and G4ERP. John also reports an SSB QSO with G3DAH (Kent.)

Two Metres

Mike Allmark (Leeds) reckons there was not a lot to report in Feb. but mentions the 17th when EA1CR and EA1CV (XD) were copied very weakly, along with F1FH1 (ZH) and F1EWP (AG). The weak *Ar* on the 6th. produced SSB from G18RKC, GM8's DMZ and PEV and a few G's. On the 23rd., Mike heard EI2ACB and EI3DMB and the following day heard stations in 36 counties in G, GI, GJ, GM, GU and GW.

Bill Hodgson, G3BW (Cumbria) contributes his first entry to the 1980 table and got off to a good start with several rewarding MS QSO's in the Jan. *Quadrants*. So far, he has caught three *Ar*'s working SM's and LA's in CU, FT, HS, HT and IS squares, plus GM3JJJ (WS) and GW4EAI (Gwent) a region not nor-

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G8GML	11	74	122	207
G8HVY	12	73	130	215
G3JXN	36	73	94	203
G3COJ	24	66	93	183
G8LEF	22	62	101	185
GJ4ICD	—	54	150	204
G2AXI	2	54	93	149
G3VYF	—	51	136	187
G38KNV	—	46	118	164
G8ATK	3	41	93	137
G4ERX	1	41	72	114
G4HYD	—	40	83	123
G8LHT	7	39	98	144
G8KAX	—	39	63	102
GD2HDZ	12	37	74	123
G8HHI	—	36	102	138
G3SPJ	10	36	71	117
G4CMV	—	35	140	175
G3PBV	—	35	62	97
G3OHC	4	33	104	141
G8GXE	—	32	56	88
G4IJW	1	30	108	139
G4BWG	—	29	118	147
G4AEZ	5	29	61	95
G4GEE	—	28	60	88
G8IFT	14	27	68	109
G3FIJ	—	27	68	95
G3BW	3	26	120	149
I4EAT	—	25	238	263
GM4CXP	—	25	136	161
G3KPU	—	25	91	116
G8OPR	—	25	85	110
G18EWM	—	25	67	92
GJ3RAX	↓	24	67	92
G8KGF	—	18	92	110
G8ITS	—	16	56	72
EA3LL	—	15	137	152
G8LGL	—	15	87	102
G8MFJ	—	15	74	89
9H1CD	—	13	178	191
GM4COK	—	12	154	166
GM8NCM	—	12	84	96
G8PRG	—	12	39	51
9H1BT	—	11	163	174
G8JJR	—	9	78	87
G8KPL	—	7	84	91
G8JAG	—	7	78	85
G8ERG	—	6	161	167
G4FBK	—	5	98	103
G8KSP	—	2	76	78
G4AWU	—	1	105	106
G4GXT	—	1	56	57
G4GSA	—	1	50	51
G3POI	—	—	282	282
DK3UZ	—	—	210	210
G3IMV	—	—	206	206
G3CHN	—	—	183	183
G3SEK	—	—	179	179
G3FPK	—	—	158	158
G4IGO	—	—	126	126
G4IJE	—	—	124	124
G8IXG	—	—	104	104
G4DEZ	—	—	90	90
G6UW	—	—	88	88
G8LFJ	—	—	81	81
G4GET	—	—	72	72
G4GHA	—	—	67	67
G8JGK	—	—	50	50

Starting Date January 1, 1975. No satellite or repeater QSO's. "Band of the Month" 70cm.

mally heard in Whitehaven, it seems. Bill reports "bedlam" on 2m. during the March 1/2 contest with fantastic signals from GJ and northern French stations.

Dave Sellars, G3PBV (Devon) mentions the good lift across the Channel on Feb. 17 with EA1CV (XD) a good signal all day, as was EA1CR running a 7S-700. The following evening Dave worked F1EAN (AG). During the contest, conditions picked up early with AG, BH, CI, DK, EH and EI squares worked plus HB9MIN/P in DH. By contrast, propagation to the north was poor with QSB towards the end of the affair. G4ERX put up the 6-ele. *Quad* for the contest and hooked up a 4CX150A amplifier with which he worked 30 counties and 10 countries. Stations worked included F1KFN/P (BG); F6GAK/P (CH); HB9AMD/P (EH); HB9MIN/P (DH) and some Germans in EH and EI squares.

G4FKI has not done much on 2m. so far this year but expects to be back on SSB soon to improve matters. Some months ago, a station on CW signing G4GPK was causing deliberate interference. Your scribe and others soon established that the location was not Crowborough, Sussex, where Lyster Williams, the real G4GPK lives. He writes that he has no 2m. gear at all at present but has very occasionally operated on FM using borrowed gear, from Tonbridge, Kent.

Welcome to the column Gary Allitt, G4HNS, who enters the annual table with 86 points and with 4m. to come soon, as well. He found conditions in the March contest good and worked down to EH square. Ken Osborne, G4IGO (Bristol) caught the lift on Feb. 17 and worked EA1CV (XD) and F1CPX (AH). During the contest, best DX included F1EJZ (DH); DB2VZ/P (DJ); DC0MT/P (EI); HB9MIN/P (DH); DK0VL (EH); DL0EE/P and DB1TP, both in EI, and HB9AHD/P (EH).

The G4IJE team (Essex) which comprised Paul Turner, Bryn Llewellyn, G4DEZ, and a Dutch visitor, made 527 contacts in the contest during which Bryn heard OK1KIN/P. The SOCOM group used Steve Marsh's call G4BWG/P from AL45e and made 730 QSO's, quite a few into the "F" line of squares. On CW in this event, Ron Glaisher, G6LX (Croydon) worked way down to F5C1/P in BD72d, Dept. 11.

Tony Collett, G8GXE, was out portable with G8RZO/RZP at Stokenchurch (Bucks.) and reports that G8RZO/P made about 550 contacts worth about 4,100 points. 4 HB's were worked. Dave Cox, G8OPR

THREE BAND ANNUAL VHF TABLE
January to December 1980

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Countries	Countries	Countries	Countries	Countries	Countries	
G8OPR	—	—	60	17	35	6	118
GJ4ICD	—	—	52	13	35	8	108
G3BW	—	—	56	13	24	7	100
G8GXE	—	—	44	10	29	6	89
G4HNS	—	—	47	8	27	4	86
G4ERX	15	2	30	10	18	8	83
G3PBV	—	—	38	9	27	8	82
G3FPK	—	—	60	15	—	—	75
G3KPU	—	—	33	5	28	6	72
G4DEZ	—	—	41	15	—	—	56
G8KAX	—	—	21	8	20	6	55
G8JJR	—	—	28	7	19	1	55
G8JFT	—	—	19	4	19	6	48
GD2HDZ	8	3	8	3	22	2	46
G4IGO	—	—	30	15	—	—	45
G8RZA	—	—	32	9	—	—	41
G8MFEJ	—	—	27	5	5	2	39
G8HH1	—	—	4	5	21	8	38
G3FJ1	12	1	9	4	5	2	33
G3EKP	7	3	10	4	2	1	27
GM4CXP	—	—	16	7	—	—	23
G4FK1	10	1	6	1	3	1	22
GM4COK	—	—	4	9	—	—	13

(Hants.) still leads the 1980 table, his score of 118 being the highest April one since the new counties have been used. During the contest, his best DX was DK0VL and HB9AHD/P, both in EH square. Andy Markham, G8RZA (Essex) had a go in the contest and his list includes HB9MIN/P.

From Co. Antrim, Steven Ruff, G18EWM, writes that he has not been very active recently but did get on for the contest adding three new QTH squares; F1EKU/P (BH); F1EXJ/P (CH) and DK0FR/P (DH). Geoff Brown, GJ4ICD, worked DF7RX in F119c in the contest for square number 150 on the band. Conditions to the north were obviously good as he lists QSO's with GM8BDX (Borders); G14BWM (Antrim); G8UJA (Lancs.) and G3YVY (Cleveland).

A fairly average period at G3FPK. The weak AR of Feb. 6 was missed but another was discovered in the late evening of the 15th when SM4COK (HT56c) was worked on CW. Others heard included GM3J1J (WS69c) and GM3BOC/A (YS71e), QTF's being about 10°. Another weak Ar occurred between 2200 and 2245 on the 25th, best DX heard being SM4IVE (HT). As observed from the London area, conditions during the contest were better than expected. Even so, while strong signals were received from stations up to 800 kms. there seemed nothing beyond the "E" and "F" row of squares. This was mentioned by Dave Price, GW4CQT (Gwent) who reckoned it seemed somebody had erected a screen at that distance!

There was considerable ducting from Switzerland and the Black Forest area which passed over our heads. A lengthy QSO was monitored between DL0EE/P (E132h) and E12AWB (Limerick) which must be about 1,300 kms. While the German was S9, not a whisper was heard from the E1. This was at 2030 on the Saturday night. By contrast, at 0930 on the Sunday morning, E19Q (WM65d) was a loud signal amongst all the "crud" around the SSB calling frequency.

Seventy Centimetres

G3BW has found conditions this

year to have been exceptionally quiet. During the contest, Bill seems to have been too far north to catch the ducting into HB. His best DX was to F1EDT (BH) but, nearer home, he had a chat to Albert Latham, E16AS, in Dublin. At the moment, G3EKP only has FM capability but hopes to have a transverter for SSB later this year.

G3PBV picked up another 8 squares in the contest and reckons the power increase to 50 watts has helped. On Feb. 17 Dave worked some Channel Islands folk, F1CPX (AH) and F1FYH/P in ZI, who was using an Icom IC-402 hand-held 3-watts rig and quarter wave whip! In the contest, best DX was Claus Neie, DL7QY (FJ) and DK0VL/P (EH) as well as stations in BG, BH, BJ, CK, CL, CM, and DJ.

Mike Lee, G3VYF (Essex) complains that the contest rules allowed 2m. only as a single band entry which resulted in very little 70 cm. activity. Even so, he worked some nice Continental DX on the Saturday evening including DK0VL, DJ9HJ/P (FH); F1FYA/P (CI) and DK2FR/P (DH). On Sunday, F2OL/P in the rare BG square was worked. Mike showed your scribe a QSL from IW1AHH (DF15c) at the VHF Convention. The Italian heard him working F1DJY/P (CH) but could not raise him with 5

watts. His QTH is 1,282m. a.s.l. and he uses four 20-ele. Yagis with 18 dB gain and a BFR91 RF stage. Mike also reports that HB9BMC/P (EH73) is claiming the first HB to G1 70 cm. QSO made on March 2.

G4ERX worked EA1CR on Feb. 17 for a new square and country on the band. Ray lists DK0VL and F1EDJ/P (BH) for new squares during the contest. G4HNS (Notts.) was disappointed at the lack of 70 cm. contest activity but did connect with DK0VL. Only 7 stations were heard on the Sunday. G8GXE was out portable in the contest and found conditions to the southeast on Saturday good. Tony worked 136 stations worth 740 pts. in 9 countries and 23 squares. These included an HB9 and BG, BH, CH, EH and ZH squares. G8OPR's best contest DX was DK0VL and he heard GW4CQT working into HB9.

The contest provided GD2HDZ with 8 more 1980 counties in the fixed event on Feb. 3, followed by G14GVS (Antrim) on the 15th. G18EWM added 3 new squares in the March affair; F1EDJ/P (BH); F1EBN/P (BJ) and the ubiquitous DK0VL (EH). GJ4ICD says he copies the beacon in ZD square almost every day and can call into the

Amateur radio retailers who also stock "Short Wave Magazine" include:—D. P. Hobbs Ltd., Amateur Radio Shop (G4MH), Derwent Radio, Waters and Stanton Electronics, Amateur Radio Exchange.

70 cm. nets in AD, BC and BD squares.

Twenty-three Centimetres

On the Continent, the March 1/2 contest included 23 cm. Some U.K. operators took advantage of the good conditions on the Saturday and were rewarded with some very good DX. For example, David Butler, G4ASR (Hereford) worked DK0VL/P in EH on this band, to complete the hat trick, having already worked him on 2m. and 70 cm. Russell Stewart, G8BHH, was also hearing the HB9's in Wolverhampton.

The VHF Convention

This year's VHF Convention was probably the largest yet. More use was made of the Whitton School to accommodate the trade show which featured about 30 exhibitors. In addition, numerous groups, such as AMSAT-UK, Raynet, BAC and, of course, the RSGB were there. The exhibits ranged from high quality products to utter junk but the main attractions were those traders offering components. With companies frequently requiring handling charges, coupled with the now very expensive postal costs, it makes sense to shop for components, large and small, at this kind of event.

Crayford Electronics had the new *Microwave Modules* 1,296 MHz transmitters on display. The transmit section is versatile in that it can accommodate inputs from the driving source between 5 and 500 mW. or 10 watts through a supplied 15 dB. attenuator. Power output is 1.3 watts continuous and a 10 watts amplifier will be available later. The receive section has a noise figure of 2.9 dB. maximum. At under £160, it would seem this product could promote much more 23 cm. activity among those who are getting increasingly disillusioned with 2m.

The new firm of *muTek Ltd.* featured the FT-221/225 replacement "front end" board and a microstrip-line UHF bandpass TVI filter. New to the U.K. is the range of aerial combiners from *Kungsimport* (SM6CKU) in Sweden. Two and four port versions for 2m., 70 cm. and 23 cm. are available at between £23.50 and £29.75, excluding VAT and carriage. All are 50 ohm devices with kilowatt power handling capacity.

Your scribe had a long talk with Charlie Newton, G2FKZ, recently returned from a trip to Greece where he met Costas Fimerellis, SV1DH, one of the keen researchers into *Trans-Equatorial Propagation* at VHF/UHF. Charlie was manning the RSGB Propagation Studies stand and played a fascinating recording of the pulsed 28 and 144 MHz signals from southern Africa as received in Athens. SV1DH now has Greek government backing for this investigation into what part of the ionosphere carries VHF signals over such long distances and is making this *TEP* study the basis of his Doctorate degree.

Obviously, extreme accuracy is vital if any firm conclusions are to be made. To this end, the 2m. and 10m. beacons ZE2JV (Salisbury) are keyed simultaneously in phase with the atomic time standard in Pretoria. The time delays of the arrival of the signals in Athens are 30-plus milliseconds, this interval being measured by reference to the atomic time standard of the Mediterranean *LORAN* chain.

The multi-path, *Doppler*-spread signals sound "semi-aural" and a definite time pattern has been observed. It is possible to follow the paths of the heavily ionised blobs as they track across the Indian Ocean, the African continent and finally over the Atlantic Ocean. Indeed, so predictable was this progression when Charlie was with Costas, that SV1DH showed Nigerian TV on 62 MHz received on a domestic set with whip aerial at just the right time.

The numerous lectures were well attended although your conductor did not attend any this time. The main complaint is about the venues. Few people are satisfied with having to

wander between two separate locations. It may be only 400 yards, according to the Convention map, but it is a bit hard on one's aching feet.

Operating News

This is a plea to *all* operators to state where they are and where they are beaming to when calling "CQ." It never ceases to puzzle your scribe that this procedure is not adopted as a matter of course. Perhaps due to inexperience, many newer licensees seem to think there is some magic way their whereabouts can be determined. However, many old hands fail to state their locations.

There are quite a lot of pirates on 2m. particularly, especially on the repeaters. One can recognise some of the voices heard on the illegal CB 27 MHz band. A frequent ploy is to "borrow" someone's call and add; "stroke alternative" in an attempt to avert suspicion. Many do operate from alternative addresses, defined as "temporary premises" in Clause 9 (1) (b) of the licence. Clause 9 (4) clearly states one must broadcast the address of the temporary premises when contacting *each* station. Those operating -/A and not complying with this requirement should not complain if they are accused of being pirates.

Deadlines

That's it for April. Due to Easter, the deadline for the May copy is April 1 at Welwyn. For the June piece it is May 7 but bear in mind that the 5th. is the May Day holiday. Everything to; — "VHF Bands," *SHORT WAVE MAGAZINE*, 34 High Street, WELWYN, HERTS. AL6 9EQ. 73 *de* G3FPK

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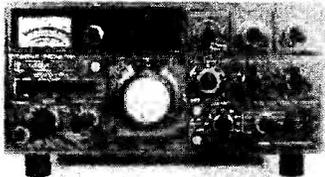
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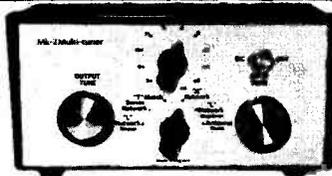
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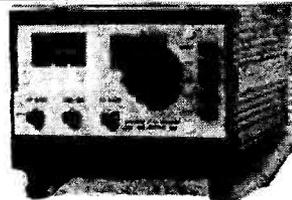
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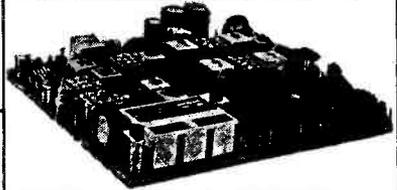
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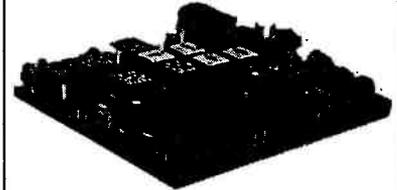
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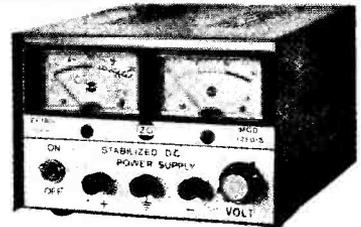


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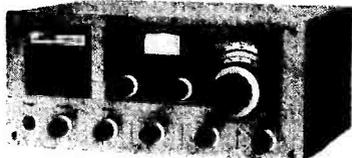
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KD1033B Turntable	£53.00
KD1500 Turntable	£55.00
KX530 Dolby Cassette	£116.00

PIONEER HI-FI

SX590 20w Receiver	£99.00
SX690 30w Receiver	£129.00
SX790 40w Receiver	£203.45
SA408 20w Amp	£59.90
TX408 FM Tuner	£59.90
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PL200x Turntable	£92.00
PL300x Turntable	£112.00
CTF500 Dolby Cassette	£89.00
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Securicor £3.50 extra on above.

FANTASTIC OFFER

FDK 2 m 1 watt Portable

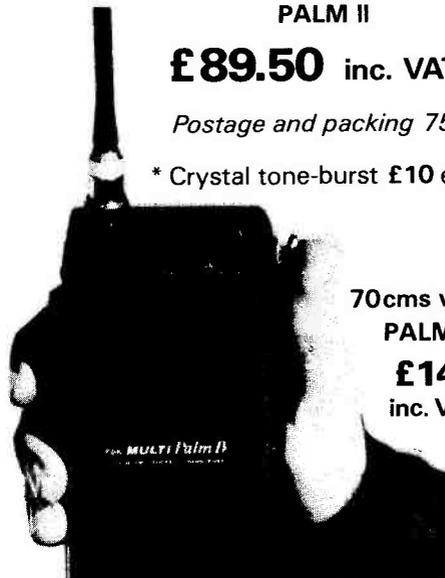
Complete with: Flexible antenna, ni-cads, AC charger, S20 and S22, cigar lighter, DC lead and 6 channel capability.

PALM II

£89.50 inc. VAT*

Postage and packing 75p.

* Crystal tone-burst £10 extra



70cms version
PALM IV
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inc. VAT

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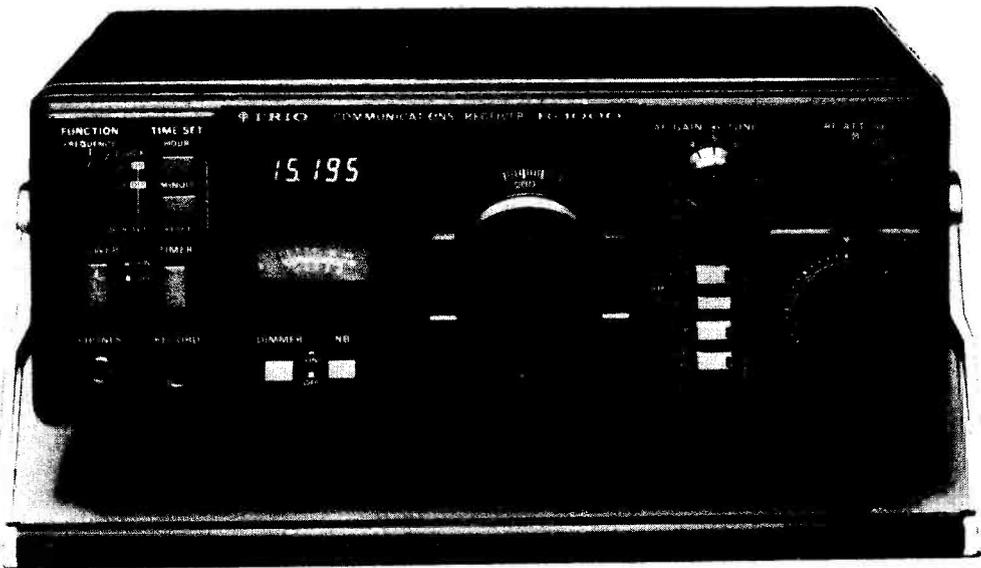
AGENTS: — G3PWJ (03844) 77778 G3WRA (0432) 67864 G8NMU (0272) 669454 G3XTX (0708) 68956 GM3GRX (0324) 24428

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A NEW EXPERIENCE — R1000



TRIO

R1000

TRIO

The R-1000 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.

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

To minimise front end overload, a step RF attenuator is included which gives 0-60dB 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 hard 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.

Up until now we have been taking orders on a waiting list system because of short supply of this item. Hopefully by the time you read this we will be able to supply from stock. And remember all our R1000 are given our full pre-delivery check and then despatched promptly to reach you within 24 hours of us receiving your order. That's real service! Just one of the many things that make more and more people come to us for all their amateur radio needs.

£298 inc. VAT

WATERS & STANTON ELECTRONICS



TRIO

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IN STOCK



DELIVERY ANY-
WHERE IN U.K.

STOP PRESS

TR9000 2m all mode £340 inc. VAT



ALL PRICES INCLUDE 15% VAT

☉ **TRIO**

TS120V £408

TS120S £495

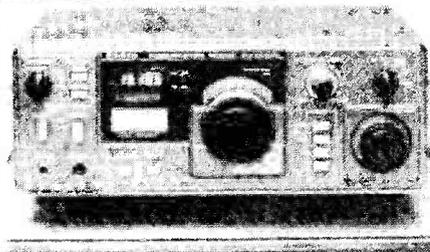
**SOLID STATE RIG
RELIABLE AT LAST**

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.



SPECIAL OFFER **TR7600 £220 + FREE MICROPROCESSOR**
144-148 mHz

Here's a really super deal. A brand new TR-7600 transceiver together with the RM76 microprocessor for £220. Full coverage 144-148mHz in 5kHz channels with 10 watts output gives you a highly versatile transceiver. The basic transceiver has plus and minus repeater shift tone-burst and memory. Plug in the microprocessor and you open up a new world of operating convenience. Electronic tuning up and down, full band scanning and 6 memories. The memories can be programmed at the touch of a button and then scanned. At £220 the transceiver is a first-class buy and if we offer you the RM-76 for nothing you'll have to admit that it's a bargain you won't see again.



NEW

☉ **TRIO**

R-1000 £298 inc VAT

At last the Trio R1000 has been announced — a real purpose-built receiver for the serious short wave listener. 200kHz to 30MHz in 30 bands. This receiver has many features that are not available on other models and, of course, has the technical backing of the world's largest manufacturers of amateur communications equipment. Features include: 1kHz digital readout and separate analogue dial, large high quality speaker, digital 12 hour clock — AM and PM, three separate filters for razor sharp selectivity, noise blanker (try finding this on any other receiver!), automatic preselector tuning via the 1MHz band switch, three-stage attenuator, dimmer control, tone control, timer circuit, and all this in a diminutive package measuring 12½ x 4½ x 8½ in. Trio have now solved the problem of choosing a receiver — there is no choice — it's got to be Trio!

KING OF THE PORTABLES

☉ **TRIO** **TR2300 £166 inc VAT**
NEW LOW PRICE!



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, 16 key touch-tone encoder, 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.

The TR2300 is a remarkable package which combines all the advantages of a portable station with those of a mobile transceiver. In many ways it's the ideal "starter rig" in amateur radio. Full band coverage from 144-146MHz in 80 x 25kHz channels plus 600kHz repeater shift and 1750Hz automatic tone-burst complete its versatility.

The dial is directly calibrated in frequency and has illumination for night use. The transmitter is exceptionally clean with an output power in excess of 1 watt. Receiver sensitivity is every bit as good as the best mobile rigs and either internal batteries or an external DC source may be used. Fits easily into a suitcase or on the corner of a desk and makes a really compact mobile rig. Price includes carrying case, shoulder strap, battery charger, external DC cord and, of course, the Waters & Stanton 12 month warranty. An absolute bargain — we even sell them to our staff!

WATERS & STANTON ELECTRONICS

FDK NEW UNITED KINGDOM SPRING COLLECTION!

MULTI 700EX 25 WATTS 2M FM 25 & 12½kHz CHANNELS PRIORITY SCANNING

Price
T.B.A.

Delivery expected
April



The Multi 700EX is the replacement for the Multi 700E, having an updated specification — without making it too complex for safety under mobile conditions! Its powerful 25 watts output has been retained together with the front panel continuously variable power control. The frequency range has been expanded to cover the entire band 144-146MHz in 25kHz steps. Of course, essential to all current equipment is its ability to operate on 12½kHz channel spacing and this you can do at the press of a button. Four priority channels that are user programmable have been added and these can be electronically scanned. The channels are not lost when the equipment is switched off! The stable crystal controlled tone-burst is automatic and both normal and inverse repeater operation is possible at the press of a button. By simple alteration of the diode matrix the plus 600kHz facility can be changed to 1.6MHz for operation through the proposed FDK 70cms transverter (in matching cabinet). Altogether a simple but highly effective mobile transceiver that provides everything you could wish for in a 2 metre FM mobile.

MULTI 750 15 WATTS FM/SSB/CW — EVERYTHING YOU NEED AT A VERY SENSIBLE PRICE!

**This rig will really set the pace for
1980 — wait until you hear the price!**

Delivery expected April



The Multi 750 is FDK's new, all mode 2 metre unit for both base or mobile use. Using the same cabinet dimensions as the M700EX, this really does provide the basis for an action-packed, go-anywhere station. To list all its features would be impossible in the space available on this page. However, we will list its main points so you can get some idea of just what this amazing package is capable of.

144-146MHz at 10 WATTS OUTPUT (Minimum!); ALL MODES — FM/USB/LSB/CW; REPEATER OPERATION — normal or reverse with automatic crystal controlled tone-burst; DUAL VFO's — these are selectable at the press of a button so that one vfo can be left at the SSB end of the band and the other at the FM end; NOISE BLANKER — a really efficient circuit to take out those ignition pulses on ssb; DUAL SPEED TUNING — enables 1kHz or 100Hz step tuning on SSB/CW and 1kHz or 5kHz steps on FM; RIT — essential for accurate tuning of the received SSB signal; LOW EFFECTIVE PRICE — at present we cannot tell you what the final price will be — suffice to say it will be extremely competitive — so much so that we would strongly recommend you to hold back on purchasing a similar unit until we unveil our SUPER LOW PRICE PACKAGE!

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MMV 1296 23cm Tripler	MMML 432 100W	MMC 144 2m converter	2.4-12-14-18-28MHz 70cm models with IF outputs of 28-14-18 or 144MHz.	
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FT901D	£710.00	YO901P	£280.00	YC7B	£60.00	FRG7D	£227.00
FT901DE	£700.00	SP901	£24.00	FP12	£67.00	YH55	£8.75
FT101Z	£500.00	SP901P	£44.50	FT202	£103.48	QTR24	£16.00
FT101ZD	£575.00	FL2100Z	£355.00	FT207R	£173.04	YP150	£55.00
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FC901	£115.00	FT225R	£445.00	NC-1	£16.50	Range of Yaesu Filters at £19.95	
FTV901	£245.00	CPU2500RK	£308.00	NC-2	£34.50		
		FT227RB	£229.00	FRG7000	£327.00		

All prices subject to 15% VAT

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IC701 transceiver and power supply	£781.74
IC215 2M portable	£140.87
IC202S 2M SSB	£173.04
IC255E 2M	£255.00
IC240 2M Transceiver	£188.00
IC260E 2M FM/SSB	£369.00
IC211E 2M FM/SSB	£477.39

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Asp 677 1/2 3dB 2m mobile	£13.50	Asp E667 70cm 5dB mobile	£16.90
Asp 393 1/2W 3dB 2m mobile	£17.00	Asp A659 UK 70cm 5dB base antenna	£22.00
Asp no hole boot mount	£3.70		

Post and Package: £1.00+ VAT 15%

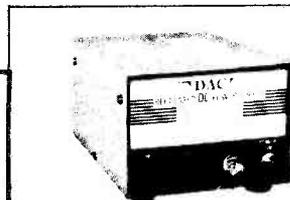
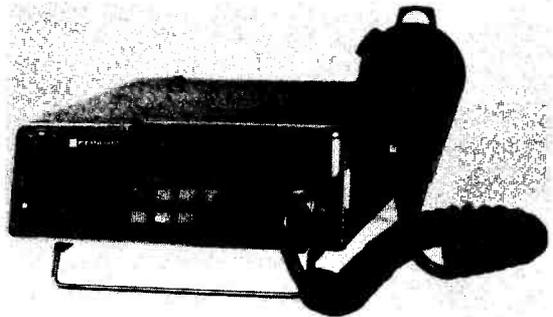
C8800 2m FM Mobile

The C8800 is a matching unit to the C7800 with the same features covering the 2m band in 5 or 25kHz steps (this is switchable from the rear panel). S20 and S22 are pre-programmed and available at a touch of a button, the unit has a 3 position RF gain to attenuate strong signals such as repeaters. Provision is made for two repeater offsets (600 kHz is fitted as standard) at £219.50 + VAT carriage free.

C7800 70cm FM Mobile

The C7800 is one of the most advanced mobile 70 cm transceivers available covering 430.00-440.00 a full 10 Mhz, in 25 kHz steps. Tuning is accomplished either by the main tuning control or with the Up/Down control on the mic. A Mhz button is provided to step the frequency up by 1 Mhz at a time to save hours of knob twiddling. Su20 is available at the touch of a button, two repeater offsets are supplied 1.6 Mhz and 4.6 Mhz for European use.

Just look at the features — ★ Digital readout ★ Easy to read display ★ Five programmable memories ★ Scanning of the band in 1 Mhz or memories stopping on in-use or vacant channels ★ Two speed scan rate ★ Tone burst ★ L.E.D. power and S meter 10 watts RF output ★ Back-up for memories ★ Spare button on front for user's use ★ at **£239.50 + VAT carriage free.**



PX402 13.8V DC 3amp continuous 4amp max fully stabilised power supply with overload protection **£19.95 plus VAT. P&P £1.00**



SWR25 This ever popular twin SWR and power meter covers 3.5-150Mhz at **£10.50** plus 15% VAT and 50p P&P.

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Belcom AMR217B (+ scan).....	£120.00
Bearcat 220.....	£241.00

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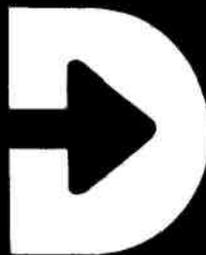
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Datong RF Speech Clippers add "punch" to your speech signal and help you get through where otherwise you wouldn't. Their low-distortion R.F. clipping technique helps in two ways.



Model A.S.P.

Firstly it allows your transmitter to radiate more useful average power and **secondly** it improves the intelligibility of your speech in difficult conditions.

The renowned fully automatic R.F. clipper **MODEL ASP** is now joined by a new manually operated R.F. clipper **MODEL D75**. This supersedes our original manually controlled unit, **MODEL RFC**, and offers the following additional features:

- Input monitor LED – lights when clipping is between 0 and 20 db.
- Power-on LED
- Low/High input impedance selector
- Stylish appearance to blend with any rig

Remember: all Datong R.F. clippers connect in series with your microphone. No internal connections are required. For R.F. clipping at minimal cost our **MODEL RFC/M** is still available. **MODEL RFC/M** is a fully assembled and tested R.F. clipper in PCB module form. You provide controls, case and power source.

Data sheets on all three R.F. clippers, including the new **MODEL D75**, are available on request. Price: Model D.75 £49.00 plus VAT (£56.35 total). Model A.S.P. £69.00 plus VAT (£79.35 total).

NEW



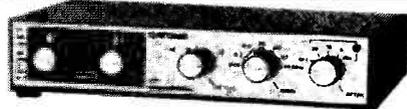
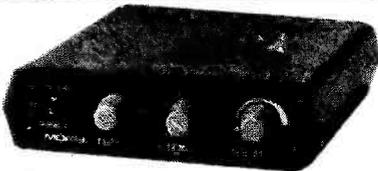
Model D75

MORSE TUTOR

Morse Tutor has a calibrated speed control **plus**, and this is vital, a separately adjustable delay between letters.

Start at, for example, 12 words per minute but with a two second delay and just reduce the delay as you improve. It delivers five character groups of letters, numbers, or both together. The sequence is random so the supply is unlimited!

All this plus portability, built-in loudspeaker, personal earpiece and key jack. Only £43.00 plus VAT (15%), inclusive price £49.45. Full data sheet free on request.



MODEL UC/1 UP CONVERTER

If you already own a good quality ten-metre or two-metre receiver or transceiver you are only £118 away from a really high performance general coverage receiver. Just add the magic ingredient, **MODEL UC/1** from **DATONG**!

You get full coverage in thirty synthesised 1 MHz segments from 60kHz (Rugby MSF) to 30MHz, at high sensitivity and with all the facilities and high performance of your existing rig!

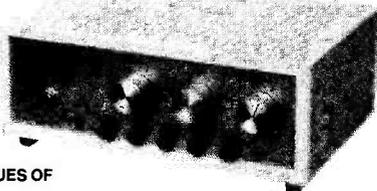
For good measure **UC/1** also adds two-metre coverage to ten-metre receivers. Price: £119.00 plus VAT (£136.85 total).

MODEL FL1

Frequency
Audio
Filter

AS REVIEWED
IN AUGUST ISSUES OF
"QST" and "73"

A versatile add-on unit for communications receivers which helps to extract wanted signals from background interference. It connects in series with the loudspeaker or headphones. The effect is similar to "I.F. pass-band tuning" for SBB/ or RTTY reception, and bandwidth down to 20Hz (with limited a.f.c.) gives an amazing capability for pulling weak CW stations out of the QRM. Model FL1 is unique in being able to tune itself when notching out unwanted whistles.
Price: £59.00 plus VAT (£67.85 total).



MODEL AD170 ACTIVE ANTENNA

For sensitive reception right through from MSF at 60 kHz to Band 1 TV DX around 50 MHz,

without the need for an antennae farm, **MODEL AD170** has no adjustments and needs no external tuning units.

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

Price: £33.00 plus VAT (£37.95 total); Special price complete with mains power unit: £37.00 plus VAT (£42.55 total).



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GAIN: 15dB NF: BETTER THAN 1.3dB
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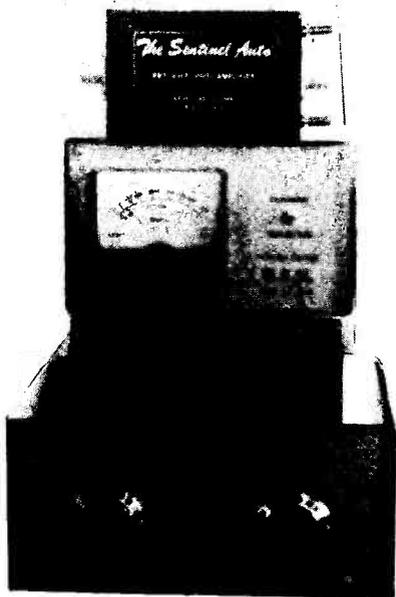
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THREE SENTINEL 2 METRE POWER/PRE-AMPLIFIERS

All are linear, ALL MODES. Switch straight THROUGH on receive. R.F. switching switches at .1 watt. Latest SWR protected power transistors. Receive J FET selected for 1dB N.F. 18dB gain, same circuit as Sentinel V.H.F. pre-amp (see below) SO239 sockets.

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SENTINEL 40 — Four times power gain, e.g. 10W in 40W out up to 16 watts drive. **£66.70.**

SENTINEL 100 — Ten times power gain, e.g. 10W in 100W out up to 16W input. **£126.50.** All in stock.

Note that all 'AUTO' pre-amps go to a 'straight through' condition when switched off.

SENTINEL 2 METRE PRE-AMPLIFIERS

The 2 metre units use a neutralised J FET circuit rather than the more common MOSFET or grounded gate J FET. This gives lower noise figures and higher gain. We select the J FETs for a 1dB noise figure and 18dB gain.

The noise figure of 2 metre receivers is usually 7-8dB and to overcome this noise we find the 18dB is necessary. We use 18 s.w.g. (1.22 mm) air spaced coils for high Q. These are both efficient and selective.

We have three models for your choice.

1. SENTINEL AUTO 2 METRE PRE-AMPLIFIER

For connection straight into the aerial lead and the r.f. switch changes over automatically between transmit and receive on any mode. See above for more detail. 12V nominal. Size: 1½" x 2½" x 4". Price: **£20.00* ex. stock.** 70 cm version **£23.00* ex. stock.**

2. PA5 AUTOMATIC 2 METRE PRE-AMPLIFIER

Same as the Sentinel Auto but for 240V mains operations in a pretty little case. Size: 3½" x 6½" front panel, 2½" deep. SO239 sockets. Price: **£28.75 ex. stock.**

3. SENTINEL STANDARD 2 METRE PRE-AMPLIFIER

Same performance as the Sentinel Auto but no r.f. switching. Price: **£13.22* ex. stock.** 70 cms version **£20.90* ex. stock.**

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2-40MHz, 15dB gain. Ideal units for pepping up receivers on 15 and 10, for OSCAR reception and as an ACTIVE AERIAL. 9-12V supply. Size: 2½" x 1½" x 3". We make the following two versions:

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SEM 70 70 cms to 2 metres — **£23.00.**

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TWO METRE — CRYSTAL RANGE

CRYSTAL FREQUENCY RANGE USE (Tx or Rx) and HOLDER	4 MHz-TX-HC6/U	6 MHz-TX-HC25/U	8 MHz-TX-HC6/U	10 MHz-RX-HC6/U	11 MHz-RX-HC6/U	12 MHz-TX-HC25/U	14 MHz-RX-HC25/U	18 MHz-TX-HC25/U	36 MHz-TX-HC6 & 25U	44 MHz-RX-HC6/U	44 MHz-RX-HC25/U	48 MHz-TX-HC6 & 25/U	52 MHz-RX-HC25/U	72 MHz-TX-HC25/U
OUTPUT FREQUENCY														
144.4 (433.2)	b													
144.480	c													
144.800	e													
144.850	e													
145.000/ROT	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.025/R1T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.050/R2T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.075/R3T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.100/R4T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.125/R5T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.150/R6T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.175/R7T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.200/R8T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.300/S12	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.350/S14	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.400/S16	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.425/S17	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.450/S18	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.475/S19	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.500/S20	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.525/S21	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.550/S22	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.575/S23	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.600/R0R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.625/R1R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.650/R2R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.675/R3R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.700/R4R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.725/R5R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.750/R6R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.775/R7R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.800/R8R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.950/S36	a	a	a	a	a	a	a	a	a	a	a	a	a	a

S18 and S19 are now added to our stock range

PRICES: (a) £1.95; (b) £2.32; (c) £2.80; (e) £3.94.

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

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JAPANESE AND AMERICAN EQUIPMENT We can supply crystals for YAesu (FT2F, FT2 Auto, FT224), most of the ICOM range and the TRIO-KENWOOD range. We can also supply from stock crystals for the HEATHKIT HW202 and HW17A.

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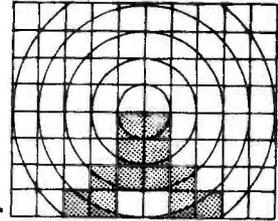
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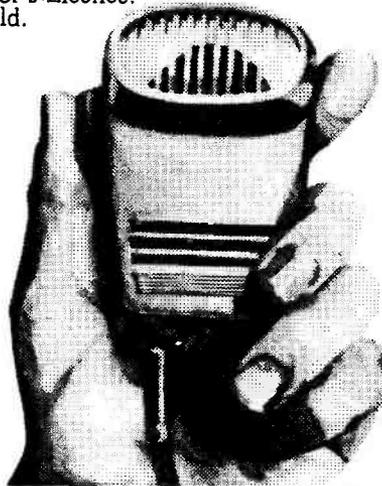
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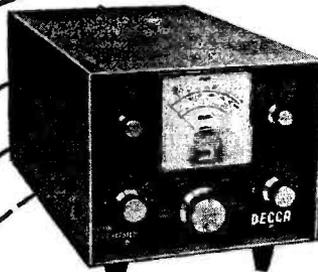
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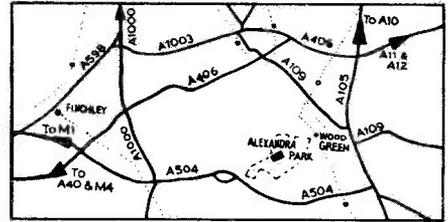


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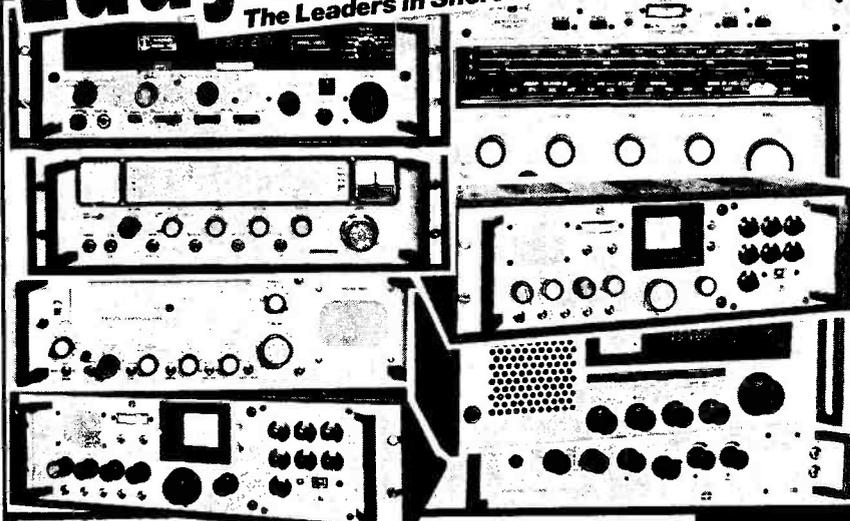
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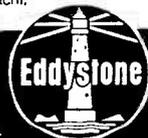
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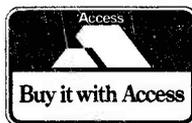
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