55p

The SHORT WAVE Magazine

VOL. XL JUNE 1982 NUMBER 4

160-10 Metres, with 150 kHz – 30 MHz general coverage receiver.
Covers all Amateur frequencies from 160– 10 metres, including new WARC, 30, 17, and 12 metre bands, on SSB, CW, FSK, and AM. Features 150 kHz – 30 MHz general coverage receiver. Separate Amateur band access keys allow speedy band selection. UP/DOWN bandswitch changes in 1 – MHz steps. A new, innovative, quadruple conversion, digital PLL synthesized circuit provides superior frequency accuracy and stability, plus greatly enhanced selectivity.

All solid state, 28 volt operated final amplifier.
The final amplifier operates on 28 VDC for lowest IM distortion. Power input rated at 250 W on SSB, CW, and FSK, and at 80 W on AM. Final amplifier protection circuit with cooling fan, SWR/Power meter built-in.

Automatic antenna tuner, built-in.
Available with AT-930 antenna tuner built-in, or as an option. Covers Amateur bands 80– 10 metres, including the new WARC bands. Tuning range automatically pre-selected with band selection to minimize tuning time. "AUTO-THRU" switch on front panel.

CW full break-in.
CW full break-in circuit uses CMOS logic IC plus reed relay for maximum flexibility, coupled with smooth, quiet operation. Switchable to semi-break-in.

Dual digital VFO's.
10-Hz step dual digital VFO's include band information. Each VFO tunes continuously from band to band. A large, heavy, flywheel type knob is used for improved tuning ease. T.F. Set switch allows fast transmit frequency setting for split-frequency operations. A = B switch for equalizing one VFO frequency to the other. VFO "Lock" switch provided. RIT control for ±9.9. kHz receive frequency shift.

Eight memory channels.
Stores both frequency and band information. VFO-MEMO switch allows use of each memory as an independent VFO, (the original memory frequency can be recalled at will, or as a fixed frequency. Internal Battery memory back-up.

Dual mode noise blanker ("pulse" or "woodpecker").
NB-1, with threshold control, for pulse-type noise.
NB-2 for longer duration "woodpecker" type noise.

SSB IF slope tuning.
Allows independent adjustment of the low and/or high frequency slopes of the IF passband, for best interference rejection.

CW VBT and pitch controls.
CW VBT (Variable Bandwidth Tuning) control tunes out interfering signals. CW pitch controls shifts IF passband and simultaneously changes the pitch of the beat frequency. A "Narrow/Wide" filter selector switch is provided.

IF notch filter.
100-kHz IF notch circuit gives deep, sharp, notch, better than – 40 dB.

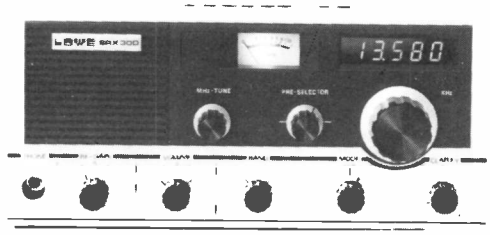
Audio filter built-in.
Tuneable, peak-type audio filter for CW.

TS930S	£1078 inc VAT
AT930	£ 125 inc VAT
SECURICOR CARRIAGE	£ 5.00

A familiar name, but a whole new receiver behind it. Outstanding new features are:

- Extended coverage 200 KHz-30MHz.
- Digital readout in large green display units which give true unambiguous frequency information — even when you switch sidebands or use the clarifier.
- All new frequency synthesis using Plessey SL 1600 series ICs for a new high standard of performance.
- All new audio system which produces outstandingly good quality on the built in speaker, and is capable of driving external hi fi speaker units for even better sound.
- All new IF filters with optimum bandwidth for mode in use. Automatic filter selection from mode switch.

We predict that the SRX30D will be a landmark in low cost, high performance SWL receivers. Just consider how much you should pay for a receiver covering 200 KHz-30 MHz with accurate digital readout; high performance USB/LSB/AM with switched filters; drift cancelling frequency synthesis; built in mains supply and built in speaker; high quality construction and advanced design — and so much more.



SRX 30D £215.00 inc VAT. Securicor carriage £5.00.

The NRD515, complete with the optional 24 channel memory unit and speaker, was a superb piece of equipment for the dedicated shortwave listener.

Now with the arrival of the 96 channel memory unit, which is available at £198.00, (the same price as the 24 channel unit was sold for), JRC have provided the ultimate in shortwave receivers. The NRD is a PLL-synthesised communications receiver of the highest class featuring advanced radio technology combined with the latest digital techniques.

The new NRD515 is full of performance advantages, including general coverage, all modes of operation, PLL digital VFO for digital tuning, direct mixing, pass-band tuning, etc. JRC's 65 years of radio communications experience will give you "the world at your fingertips". The NRD515 is but a single item from the JRC product range which extends all the way to full marine radio installations for supertankers.

NRD 515 £1090.20 inc VAT. Securicor carriage £5.00.

The TR-7730 is an incredibly compact, reasonably priced, 25-watt, 2-meter FM mobile transceiver with five memories, memory scan, automatic band scan, and other convenient operating features.

TR-7730 FEATURES:

- **Smallest ever TRIO mobile**

Measures only 5¾ inches wide, 2 inches high, and 7¾ inches deep. Mounts even in the smallest car, and is an ideal combination with the equally compact TR-8400 synthesized 70-cm FM mobile transceiver.

- **25 watts RF output power**

HI/LOW power switch selects 25-W or 5-W output.

- **Five memories**

May be operated in simplex mode or repeater mode with the transmit frequency offset ±600 kHz. The fifth memory stores both receive and transmit frequency independently. Memory backup terminal on rear panel.

- **Memory scan**

Automatically locks on busy memory channel and resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.

- **Automatic band scan**

Scans entire band in 5 kHz or 25 kHz steps and locks on busy channel. Scan resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.

- **UP/DOWN frequency control from microphone**

Manual UP/DOWN scan of entire band in 5 kHz or 25 kHz steps is possible.

- **Offset switch**

Allows VFO and four of five memory frequencies to be offset ±600 kHz for repeater access or simplex.

- **Four-digit LED frequency display**

Indicates receive and transmit frequency.

- **S/RF bar meter and LED indicators**

Bar meter of multicolor LEDs shows S/RF levels. Other LEDs indicate BUSY, ON AIR, and REPEATER offset.

- **Tone switch**

TR 7730 £247.94 inc VAT. Securicor carriage £5.00.

handability TR 2500

The TR-2500 is a compact 2 metre FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan and Hi/Lo power switch.

TR-2500 FEATURES:

- Extremely compact size and light weight 66 (2-5/8) W x 168 (6-5/8 H x 40 (1-5/8) D, mm (inches), 540g, (1-2lbs) with Ni-Cd pack.
- LCD digital frequency readout, with memory channel and function indication.
- Ten channel memory, includes "M0" memory for non-standard split frequencies.
- Lithium battery memory back-up built-in, (estimated 5 year life) saves memory when Ni-Cd pack discharged.
- Memory scan, stops on busy channels, skips channels in which no data is stored.
- UP/DOWN manual scan in 5kHz steps.
- 2.5W or 300mW RF output. (HI/LOW power switch.)
- Programmable automatic band scan allows upper and lower frequency limits and scan steps of 5kHz and larger (5, 10, 15, 20, 25, 30kHz . . . etc) to be programmed.
- Slide-lock battery pack.
- Repeater reverse operation.
- Keyboard frequency selection across full range.
- Frequency coverage, 144.000 to 145.995 MHz.
- Optional power source, MS-1 mobile or ST-2 AC charger/power supply allows operation while charging. (Automatic drop-in connections.)
- High impact plastic case.
- Battery status indicator.
- Two lock switches for keyboard and transmit.

STANDARD ACCESSORIES

- Flexible rubberized and antenna with BNC connector.
- 400mA heavy-duty Ni-Cd battery pack.
- AC charger.

TR 2500	HANDHELD TRANSCEIVER	£207.00
ST 2	BASE STAND/CHARGER	£46.23
SC 4	SOFT CASE	£12.19
MS 1	MOBILE STAND	£28.29
SMC 25	SPEAKER/MIKE	£14.49
PB 25	NICAD PACK	£22.31
LH 2	LEATHER CASE	£21.39

portability TR 2300

So the TR2300 now costs less than its predecessor did in 1976. Not only that, the TR2200GX of 1976 only had 12 channels where the TR2300 of today covers the full amateur band.

So we rest our case — the TR2300 has to be, in today's market, outstanding value for money and, what is more, the TR2300 has an unprecendented reliability factor.

There is no need to talk of full 2 metre band coverage, the 1 watt of perfect transmitted signal, the fully comprehensive list of included accessories: carrying case, Nicad charger, 12 volt power cord, shoulder strap, hand microphone, collapsible whip antenna, reverse repeater facility, automatic tone burst, switchable illuminated frequency dial, consequent long life operation out in the field.

Don't ask us about the Trio TR2300 — ask our best form of advertisement: one of the 5,000 owners!

TR2300 PORTABLE TRANSCEIVER £166.75
Securicor Carriage £5.00

HEAD OFFICE AND SERVICE CENTRE
Chesterfield Road, Matlock, Derbys. Tel. 0629 2817 or 2430.
Open Tuesday-Friday 9-5.30, Saturday 9-5.00. Closed for lunch 12.30-1.30.
For all that's best in ham radio, contact us at Matlock.
For full catalogues send 70p in stamps with your address. Mark enquiry SWM.

LE

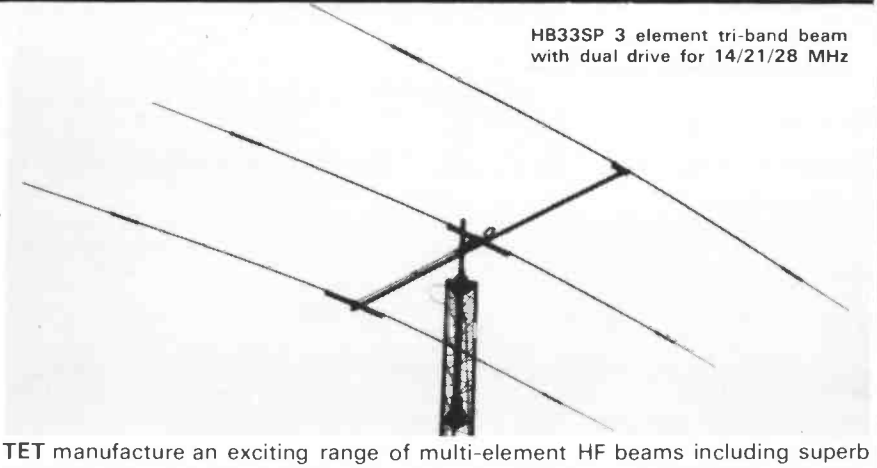
TET ANTENNA SYSTEMS

THE ANTENNA WITH THE DIFFERENCE

TET HF antennas are unique in that they employ dual driven elements with the following distinct advantages—

- Improved gain over conventional arrays.
- Broader bandwidth with lower SWR.
- Enhanced front to back ratio.
- Better matching into solid state transceivers without an A.T.U.
- High power handling capacity.

TET SOLE AGENTS

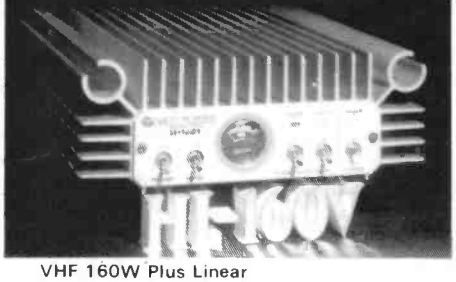


HB33SP 3 element tri-band beam with dual drive for 14/21/28 MHz

TET manufacture an exciting range of multi-element HF beams including superb monobanders plus HF verticals. Also there is a full range of VHF/UHF antennas most of which have multi-element drive or distinctive technical features.

NEW from TOKYO HY-POWER LABS

HL-160V



VHF 160W Plus Linear

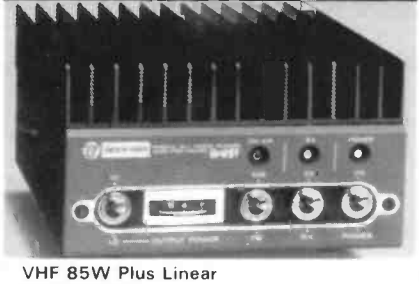
FEATURES:

160W output achieved with a pair of rugged MRF247 transistors. Drive requirement as low as 10W or 3W from hand-held. Selectable hi/lo output. Newly designed effective heat sink and high reliability one board construction.

SPECIFICATION:

Freq. Band: 144-146MHZ, **Mode**: FM-SSB-CW, **Supply Voltage**: DC 13.8V neg. ground, 12-23A, **Output**: 160W, **RF Input**: 1-15W (or 0.5-3W), **Receive Pre-amp**: 12 dB gain with low-noise 2SK 125 JFET, **In/Out Connectors**: SO-239 (50 ohm), **Built-in Circuitry**: COX, remote-control terminal, hi/lo output select, output power meter, reverse polarity protection, **Dimensions**: 218W x 82H x 299D (m/m), **Weight**: 3.5 kgs.

HL-82V



VHF 85W Plus Linear

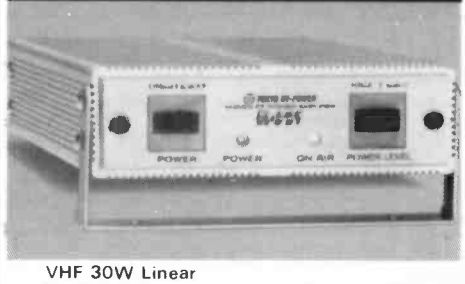
FEATURES:

A compact 144MHZ band amp. with receive preamp and power output meter.

SPECIFICATION:

Freq. Band: 144-146MHZ, **Mode**: FM-SSB-CW, **Supply Voltage**: DC 13.8V neg. ground, 13A max., **Output**: 35-85W, **RF Input**: 2-12W, **In/Out Connectors**: SO-239 (50 ohm), **Built-in Circuitry**: COX, remote control terminal, receive preamp (MOS FET 12dB gain), output power meter, output select (hi/lo), reverse polarity protection, **Dimensions**: 152W x 92H x 217D (m/m), **Weight**: 1.8 kgs.

HL-32V



VHF 30W Linear

FEATURES:

A compact and light-weight 144MHZ band amp with 30W output. Drive power of 1W to 5W from hand-held radio. Hi/Lo output selection.

SPECIFICATION:

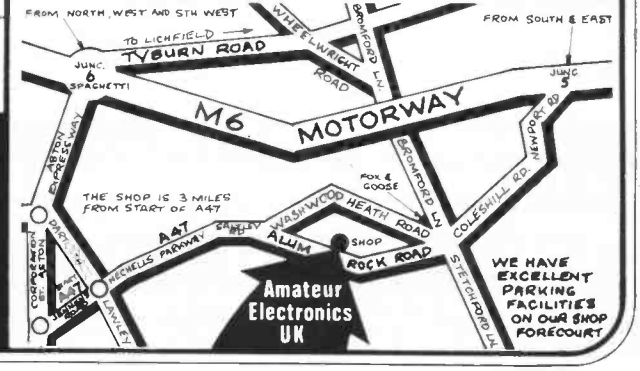
Freq. Band: 144-146MHZ, **Mode**: FM-SSB-CW, **Supply Voltage**: DC 13.8V neg. ground, 4A max., **Output**: 25-30W, **RF Input**: 1-5W, **In/Out Connectors**: SO-239 (50 ohm), **Built-in Circuitry**: COX, output select (hi/lo), reverse polarity protection, **Dimensions**: 100W x 30H x 158D (m/m), **Weight**: 520g.

● An S.A.E. will bring you full details.

Access — Buy it with Access

BARCLAYCARD VISA

WHERE TO FIND US



Amateur Electronics UK
508-516 Alum Rock Road · Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 337045
Opening hours: 9.30 to 5.30 Tues. to Sat. continuous – CLOSED all day Monday.

YAESU TRANSCEIVERS

FT-ONE	1,295.00
FT-902	885.00
FT-102 AM/FM	t.b.a.
FT-101ZD FM	665.00
FT-101ZD AM	650.00
FT-101Z FM	590.00
FT-101Z AM	575.00
FT-107	725.00
FT-707	589.00
FL-2100 Linear Amp	425.00
FT-480 VHF	379.00
FT-290 VHF	249.00
FT-230 VHF	239.00
FT-790 UHF	t.b.a.

YAESU RECEIVERS AND ACCESSORIES

FRG-7	189.00
FRG-7700	329.00
FRG-7700M	409.00
FRT-7700 ATU	37.00
FRV-7700A Converter	68.00
FRV-7700B Converter	75.00
FRV-7700C Converter	65.00
FRV-7700D Converter	72.00

ICOM

IC-720A, IC-730, IC-451, IC-251, IC-290, IC-25E, PS-15, IC-2E, IC-4E — Prices on application

TRIO

TS-930 TS-530 TS-830 PS-30 — Prices on application

All other TRIO models available

MICROWAVE MODULES

MMT144/28	2M Transverter for HF Rig	99.00
MMT432/28S	70cm Transverter for HF Rig	149.00
MMT432/144R	70cm Transverter for 2M Rig	184.00
MMT70/28	4M Transverter for HF Rig	115.00
MMT70/144	4M Transverter for 2M Rig	115.00
MMT1296/144	23cm Transverter for 2M Rig	184.00
MML144/25	2M 25W Linear Amp (3W I/P)	59.00
MML144/40	2M 40W Linear Amp (10W I/P)	77.00
MML 144/100S	2M 100W Linear Amp (10W I/P)	129.00
MML432/20	70cm 20W Linear Amp (3W I/P)	77.00
MML432/50	70cm/50W Linear Amp	119.00
MML432/100	70cm 10/100W Linear Amp	228.64
MM2000	RTTY to TV Converter	169.00
MM4000	RTTY Transceiver	269.00
MMC50/28	6M Converter to HF Rig	27.90
MMC70/28	4M Converter to HF Rig	27.90
MMC144/28	2M Converter to HF Rig	27.90
MMC432/28S	70cm Converter to HF Rig	34.90
MMC432/144S	70cm Converter to 2M Rig	34.90
MMC435/600	70cm ATV Converter	27.90
MMK1296/144	23cm Converter to 2M Rig	59.80
MMD050/500	500MHz Dig. Frequency Meter	69.00
MMD600P	600MHz Prescaler	23.00
MMDP1	Frequency Counter Probe	11.50
MMA28	10M Preamp	14.95
MMA144V	2M RF Switched Preamp	34.90
MMF144	2M Band Pass Filter	9.90
MMF432	70cm Band Pass Filter	9.90
MMS1	The Morse Talker	115.00

MORSE EQUIPMENT

MK704	Squeeze Paddle	10.50
HK707	Up/Down Key	10.50
HK704	Deluxe Up/Down Key	14.50

MORSE EQUIPMENT

BY1	Keyer Paddle (black)	32.00
BY2	Keyer Paddle (chrome)	39.95
BY3	Keyer Paddle (gold-plated)	92.00

ROTATORS

KR250	Kenpro Lightweight 1-1½" mast	44.95
9502B	Colorotor (Med. VHF)	49.95
KR400RC	Kenpro-inc lower clamps	99.95
KR600RC	Kenpro-inc lower clamps	139.95

DESK MICROPHONES

SHURE 444D Dual Impedance	33.00
SHURE 526T Mk II Power Microphone	46.00
ADONIS AM502 Compression Mic 1 O/P	39.00
ADONIS AM601 Compression Mic + Meter 1 O/P	49.00
ADONIS AM802 Compression Mic + Meter 3 O/P	59.00

MOBILE SAFETY MICROPHONES

ADONIS AM 202S Clip-on	20.95
ADONIS AM 202F Swan Neck + Up/Down Buttons	30.00
ADONIS AM 202H Head Band Up/Down Buttons	30.95

DRAE PRODUCTS fully protected power supplies

4 Amp	27.95	12 Amp	69.00
6 Amp	44.95	24 Amp	99.00

VHF Wavemeter 130-450MHz	24.95
Morse Tutor — new product	47.00

TEST EQUIPMENT

DM81	Trio Dip Meter	63.25
AT145	Packer VHF Wavemeter	19.95
Welz SP15M	1.8-150MHz — 200W	29.00

LICENSED CREDIT BROKERS ✻ Ask for written quotation. Credit Card sales by telephone.

BARCLAYCARD VISA

Prices are correct as we go to press, but we reserve the right to vary them if forced to do so by the time this advertisement appears.

FT ONE £1,295 inc. VAT @ 15% & SECURICOR

*Option

★ Rx: 150kHz-30MHz. Continuous general coverage.
★ Tx: 160-10m (9 bands) or 1.5-30MHz commercial.
★ All Modes: AM, CW, FM*, FSK, LSB, USB.
★ 10 VFO's!!! Any Tx-Rx split within coverage.
★ Two frequency selection ways, *NO* bandswitch.
★ Main dial, velvet smooth, 10Hz resolution.
★ Inbuilt keyboard with up/down scanning.
★ Dedicated digital display for RIT offset.
★ Receiver dynamic range up to 100dB!!!
★ SSB: Variable bandwidth *AND* IF shift.
★ 300* or 600Hz*, 2,400 → 300Hz, 6kHz*, 12kHz*.
★ Audio peak and notch filter. FM squelch.
★ Advanced variable threshold noise blanker.
★ 100W RF, key down capability, solid state.
★ Mains and 12VDC. Switch mode PSU built in.
★ RF processor. Auto mic gain control. VOX.
★ Last but not least *FULL* break in on CW.

FT902DM £885 inc. VAT @ 15% & SECURICOR

*Option

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

FT101ZD £635 inc. VAT @ 15% & SECURICOR

*Option

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

FT107M £725 inc. VAT @ 15% & SECURICOR

*Option

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

FT707 £569 inc. VAT @ 15% & SECURICOR

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

OVER 40% OFF!!

Reductions shown are taken from previously advertised prices and are not necessarily those that the equipment has been offered continuously for the last 28 days. Certain items are shop soiled/ex demo — please enquire

2m SYNTHESISED £205 inc.

CPU2500RKS. 10W keyboard mic up/down tuning etc., 25W RK model **£210**, 25KHz stepper version **£220**.

OVER 33% OFF!!

Reductions shown are taken from previously advertised prices and are not necessarily those that the equipment has been offered continuously for the last 28 days. Certain items are shop soiled/ex demo — please enquire

2m SYNTHESISED £175 inc.

FT227RB. 10W remote tuning transceiver.

FT227RXS. 227 fitted special scanner **£195.**

2m, 25W, FM, £239 inc.

FT230R 6" × 2" × 7", 12½/25kHz, ±600kHz, special LCD display, 10memories, memory and band scan, RX priority feature, two independent VFO's.

2m, 25W, FM, £199 inc.

2025 MARK II Full coverage 2M Transceiver, 12½kHz (set 12½-200kHz), rapid tune, 10"easy write" memory channels, memory or band-scan between programmable limits, auto scan stop dependent on squelch *and* centre zero.

2m, 250W (+) PEP. £499

NAG 144XL LINEAR. 4CX350F tube, 10W nom. drive, switchable pre-amp. RF and hard switching. Thermal delay, etc., etc.

2m. 160W OUTPUT, £164

MIRAGE B3016 LINEAR. 12VDC. Nominal 30W drive, switch pre-amp., etc. B108 10-80W £120.75. B1016 10-160W £189.75.

FT480R (2m) £379 inc. VAT @ 15% & SECURICOR

- ★ USB-LSB-CW-FM (A3j, A1, F3).
- ★ 30W PIP A3j, 10/1 W out A1 F3.
- ★ Bandpass filter no tune design.
- ★ Bandwidth 2.4kHz and 14kHz at −6dB.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx & Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ Digital receiver offset tuning.

- ★ Advanced effective noise blanker.
- ★ Memory scanning with slot display.
- ★ Up/down tuning/scanning from mic.
- ★ Priority channel on any memory slot.
- ★ Satellite mode allows tuning on Tx.
- ★ Scanning for busy or clear channels.
- ★ Size (Case): 8.3" D, 2.3" H, 6.9" W.
- ★ LED's; "On Air" Clar, Hi/Low, FM mod.
- ★ Matching PP80 Mains PSU available.

YAESU

SMC

FT780R (70cm) £449 inc. VAT @ 15% & SECURICOR

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

FT480R

- ★ 1.6MHz shift now available

- ★ FT780R 1.6 fitted 1.6 MHz Shift **£459** inc.
- ★ 430-434MHz (440-445) possible.
- ★ GaAs Fet RF for incredible sensitivity.
- ★ NMOS four bit micro control.
- ★ FM; 100kHz, 25kHz, 1kHz, steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ Repeater access by use of dual VFO's.
- ★ Four easy write-in memory channels.

FT780R

ADVERTISERS' INDEX

SHORT WAVE MAGAZINE

(GB3SWM)

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CONTENTS

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AUTHOR'S MSS

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VHF BANDS

NORMAN FITCH, G3FPK

Sporadic E

THE first *Sporadic E* propagation of the summer for British amateurs occurred on May 9, after the written copy deadline. Geoff Brown, GJ4ICD, telephoned your scribe at 1300 to report contacts with OK stations, but the brief event was about over by then. In a later QSO with G3UNU (Nottingham) operated by Mark Turner, G8OBS, it was learned that the opening lasted from 1222 to 1303 in which period six YO6 stations were worked on CW; YO6CBM/6 (NG71d), 'AFP (MG33a), 'AZL (MG33b), 'XR (MG33d), 'ADW (NG33d), and 'KNX (MG33a). 'CBM/6 was heard on SSB at 1247 and all signals were S9-plus.

Nick Button, G4IRX, (Beds.) worked YO6BCW (MG33) running 100w. to an HB9CV aerial fixed to a wardrobe in the bedroom! Paul Gobey, G8IYG, (Staffs.) is reported to have contacted a couple of YUs in JF and KF squares, while Jim Rabbitts, G8LFB, (London) heard a brief snatch of YU2CCB at 1300. On the 20m. VHF net, a German station mentioned that the path SM4 to 18 had been worked which, with the G3UNU results, suggests the reflecting layer to have been over northern Czechoslovakia.

Awards News

Another, the 20th, QTH Squares Century Club certificate has been issued, this one going to Jon Stow, G4MCU, from Billericay, Essex, and was dated April 23. The 101 confirmed squares comprised 3 *Ar* QSOs on CW, all the rest being SSB, two *via E's,* the remaining 96 on tropo. Jon was first licensed as G8LFJ in January 1976, but admits to not discovering the bottom end of 2m. till the following June when, within hours of buying a *Liner 2,* he had worked SM7FJE. The present station consists of a *Yaesu* FT-221R with *muTek* "front end," a solid-state 180w. amplifier and a 16-ele. *Tonna Yagi.*

Václav Homolka, OK1GA, was elected to membership of the 2m. VHF Century Club last month and now joins those in the 70cm. branch. Certificate no. 31 was issued on May 5. His previous call was OK1FDG, by the way. The majority of the QSOs were with other OK stations, but QSOs with Y, SP, DL, OZ and SM folk are listed. The contacts were an even mixture of AM, FM, CW and SSB modes dating back to October 1966.

For details of the rules for the QTHCC and VHFCC send an s.a.e. to the Awards Dept. at Welwyn.

Beacon Notes

From Brian Bower, G3COJ, news that certain UK beacon call signs are to be changed from two to three letter suffixes. On 4m., GB3SX in 70.04 MHz will become GB3WHA, and GB3SU on 70.05 MHz will be GB3BUX. This latter has had its FSK adjusted to 170 Hz in anticipation of future RTTY identification. GB3ANG became operational on 70.06 MHz on April 15 with a power output of 30w. to a 3-ele. *Yagi* pointing south. Normal ident. is at 12 *w.p.m.* with 100 *w.p.m.* in between for MS purposes. Reports to GM3WOJ (*QTHR*).

On 2m., GB3GI on 144.945 MHz is to become GB3GIB. The 2m. Angus beacon, GB3ANG on 144.975 MHz, has had a change of feeder and aerial resulting in more reliable and frequent reception at G3FPK, for example. Reports to GM8BZX (*QTHR*). On 70cm. the Emley Moor beacon, GB3EM, on 432.910 MHz will become GB3MLY. On 3cm., GB3SWH, located at Bushey Heath, Herts., is now back on 10.368 GHz and G4KUJ would like reception reports. His 'phone number is 09277 62201.

Finally, Geoff Brown, GJ4ICD, reports that the *Jersey Amateur Electronic Club* members are considering installing beacons for various bands on the Island and to operate and maintain them on behalf of the *RSGB.* The club was due to meet on May 12 to discuss the proposals.

The Satellite Scene

It seems to be *status quo* regarding *U-O-9.* At the time of editing, *AMSAT-UK* was relying on the assistance of a station in Maine, U.S.A., with a large dish aerial, to attempt to regain proper command of the satellite. The reasons for the present trouble are explained in detail in the Spring issue of *Oscar News.* Stemming from this interminable delay in getting this satellite fully operational, AMSAT-UK has received a number of complaints from schools who say they have invested money and effort in building reception hardware which they have thus far been unable to use. Well, in fairness, the organization has resolutely refrained from providing *p.c.b.'s* and will not offer these until everything is working satisfactorily. It must be appreciated that satellites are a risky venture and not even the professional and military people can ensure 100% success.

Concerning the first Phase III satellite — discounting the one last year that ended up in the sea — it would appear that a launch before the Spring of 1983 is unlikely. This is due to inevitable slippages in the *E.S.A* programme, outside the control of *AMSAT.* On the vexed subject of the 1,269-to-436 MHz transponder, your scribe has failed to get any information from *AMSAT* to enable some ideas of ground station Rx. and Tx. requirements to be recommended. Frankly, all we are getting is "waffle," suggesting somebody has not thought these problems through.

From German sources, it seems that Dr. Karl Meinzer, who built the transponder, refuses to talk to potential users. This is a ridiculous state of affairs considering the users' donations have been used for his work! Unless details of the transponder's aerials, 1,269 MHz Rx. and 436 MHz Tx. are provided immediately, manufacturers will be unable to design and develop equipment for anyone to use this "Mode L" system. The transponder is already built. Surely *somebody* can reveal its power output and receiver sensitivity and the gain of the aerials?

The second part of the annual orbital calendar, published by AMSAT-UK, has been received. It covers predictions for *O-8, U-O-9* and *RS-3* to *8* up to July 5 for *O-8* and July 2 for the Russian "birds." The *U-O-9* data goes up to June 5 and, with such a low orbit, could be somewhat out by then. For details of *AMSAT-UK* and its many services to members, contact at 94 Herongate Road, London E12 5EQ, enclosing an *s.a.e.*

Contests

The 70 MHz Contest is on June 13, from 0900-1600, in two sections; fixed and all-other. On June 20, 0900-2000, there is the next leg of the 10 GHz *Cumulatives.* On Saturday, June 26, the 2m. session of the *AGCW-DL* contest takes place from 1900-2300. Operate in the section 144.010 to 144.150 MHz, otherwise rules as for the 432 MHz event, detailed on page 673 in the February *Magazine.* On June 27, the *WAB* phone contest is scheduled for the 2m. and 70cm. bands. For rules, apply to G4FQO (QTHR).

VHF NFD weekend is July 3/4 and this year the period is earlier, 1400-1400. Every group must send site details with NGR reference by June 11 to the VHF Contests Committee, c/o G8ACJ (QTHR). Another change is that the 70 MHz section will be run as two, separate events; 'phone only from 1400 to 2300, CW only 0600-1400 with silence from 2300-0600. Again there is a Restricted section with 25w. maximum CW or PEP output, only one aerial *per* band no more than 35ft. *a.g.l.*

DX Notes

In a recent QSO with CT2DL on 15m., your scribe asked Mañuel about VHF activity in the Azores Islands. With repeaters now in operation, there has been growing interest in 2m. and some CT2s have already worked into EA8 and CT3

TWENTY-THREE CENTIMETRES ALL-TIME TABLE

Station	Counties	Countries	Total
G3JXN	46	12	58
G3OSS	40	9	49
G3DAH	37	9	46
G6NB	28	7	35
G8FMK	32	3	35
G8IFT	28	5	33
G3XDY	25	7	32
G3NHE	24	5	29
GD2HDZ	21	7	28
G3COJ	19	8	27
G4NBS	19	6	25
G4ALN	20	5	25
G4CMV	20	5	25
G3JVL	21	4	25
G3OBD	20	3	23
G8LEF	16	6	22
G8ARM	20	2	22
G8GML	17	4	21
G8KAX	18	3	21
G3PBV	15	5	20
G8VRJ	14	3	17
G8EOP	11	5	16
G5DF	12	2	14
G2AXI	11	2	13
G8AOD	11	2	13
G8LHT	7	3	10
G4DKX	7	2	9
G3OHC	8	1	9
G3BW	3	5	8
G8FJG	7	1	8
G8HHI	6	1	7
G8GNZ	4	2	6
G8OPR	3	1	4

Based on administrative counties

(Madeira). Most of the fellows use low power transceivers but with horizontal aerials. Maïuel mentioned CT2AK and CT2CE, both in Ponta Delgada, and CT2CY in Lagoa, where he lives, on the island of São Miguel in NX square. The other main island is Terceira, which is in MY square. The QTF from Britain is about 240° and in the E.B.U. List of VHF Broadcasting Stations, a 1kW. transmitter is shown on 97.9 MHz for *E's* watchers.

The Liverpool University ARS is planning an all-band DX-Pedition to the Lizard Point (XJ) from July 14 to 21, with operation on 144 and 432 MHz, and 1.3, 5.6 and 10 GHz. For more information and skeds., contact the club's secretary under G3OUL, (*QTHR*).

Moonbounce

A number of overseas stations, such as K1WHS, have such "big ears" that they are able to copy *E-M-E* signals from stations only running 3kW. *e.r.p.* Consequently, more serious DX-ers are trying their hands at 2m. *E-M-E* work. In the Apr. 3/4 Moonbounce Contest, Doug Parker, G4DZU, (Leeds) who has four, 19-ele. *Cushcraft* aerials, completed the first 2m. W.A.C. from England with YV5ZZ in South America. He reckons this to have been the first G/YV and G-to-South America 2m. *E-M-E* contact. Other stations worked were SM7BAE, K1WHS, W0LSH, KI7D, YU1AW, N4GJV, SM2GGF, WB5ERD and WA1JXN who was worked in five minutes.

From Wales, Walt Davidson, GW3NYY, (Swansea) heard CW from WA1JXN on Apr. 3, KI7D on Apr. 4, K1WHS at RST 559 on May 1 and KI7D again on May 2. Richard Hope, GW8TVX, also in Swansea, copied K1WHS on March 9 and has a QSL from Dave on which he says that 300w. of RF to a single 16-ele. *Yagi* is sufficient to work him. Geoff Brown, GJ4ICD, mentions an *E-M-E* QSO with G3POI when he was at the F6BSJ station during the April Contest. From Jersey, Geoff has worked K1WHS on CW on May 2, for a notable "first," this confirmed by telephone. He has spent a lot of time getting a good station together and is keen to put Jersey on the *E-M-E* map.

Four Metres

Syd Harden, G2AXI, (Hants.) has added EI and GJ to his country score for 1982, EI6AS being worked in the Apr. 10 *Aurora,* along with GM3TAL (Fife), and GJ4LVH *via* tropo. on the 9th. Frank Howe, G3FIJ, took part in the final leg of the *Cumulatives* on Apr. 25, adding another seven counties. Dave Sellars, G3PBV, (Devon) has increased his power to 25w. on the band with "... a half-blown 2N6084 . . ." to which he did a mischief during development work. His aerial is a 2-ele. *Yagi* at 20ft. He was on for the Apr. 10 *Ar* and contacted his first GM, GM3WOJ who was S9 on SSB. G4HNS (Nottingham) was worked on CW and GM4DIJ was heard in the second, midnight phase. Beacons GB3SU and GB3ANG were received as were east European BC stations. G3PBV took part in the last three *Cumulatives* sessions, in between reading the GB2RS news bulletins, best DX being G4ANT in Norwich.

Roger Greengrass, G4NRG, hopes to include a 4m. score next time, so will be a new station from Essex. Arthur Breese, GD2HDZ, lists GM3TAL on Apr. 10, and worked the Isle of Man on the 25th, thanks to GD3FOC. Derrick Dance, GM4CXP, is back on the band from the Borders Region. He has a 3-ele. *Yagi* at 24ft. *a.g.l.* and a separate dipole at 22ft. for general listening. The new GB3ANG beacon is S8 on the latter at 75 miles. GB3SU is a very useful signal. In the Apr. 25 *Cumulatives,* conditions were fairly poor and only four QSOs were made, best being G4ERP/P in Gloucs.

Two Metres

G3PBV has been spending a fair bit of time screening his *Sinclair* ZX81 computer to try to eliminate the clock harmonics. He now has a high speed CW program running for future MS work. Dave reckons the April 10 *Ar* was one of the best he has heard from Devon with strong "local" signals, but not much real DX; only SM4GVF in the first phase and OZ1BUH in the second. SSB signals were quite readable and G8PWX (Tyne & Wear), GI8ROJ (Armagh) and GI6EWO (Antrim) were new 1982 counties. Tropo. has been rather poor in contests and he has not noticed any really good conditions so far, this year; just a few minor lifts along the English Channel into the nearer Continent.

Mike Lee, G3VYF, (Essex) has caught several recent *Ar's* and on Apr. 2 got

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3POI	—	—	354	354
G3IMV	—	—	296	296
DK3UZ	—	—	287	287
G3VYF	—	94	282	376
SP2DX	—	—	280	280
G4IJE	—	—	243	243
EA3LL	—	15	231	246
G4ERG	—	16	223	239
G3CHN	—	—	214	214
9H1BT	—	11	210	221
GJ4ICD	1	97	209	307
G4IGO	—	17	207	224
G4DEZ	—	—	203	203
G3BW	5	31	191	227
GM4COK	—	12	182	194
G3FPK	—	—	180	180
G8VR	—	3	178	181
G3KEQ	—	—	173	173
GJ8KNV	8	73	164	245
GW4EAI	—	—	158	158
GW3NYY	—	36	156	192
GM4CXP	—	25	145	170
G4OAE	—	7	140	147
G4NFD	—	36	138	174
GJ8SBT	1	—	138	139
G4BWG	—	38	136	174
G8MFJ	—	28	135	163
G4AWU	—	22	130	152
G3NAQ	—	58	128	186
G3COJ	24	74	126	224
G3PBV	14	65	125	204
G4MCU	—	34	125	159
G3JXN	43	87	124	254
G3XDY	30	84	123	237
G8CXQ	—	25	123	148
G8HHI	6	52	121	179
G4JZF	—	40	120	160
G4HMF	—	13	116	129
G8LFB	—	—	116	116
G8KBQ	4	50	115	169
G8ATK	6	56	113	175
G4NQX	—	46	111	157
G8TGM	—	—	109	109
G8JJR	—	38	108	146
G2AXI	8	60	106	174
G8RZP	—	40	105	145
G4ERX	6	46	104	156
G8RZO	—	39	104	143
G4GFX	7	40	103	150
GM4IPX	—	—	102	102
G4GHA	—	—	95	95
G8KPL	—	7	91	98
GD2HDZ	12	44	90	146
G4NBS	13	57	89	159
G8VRJ	8	28	88	124
G3FIJ	—	29	86	115
G4MJC	—	12	85	97
G4IRX	—	—	85	85
G8JAG	—	7	81	88
G4HFO	—	55	80	135
G8KAX	11	45	79	135
G8FMK	16	57	71	144
G8RWG	—	—	71	71
G8VFV	—	—	68	68
GW3CBY	3	14	65	82
G6ECM	—	—	63	63
G4KLX	—	5	62	67
G8XMP	—	—	62	62
GM8OEG	—	—	58	58
G8WUU	—	20	56	76
G8TIN	—	3	56	59
G4NWT	—	22	55	77
G6DDK	—	4	53	57
G4GXL	—	4	52	56
G4MUT	—	32	50	82
G6ADC	—	14	47	61
G8XQS	—	—	47	47
G4LDY	—	3	41	44
G8MBI	—	—	40	40
G4NRG	—	5	37	42
G8ZYL	—	—	36	36
G8LXY	—	20	34	54
G4BVY	9	58	—	67

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

GM4FZH (YS), with LA8UU (CT) and UQ2GLO (KQ) on the 10th, for new squares. UP2BJB (LP) was also worked and OH1AA (LU) and UP2BOZ (LQ) heard along with many SM, OZ, Y and GMs. Unfortunately, no activity from WQ, WR, YT, ZT, ZU, etc., and Mike is finding it more difficult to work those regions than the Russians. On Apr. 22, UQ2GAJ (LQ) was worked *via* MS. QSLs from UA3LBO and SV2JT have arrived for past MS and *E's* QSOs.

Paul Turner, G4IJE, (Essex) has continued his MS operation which has brought two more squares in April; RQ2GGS (LQ) on the 16th, and YU7AJH (JG) on the 22nd. On the 24th, *via* random meteors, Paul needed just "JE" letters to send "R" reports to OH7TN/4 (OV) at a QRB of 2,040 kms. He received 6 bursts and 8 pings. Other successes were DF7RG/P (GI) on the 6th, OK1OA (HK) on the 7th, DJ5MS (GI) on the 10th and 17th, EA3LL (AB) on the 11th, OE6WIG (HG) on the 21st on the random CW QRG, OK1OA again on the 26th, using 2½ min. periods and completed in 12 mins., I3TJQ (GF) on the 26th. and YU2DI (JF) on May 5 who was only running 10w! He received a 64 secs. burst from Paul. All the foregoing on CW, with DL9MCC (GH) on SSB on Apr. 21.

Terry Hackwill, G4MUT, (Berks.) is another reader who feels that, with band occupancy growing continually, as SSB calling frequency is less necessary. Time is often wasted in agreeing a clear-both-ends "QSY" frequency so Terry suggests choosing any clear frequency to call "CQ" so avoiding this problem. Your scribe would again suggest the choice of odd frequencies; why always use fives or zeros? In the Apr. 2 *Ar,* Roger Greengrass, G4NRG, (Essex) had his first contact on this mode with GM8TSI (YP) for a new county, country and square, but he missed the big event on the 10th.

Mick Cuckoo, G6ECM, (Kent) has had some notable *Ar* successes in April. He QSO-ed GM8TSI at the tail end of the event on the 2nd and was on for the big one on the 10th, between 1500 and 1730. This yielded GI4CZO/P (WO), DL6FAW/P (EO), GM3ZXE (YQ), GM8YPI (YP) and GM6CFN (XR) on SSB. In a short late night phase, Mick's CQ call raised OZ1FKR (EP). On tropo., GU8NIS was contacted on Apr. 20 for another 1982 country/county.

George Gullis, G8MFJ, (Wilts.) operated from 1556 to 1834 in the Apr. 10 *Ar* and GM8BKE (XP) was a new square. Other QSOs were: GI4CZO/P, DD0OZ (FN), DC4LM (EN), PE1DTP (DN), GW8YUJ (XN), G8YMV (XO), GM8OFV (YP) and G4LAA (YO). QTFs were between 20° and 40°. Jackie and John Brakespear, G8RZO and 'RZP, were on for the Apr. 10 *Ar* from 1504 to 1658, getting one new county and square — GI5MPS (WO) in Armagh. They made 146 QSOs in the FM contest on Apr. 11, worth 952 pts., best DX being PE1GXC (DK). EI9Q was heard on the 24th but no QSO resulted.

ANNUAL VHF/UHF TABLE

January to December 1982

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	23 CENTIMETRES Counties	23 CENTIMETRES Countries	TOTAL Points
G2AXI	36	6	60	12	39	9	*10*	*2*	162
G4JZF	—	—	65	14	43	7	—	—	129
G8RZP	—	—	65	14	35	10	—	—	124
G8RZO	—	—	65	14	32	10	—	—	121
GD2HDZ	33	5	35	9	30	5	*3*	*2*	117
G3PBV	15	4	46	11	20	4	*3*	*1*	100
G3FIJ	18	1	45	11	18	3	—	—	96
G6ADC	—	—	51	11	29	3	—	—	94
G8TFI	—	—	39	9	37	7	—	—	92
G4DEZ	—	—	65	25	—	—	—	—	90
GW3NYY	—	—	62	16	7	2	—	—	87
G8VRJ	—	—	37	10	21	5	8	3	84
G8VR	10	1	44	22	—	—	—	—	77
G3FPK	—	—	61	15	—	—	—	—	76
G3BW	—	—	40	14	14	3	2	2	75
G6ECM	—	—	60	15	—	—	—	—	75
G8WUU	—	—	41	10	17	4	—	—	72
G8LFB	—	—	58	13	—	—	—	—	71
GM4CXP	7	3	40	13	5	2	—	—	70
GW3CCF	—	—	40	7	12	2	5	1	67
G4KLX	—	—	49	14	3	1	—	—	67
G4MUT	—	—	33	9	22	1	—	—	65
G8VFV	—	—	47	12	—	—	—	—	59
GM8OEG	—	—	44	11	—	—	—	—	55
G8KAX	—	—	23	4	13	2	8	1	51
G4NRG	—	—	22	12	10	2	—	—	46
G6AJA	—	—	38	5	—	—	—	—	43
G6CGY	—	—	32	10	—	—	—	—	42
G8XHL	—	—	25	8	4	2	—	—	39
GM4COK	—	—	21	15	1	1	—	—	38
GW4HBX	18	3	11	5	—	—	—	—	37
G8ZYL	—	—	31	5	—	—	—	—	36
GW8TVX	—	—	24	6	3	2	—	—	35
G4FKI	17	1	3	2	9	1	—	—	33
G8LXY	—	—	18	1	12	2	—	—	33
G6FSH	—	—	13	3	—	—	—	—	16

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

Chris Easton, G8TFI, (Gloucs.) now has a very stable, 50% efficient amplifier with a pair of 4CX250BM valves. It is a "plumber's special", with silver plating. This should be fully ready by the May 22/23 contest weekend, under the South Bucks. Contest Group's call, G4NXO. It is always pleasant to welcome new contributors, especially the ladies. Gloria Hills, G8ZYL, (Kent) says she was "instructed" to write by G8RZO. She got her licence on Feb. 4, 1981 and enters the annual table and the squares list. Gloria's station is the *Trio* TR-9000 transceiver with an 8-over-8 skeleton slot-fed aerial at 27ft. She also works RTTY and as many contests as possible.

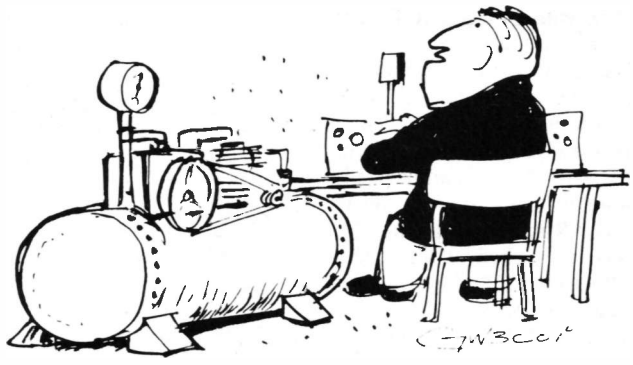
GD2HDZ reckons conditions in his part of the realm have remained rather disappointing despite recent fine weather and high pressure. So only four more 1982 counties have been added to Arthur's score in April.

GM4CXP passed along several *Ar* report sheets which have been passed to G2FKZ. On Apr. 27, an event was in progress at 1635. Beacon GB3LER (ZU65f) was S2 at 30° azimuth and LA6CU (CU) was worked at the same time and QTF, with fade-out at 1710. The Lerwick beacon was just audible *via Ar* on the 30th at 1713 for a couple of minutes. On May 1, another event was going on at 1647, fading out at 1756. Five GMs in YQ and YR were worked plus LA5IH and LA6CU, both in CU, and LA9FY in EU. The next day another one occurred from 1818 to 1915 in which three GMs were contacted, plus GI8UPV on SSB at 1901. GB3LER was not heard at all. Power failure? May 3 found yet another *Ar* going at 1628, this one fizzling out at 1850. QTFs were a bit more easterly — 30° to 50° — and this time GB3LER was heard. Stations worked were LA8SJ (FT), GW3LDH (YN), GM6CFN (XR), DK0IK/P (DO) and GD3YEO (XO).

Via tropo., Derrick worked the Norwegian oil rig, LA1EKO (BQ37g) on Apr. 5, and again the next day. Some GIs were contacted on the 15th, and in the CW Contest on the 18th, he was only active the first 50 mins. with seven QSOs, none south of Yorkshire. On the 21st, from 1830, some weak PAs were heard and on the 24th, some GIs worked on SSB. Considering the bad weather, conditions in the May 2 QRP Contest were surprisingly good, with F1KAW/P (ZJ23d) a consistently good signal throughout. Derrick exchanged RS59 reports at 1015.

GW3NYY (XL) lists seven completed MS skeds, all on CW with LA9BM (EU) on Apr. 4, DL1MBV (FI) on the 11th, followed by OZ1CLL (GP). Apr. 12 gave

LA8OW (EU), with DL4NAA (EJ) on the 18th, SM0IOT (JT) on the 21st and SM3JGG (HV) on the 22nd. On tropo., Walt worked the Cambridge University team on SSB at GJ6CUW (YJ) on the 12th and G8UVE/P (XJ) on the Lizard. May 1 brought a CW QSO with PA0IHD/P (BL) with SSB to assorted F, ON and PA folk. In the Apr. 10 *Ar* Walt managed 18 squares and eight countries in the two phases, 1530-1845 and 2215-2310. He mentions many GMs, Gs and GWs, plus near continentals and SM4GVF (HT). The May 3 event was a weak affair between 1730 and 1820.



". . . the compressor here is quite basic. . .".

Seventy Centimetres

G3PBV found conditions very poor in the May 1/2 Contest and only worked nine stations from Newton Abbot. G8SFI was the only contact over 400 kms. G2AXI picked up just Humberside, G4APA/P, in the contest. G3VYF worked the Heligoland station. DK0IK/P (DO) on May 5 for the 94th square on the band. G4MUT used the contest to work some countries for the annual table and also picked up the elusive AN square, as well.

Your scribe was pleased to receive a letter from Malcolm Pemberton G6DAY, from South Croydon, since it was the first he had ever written to a radio magazine. The home station is a *Trio* TR-8400 with a *Hamburger* 16-ele. *Yagi* in vertical mode, at 40ft. In a letter dated Apr. 9, he refers to a recent lift during which signals were heard on 438.925 MHz. On Mar. 25 at 0820, the same signals were heard, so he programmed the TR-8400 for a 7.6 MHz repeater shift. A CQ call on 431.325 MHz brought a reply from a YL operator, DG4HAW, who told Malcolm he had accessed the Hamburg repeater, DB0ZE. Later, using just one watt, he again got into DB0ZE for a six minute contact with DF5HR/P. On Mar. 27, he was able to access GB3IH in Ipswich with an *FT-708* hand-held from the back garden.

G8RZO worked G3PBV in Devon on Apr. 25, Jackie reckoning that to be an elusive county on the band. Chris Easton, G8TFI, has sent details of the April 4 Contest in which he operated from Sheppey, chez-Brakespear. The four 16-ele. *DL6WU Yagis* were stacked one above the other at 1.2m. spacing to keep the beamwidth sensibly wide. An *SM6CKU* power divider was used and the 192 stations worked were worth 1,890 pts. in flat conditions. Best DX was DL7QY (FJ61) at 680 kms. on SSB at 15 dB. over noise.

Chris writes that the South Bucks. Contest Group went to Sheppey for the May Contest, using Dave Raimbach's call, G3ZWK. They operated portable from 200ft. cliffs on the northeast side of the island and in very flat conditions, had 236 QSOs for about 2,400 pts. 140 continentals were contacted. GD2HDZ used the Apr. 4 Contest to add another 1982 country and ten counties. Arthur's list includes G4MRS/P (Suffolk), G2AXI (Hants.) and GW6UW/P (Gwent). The new country was Ulster, GI4FUM/P in Antrim.

GM4CXP finds the band ". . . hard going but fascinating". Derrick is only running 8-10w. at present but hopes to increase that this year. The aerial is a 46-ele. *Multibeam* at 44ft. For GW3NYY, G8UVE/P (XJ) was worked on SSB on Apr. 13.

Gigahertz Band

G3PBV only made one contact in the May Contest and that was with G4JAR/P in ZK at 187 kms. with nothing else heard. Dave Robinson, G4FRE, (Ipswich) asks if we would consider a sort of "half-VHFCC" for 23 cm. operation. Is there a demand for another certificate of this sort? Comments please. Dave's home QTH is his parents' home in Nuneaton, Warks. but he rarely operates from there these days. Main interest is in UHF/SHF now and he has the reciprocal call, ON8QK which was used in Belgium last year for two weeks in July on 2,304 MHz. The call has been reissued for a 1982 visit about now during which he hoped to operate on 2,320 MHz and 10 GHz SSB.

In the May UHF/SHF Contest, the South Bucks. lads operated from Sheppey and their one watt from G4NBS/P did reach 20 stations, including some PAs, and another 20 could have been worked with a little more power. In the 1,296 MHz Trophy Contest on Apr. 3, GD2HDZ worked GW4HWA/P (Clwyd) for a new 1982 county and country. GM4CXP writes:— "I have an antenna for the band and am thinking of doing something with it!"

GW3CCF (Clwyd) is always on 23 cm. on Sunday mornings between 11 and 12 o'clock local time, also on Monday and Tuesday evenings from 8.30 p.m. He says:— "Please turn your antennas towards Clwyd". GW8TVX (W. Glam.) is trying to concentrate on 23 cm. this year. He has a couple of regular skeds., with G6FK (Staffs.) and G8KAX (Essex). Another one soon will be G3WDG. Richard recently completed a QSO with G4MAW in Paignton, Devon, at the second attempt. Not bad for one watt.

Operating Notes

Dave Sellars, G3PBV, is not alone in reckoning that operating standards seem to be declining even further. He offers two theories. First that the new G6s have never even listened on 2m. SSB before they got their licences and bought their multimode sets. Second, that it is not nearly as easy to tune the band and winkle out the weak stations on the modern "click-tune" rigs. He feels you cannot beat a free-tuning VFO for carefully searching the band. Although initially opposed to the concept of a second, local calling frequency, he now wonders if it is, after all, meritorious in view of the congestion on 144.30 MHz.

Your scribe would once again suggest that everyone, when calling CQ, states where they are and where they are beaming. This is particularly desirable for those not listed in a Call Book. Listening in recent contests revealed most operators of portable stations giving no indication of their whereabouts. One had no idea if they were distant or just locals off the side of the beam. One way to beat this is to never reply to a station who does not say where he is!

Deadlines

Not too much excitement this time. Next month, no doubt there will be some *E's* to report. Copy for the July feature should reach us by June 2, and for August, by July 7. Send it to:— "VHF Bands", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ. *73 de G3FPK.*

Stop Press!

A low orbit Soviet amateur radio satellite, ISKRA 2, was launched by the crew of *Salyut 7* on May 17. The initial period was 90.78 mins., the inclination 51.59° and the track separation 23.09° west per orbit. The altitude would be 316 km. approximately. The telemetry channel is 29.58 MHz and there is a 21.29 MHz transponder. For latest details check the AMSAT net on 3780 kHz at 1900 local, Monday to Saturday.

BETTER FRONT-END SELECTIVITY FOR THE YAESU FT-707

ELIMINATING SPURIOUS RECEIVED SIGNALS ON THE HIGHER BANDS

IAN WHITE, G3SEK

THE Yaesu FT-707 is an excellent little transceiver, both in the car and in the shack. One of its few faults is its tendency on the bands above 18 MHz to pick up signals that are actually on the lower part of the HF band. Only 21 MHz and 28 MHz are of immediate interest, and the problem is not particularly important when those bands are wide-open and full of amateur signals. But the spurious signals can be very annoying to the DX-er who is looking for contacts on an apparently dead band, or to the VHF-er who uses the FT-707 as a tunable IF. Incidentally, although the problem seems quite well known to FT-707 owners, only the *Short Wave Magazine's* reviewer has mentioned it in print (November 1980, p. 567).

This article describes a modification which completely eliminates the spurious received signals. Since it involves cutting tracks on a PC board, and some delicate work on miniature coils, it is not for the faint-hearted or the fumble-fingered.

Cause of the Problem

As noted in the *Short Wave Magazine* review, the spurious signals appear to be due to a lack of front-end selectivity, and can be removed by frequency-selective antennas and/or an ATU. Further investigation reveals the true cause, a design fault. On the 18, 21, 24 and 28 MHz bands the designer has dispensed with the conventional link coupling in the RF input circuit, as used on the lower bands (Fig. 1a). On the higher bands the input circuits are *pi*-networks (Fig. 1b), the necessary impedance transformation being achieved by making the capacitance at the input much larger than that at the output to the RF amplifier QO1. But a *pi*-network is also a low-pass filter, and although it is resonant at the wanted frequency it is also "transparent" to strong unwanted signals at lower frequencies. When the FT-707 is switched to 28 MHz, signals in the 5-15 MHz region can develop several volts of RF at the drain of QO1! The following double-tuned circuit will eliminate the fundamental frequencies, but by then it is too late: the strong signals have produced harmonics and intermodulation products on 28 MHz, which cannot then be eliminated. The solution is of course to keep those strong signals away from QO1, either by external selectivity or by improving the front-end selectivity of the FT-707 itself.

The Cure

All that is needed to eliminate the spurious signals is to change the input circuits for 18 MHz and above to conventional link coupling, as used on the lower bands. So far, I have modified only the 21 MHz and 28 MHz circuits, and will now describe the operations for the latter band.

Begin by completely removing the RF Unit board, an easy job thanks to the plug-and-socket connections. Identify the 28 MHz

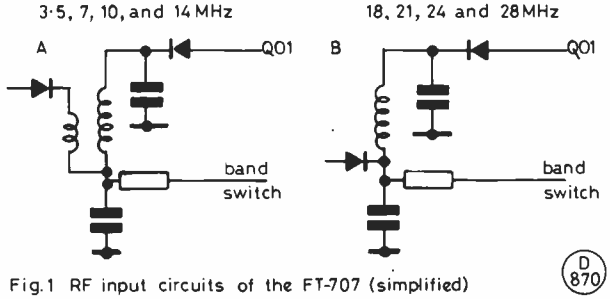


Fig. 1 RF input circuits of the FT-707 (simplified)

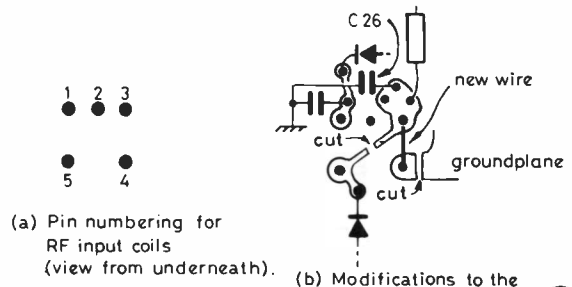


Figure 2

input coil TO8, and remove its can by alternately unsoldering each of the two lugs and "walking" the can upwards. This method will not work for the coil itself, which has 5 pins (Fig. 2a) and is easily damaged by excessive heat. Instead, carefully cut and shape a piece of aluminium so that it just fits within the rectangular area between the coil pins. Heat the aluminium with a soldering iron, and all 5 pins will be unsoldered at once, allowing TO8 to drop out undamaged.

The modifications to TO8 and to the board are intended to copy the link-coupled circuitry used on the lower bands. The RF Unit board on my FT-707 had some unused holes in the vicinity of the RF input circuit, indicating last-minute design changes, and the actual circuit did not conform entirely to that shown in the handbook. The following instructions may not therefore be directly applicable to all production runs of the FT-707. Referring to the pin numbering in Fig. 2a, cut the PC track joining pins 3 and 5. Separate pin 4 from the main ground plane, leaving an isolated pad of copper, and wire this pad to pin 3 (Fig. 2b). Replace C26 (82 pF) by a 10 nF disk ceramic bypass.

On TO8 itself, wind a 2½ turn link at the "cold" end of the main winding, and connect the link to pins 4 and 5. Do not glue the link into place yet, and leave enough slack to allow the position of the link to be adjusted. Replace TO8 (but not its can) in the board, and the board in the FT-707.

Alignment

Switch on, and trim the core of TO8 for a noise peak on receive at 28.85 MHz, the middle of the band. Tune across the band using a non-selective antenna, and the spurious signals will be gone.

If the FT-707 were only a receiver, the modification would be complete. However, TO8 is also used on transmit so the link coupling has be be adjusted to restore the correct drive level. Set the CAR (carrier level) control to the correct position by tuning-up on another band, according to the instructions in the handbook. Now switch to 28.85 MHz without moving the CAR control. Carefully adjust the position of the coupling link on TO8 until at resonance the correct RF power level is achieved. You will probably have noticed that the settings of the CAR and MIC controls need to be varied a little in order to achieve precisely the same RF power on every band, so the adjustment of the new link is not ultra-critical.

When all is well, glue the link into place, refit the can over TO8, and finally re-resonate at 28.85 MHz. The modifications required for 21 MHz are very similar to those described for 28 MHz, and the new link on TO7 should also be 2½ turns. I have not yet attempted the 18 MHz and 24 MHz modifications, but once again would start with 2½-turn links.

Dire Warnings

The modifications described in this article should only be undertaken by experienced constructors — or modifiers — of miniaturised solid-state equipment. If you flinch at the thought of putting your FT-707 under the surgeon's scalpel (literally) and the soldering iron, these modifications are not for you. I regret that I am not prepared either to modify other FT-707s, or to rescue the over-confident! If you are still prepared to have a go, despite these dire warnings, you will find that the modifications add considerably to the pleasure of using your FT-707. Maybe Yaesu will read this, too. . . .

PLUG IN YOUR SOLDERING IRON AND BEGIN HERE, PART I

A GUIDE FOR THE INEXPERIENCED IN THE METHODS, TECHNIQUES, PITFALLS AND FOLKLORE OF BUILDING EQUIPMENT, WITH PRACTICAL PROJECTS TO BUILD ALONG THE WAY

REV. G. C. DOBBS, G3RJV

"THE engineer is the man who can build for five bob what the fool buys for a pound" the old saying went, but these days in the KISS-KIDS battle, the KIDS are winning. (KISS = Keep It Simple Stupid, KIDS = Keep It Difficult Stupid) I thought we would have learned our lesson from the autochanger. Remember in the '50's when automatic record decks became all the rage and within a couple of weeks they had seized up, jammed in mid-cycle or carved additional grooves on our records? Well we didn't learn, and people now crave televisions with ultra-sonic channel switching which the jingle of a bunch of keys or junior treading on the cat can send off wildly hunting for channels we do not want to watch. We even think digital watches are pretty neat — what is 7.47?

There was a time when most of amateur radio was a hobby of the constructor, the fiddler, the experimenter, but now, sadly, the credit card seems to have superseded the soldering iron as our chief tool of the trade. "This fellow is a typical clergyman", they say, "he lives in the past". Yet the odd thing is that those were the days of large pieces of equipment, dangerously high voltages and metal work like a Sherman tank. These days, with a solid state technology, low voltages and relatively small equipment, seem *better* suited to building one's own equipment.

So if you have never built any equipment, or tried and failed in the attempt, read along — you may add a new dimension to your hobby. But he warned, it is infectious! You may be tempted to leave your all-singing, all-dancing, digital readout Japanese Box gathering dust on the shelf . . . though you are probably bored with it anyway. In this series of articles we will be exploring the routes of home-construction and, hopefully, be building some simple, but useful items as we go.

What Can I Build?

A common enough question. There is sometimes an assumption that the only published circuits around are for multi-printed circuit board major projects with a beefy financial layout. Whilst it is true that some magazines and books seem to assume that we want to spend money, rather than save it by building our own equipment, there are still plenty of circuits and designs around for us normal mortals. Many magazines, not least of all *Short Wave Magazine,* publish buildable designs. In the non-commercial field, can I, through sheer bias, commend *Sprat,* the journal of the G-QRP Club for a variety of practical designs. There are also several good books, most sadly from the U.S.A. rather than over here, which ought to be on the shelf of the home constructor. The back cover of *Short Wave Magazine* gives an extensive list of such books. If I were to recommend only a few, they would be:

"Solid State Design for the Radio Amateur" (ARRL). Without doubt, I consider this to be the finest book currently available for the constructor. A bit of everything in it. A complete range of types of circuit, with theoretical background and practical examples written by W1FB and W7ZOI, the doyens of amateur radio circuit design in the U.S.A.

A simpler book from the same stable with lots of practical and simple ideas to build, with sound basic theory in support, is the "Electronics Data Book" which has all those useful little bits of knowledge for constructors under one cover. Lots of formulae and design ideas — you know the sort of thing, it was in an article in a magazine in 1978, you think, if only you could find it. Well most of it is in this book, although lots of it is probably beyond the real beginner.

"Hints and Kinks for the Radio Amateur" (ARRL). An old favourite, full of "practical ideas for the workshop and station" "The Radio Amateur's Handbook" (ARRL). A standard work, revised each year. Very American in parts, but lots of useful stuff in every edition; probably worth buying one about every five years.

There are lots of others, just have a look through the list. Better still borrow a friend's, or library copy, and then buy it if you like it.

Getting the Bits

Many would-be constructors claim that finding the required components is a real problem. On the one hand there are those articles which assume we want to spend £50-plus on exotic components, and on the other those which assume that we can dip into a 'junk box' the size of a well stocked component mail order company. What is worse our little radio junk shop, just off the High Street, closed down in 1963. A junk box is an important asset for any constructor but sadly life has changed and unless one is adept at experimentation or substitution, it is unlikely that just dipping into a drawer of cast-offs will provide all that is required for building modern radio projects. This does not mean, however, that the answer lies in spending lots of hard earned money; part of the joy of home construction should be saving money.

These days we do not have 'junk boxes' so much but rather a 'basic stock'. Let me expand upon the basic stock concept. There are certain basic components which are commonly featured in all manner of circuits. These include the range of resistors, capacitors, coil formers, potentiometers, presets and so on — the basic building blocks of radio circuits. There are also ranges of semiconductors, switches, relays, bits of hardware, etc., which appear frequently enough to know they will be required in the future. Build up a stock of such things as cheaply as possible, and supplement with the special components and devices required for a particular project when these are required.

What are these bits, and how can they be had cheaply? In order to discover the identity of the basic building blocks of radio circuits, we have to meet one of the significant characters of our hobby — the Armchair Constructor. The Armchair Constructor, and happily I have been one for years, is the fellow who seizes upon anything that is written of a practical nature about amateur radio. He begs, borrows and even *buys* amateur radio magazines, he searches public libraries for the diminutive amateur radio section (a tip — look for the darket corner of the library and try an inch up from the ground), and looks in vain for suitable titles in book shops. Then armed with an array of circuits, he settles into his armchair (in my case in the seat in the 'loo') and builds amazing pieces of equipment in pipe smoke in the air. A useless exercise? By no means — the armchair constructor becomes immersed in ideas and current practices and he knows what bits go into most amateur radio projects.

The secret then is to buy such components when they come up at cheap prices. It is obvious that many circuits use values like

0.01μF and 0.1μf as decoupling capacitors, and so on, so try to have these common values always in stock. Some types of transistors, diodes, LEDs, even integrated circuits, appear frequently, so get some when they are available. The most expensive way to build anything is to take a complete shopping list of components to a shop or, worse still, order every component at one time from a mail order company. Most junk shops and cheap 'bits' shops have disappeared, but the saving grace for the modern radio amateur is the Radio Rally. These weekend events, which occur throughout the summer in most parts of Great Britain, bring an amazing array of bargain price traders out of the woodwork. Get to as many rallies as possible and take lists of requirements; scour the stalls for cheap buys, but look around every stall before laying out money, the next one always has it cheaper. Failing that, try to attend one of the major amateur radio conventions or exhibitions, some good dealers usually attend these events.

There is a sliding scale of value for money that is worth remembering. At the most expensive end are the smart radio shops or the large mail order companies with expensive catalogues, less costly come the small scruffy shops (lucky if you can find one) and the small mail order concerns with a limited range, and cheapest of all are usually the stall holders (again look for untidy small ones) at amateur radio events. The cheapest ones are those to use when building up the basic stock, as you may well have to spend good money on specialist items, often the active devices, at the more expensive sources. You live in a beautiful, but remote spot and have to buy everything by mail order? Fortunately I live within easy range of several major rallies, but have you ever been in Birmingham when it's raining! All is not lost if mail order is your only viable source of components. Many dealers offer good bargains, useful cheap packs (but be careful) and some attractive deals when ordering quantities of the basic components. Several companies offer resistor starter kits, usually 5 or 10 each of the preferred values, which for the would-be constructor with little, can be a good buy. But compare prices over several advertisers in several magazines.

Hardware hurts! . . . or the case can cost more than the rest.

One of the shocks for the new constructor, or the shocking fact for the old hand is that the hardware used in a project can cost more than the rest of it added up. As the preacher might say, is it something of a parable of modern life when the case costs more than all the electronics inside it, a knob can cost more than most transistors and a moving coil meter can add 50% to component costs? These are premium items to be sought at low prices and hoarded. I will say more about meters later, but collect old cases, new cases, single and matching sets of knobs and hang on to them. At junk sales it is well worth paying a pound or two for a useless item of equipment if it is in a neat case complete with matching knobs. (We will look further into refurbishing old cases and building simple new ones later in this series). Those useless items of equipment might contain some very useful components, which brings us to the subject of stripping surplus boards.

It would be possible to argue equally that buying surplus printed circuit boards to strip-off the components is good practice or pointless. Truth to tell, I hate stripping printed circuit boards: it is tedious, laborious, often difficult, and I usually burn my fingers! But for someone with a small stock of components, or none, this can be a very inexpensive way of building up the stock. Once again the art is to look for boards that contain expensive or commonly used items. Avoid boards with oddly coded transistors, unless the coding can be deciphered and, for normal mortals, removing integrated circuits from boards is too difficult. Getting the stuff off the board can be more of a problem than a beginner might imagine. "Melt the solder and pull" sounds like the answer, but manufacturers have a fiendish way of bending leads under and making the leads so short as to render the salvaged component useless.

A lot of people swear by (when stripping PCBs, a lot of people just swear!) solder suckers. These are like miniature spring loaded bike pumps in reverse, that suck up melted solder from a joint. They are very useful but expensive. I have one but often revert to my old method of heating the joint and prizing back the bent lead with a small steel jeweller's screwdriver with a sharp blade; when the leads have been prized back the joint can be reheated and the wire pulled free. Stripping boards is above all boring and could best be done while watching television, but insensitive wives tend to frown upon splashes of solder in the carpet. Try doing it while waiting your turn in that pile-up for a DX station.

There is so much more to say about choosing and buying components. Quite a lot will be said about this when we come to the practical projects in this series. A Good rule to follow is NEVER BEGIN A PROJECT UNTIL YOU HAVE GOT ALL THE BITS. Nothing is more frustrating on a wet Saturday night than to find that the essential component required to complete a project is missing. Gather all the components first and put them into a box, then begin.

What's an MPS-DO4?

Well it's an NPN Silicon universal transistor, Darlington type, 25v. 0.3A, 0.625W, with a TO98 base connection. Thankfully quite a few articles on construction include full information on the devices and components used, but many do not. In such cases we are left to sort out for ourselves codings and connections on the various components. Colour codings and some common types of connection on components are dealt with in the available data handbooks, useful to have if much construction is envisaged. Transistor and semiconductor information is listed in some catalogues of components, but it may be safer to have a comprehensive manual. Manufacturers issue manuals for their own devices, but as these list only their own types and may only be available to the trade, a comprehensive semiconductor manual is a useful, but expensive, buy. The occasional constructor can probably find the information in the reference section of a public library. Amongst such manuals, the "Towers International Transistor Selector" offers a very comprehensive source of information. I use the slightly more expensive TVT transistor guides, German books, a volume each for 2N and A-Z coded types; they cost a lot, but they aint 'alf got some transistors in 'em! It is probably a good policy for a local radio club to buy manuals for use by their members.

What about Tools?

For any practical work there is a necessary list of tools. The tools of the trade for the home constructor are relatively few and reasonably inexpensive. Top of the list comes a good soldering iron. Soldering irons seem to have held their own against inflation, but avoid buying the very cheapest or unknown Far Eastern instruments. Probably the best type is a small 15 watt iron with a small pencil bit and devoid of technical frills; large irons with small bits ought to be avoided as it is difficult to accurately place the bit into tight corners weighed down by a hefty piece of hardware. Other essentials include something to cut and strip PVC covered wire, a pair of diagonal cutters and penknife serve very well, although many like to use special wire cutting and stripping tools. A pair of small long-nosed pliers are useful for bending leads and a selection of screwdrivers just about completes the list. Such a modest collection of tools would enable anyone to build the majority of practical projects in amateur radio. Tools are always useful, so collect them, buy the best that can be afforded and keep them in good condition.

Test equipment is another concern for a beginner: it all seems expensive and old hands seem to have such a valuable array of test gear. However, a good deal of useful work in amateur radio can be done with simple test equipment and home made test items; the only real essential to buy at first is a multimeter. A meter of the sort our brethren across the Atlantic call a VOM (volt/ohm/milliamp) meter, and a low cost, imported, meter will suffice for most purposes. Additions such as an RF probe can easily be built to use with the meter. Many amateurs seem to have frequency counters these days and they can certainly be useful and

are now cheaper. Certainly lay out money on a frequency counter if it is available, but so much can be done without one.

A most useful piece of test equipment, often overlooked, is a general coverage receiver. Even the oldest types of general coverage receivers are useful to have around the workshop, so do not sell that old HRO or Skybuddy just because you own a deluxe amateur bands only receiver or transceiver. Also, our old haunt, the radio rally, can often provide some very good buys in second hand test equipment.

Failure is a Bad Joint

It is not too sweeping a statement to say that badly soldered connections are the chief cause of trouble for the beginner in electronic construction. It is useless being able to read and understand a circuit, amass the components and get the layout correct if the connections are poor. Although I do not wish to teach grandmothers to suck eggs, a brief outline of proper soldering technique seems appropriate to a beginners series.

Considering the tools, the rules are simple: keep the soldering iron bit clean and bright and only use resin cored solder of good quality. Many people use one of the little sponges sold to clean soldering irons: amazing little things, look like a thin strip of cardboard when bought, but add the water and up it grows to a useful thing of beauty. Such sponges have to be used wet for wiping the bit clean. More frequently used, and just as good, is a piece of old cloth for the same purpose. The textbooks say that the bit must be kept tinned, which means it should have a nice thin coating of gleaming solder at the business end. If this coating is not wiped clean and remade from time to time a nasty grey oxidized coating forms. This not only impairs the usefulness of the bit, but begins to eat it away. Some kind of holder for the soldering iron is important and one which sheaths the bit is the best type. This is not only safer — stops the XYL in her best dress backing onto a hot iron hung over the edge of the table — but helps to prevent the bit overheating. The rich buy thermostatically controlled irons.

There are very few rules for good soldering and if they are obeyed the constructor will have few problems. The first is that soldering is not welding, the joint should be a good joint before soldering occurs. The second is that solder does not like muck. The third is make sure that the joint is hot enough to melt the solder — we know the iron tip will. So putting those into practice, the procedure for making a good joint goes something like this:

1. Clearn the surfaces to be soldered — nice gleaming copper is pleasant to the eye so scrape the surfaces until they shine. Even tinned leads on components are usually filthy, look at one under magnification. Use a knife blade or abrasive surface and do not be fooled by components straight out of their wrappings.

2. Make a good physical joint before soldering begins — bend wires around tags, twist wires together or whatever is required for the two surfaces to make a contact that has not got to be externally held together. Don't try to bridge gaps with solder.

3. Heat the joint with the clean soldering iron bit and apply the end of the solder to the joint, *not* to the soldering iron bit. This is the only guarantee that the joint is hot enough for the solder to flow and stick. The solder should flow freely over the joint until it is just sufficiently covered. Too much solder is almost as bad as too little solder.

4. Inspect the joint when it is cool, but do not cool it artificially. The chief faults to look for are a weak connection or the dreaded 'dry joint'. The dry joint, called more correctly the 'cold joint' in the U.S.A. (perhaps that is too much like Monday's dinner for the U.K.) is a bad connection caused by the sections joined being too cool. A good joint has a natural flow of solder over its surface and is bright. The dry joint is often a dull grey and a 'blob' of solder rather than a smooth layer. It is not a bad idea, if possible, to give the joint if it is a wire, a slight tug to see if it is a good strong connection. Dubious joints in inaccessible places can be checked with a multimeter on a low ohms scale; this is a good idea for checking made-up leads which have soldered terminations.

Follow these simple rules and no problems should occur. Some beginners find soldering printed circuit boards difficult, but here the secret is to jam the bit between the protruding wire and the copper track, so that it is in contact with both, before the solder is melted.

So far all the we have discussed is theory, the only real way to become a confident constructor is by building things. A useful starting point is to make something using simple point-to-point wiring techniques. This is a method of construction which, using no terminations apart from those provided by the components themselves, means no complicated tagboard mountings or circuits boards are required.

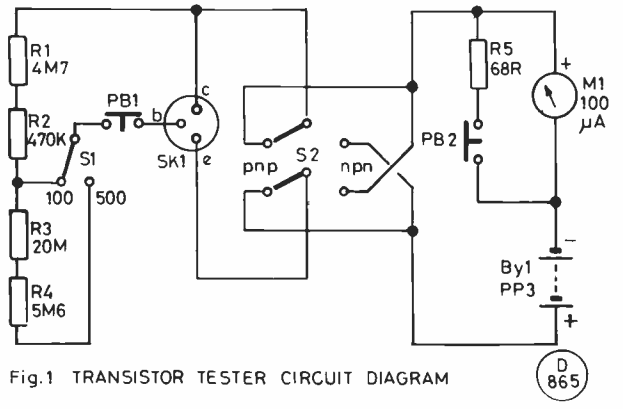


Fig.1 TRANSISTOR TESTER CIRCUIT DIAGRAM

Table of Values
Fig. 1

R1 = 4M7	PB1, PB2 = miniature press (on) buttons
R2 = 470K	S1 = single-throw, 1-pole switch
R3 = 20M	S2 = double-throw, 2-pole switch
R4 = 5M6	Sk1 = transistor holder/socket
R5 = 68R	B1 = PP3 battery
M1 = 100 A meter, *see* text	Metal Case = 4¼" x 2¾", with lid

A Simple Transistor Tester

Several of the practical projects in this series will be pieces of test equipment and a transistor tester represents a useful addition to any collection of practical equipment in the shack. This particular circuit is simple to build with direct wiring techniques and a version of this instrument has been in constant use on the G3RJV workbench for 10 years. The transistor tester described here will measure leakage current and small signal gain of almost any NPN or PNP types. It can also grade unknown transistors into NPN or PNP and can match up pairs of transistors when required.

The Circuit

The circuit, shown in Fig. 1., tests the devices in the common emitter mode, the most important parameter to be measured is the small signal gain (Hfe). S1 is the gain switch, which in the position shown in Fig. 1. gives a full scale reading equal to a gain of 100; switching over gives a full scale reading of 500. Pressing PB1 allows the reading of the gain to be taken. PB2 increases the full scale reading of the meter by a factor of 10, useful for checking the leakage current of some germanium types.

When the transistor is plugged into the socket SK1 any reading showing on the meter is the leakage, and this can be read directly off the meter in μA, unless the reading is so high that PB2 (x 10) has to be used. Pressing PB1 gives the readout of the Hfe on the scale with the option of 100 or 500 as full scale deflection. The polarity (NPN or PNP) of a transistor can be found by just plugging in the device and if the meter flicks hard over it is not the

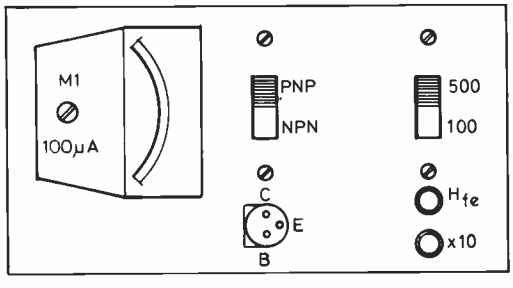
correct polarity on the NPN/PNP Switch, S2; reversing this switch should give a low reading, or no reading at all.

Construction

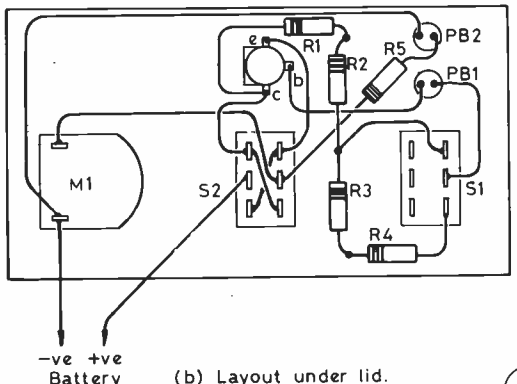
The prototype tester was built in a metal box, but any housing would serve the purpose — see what can be had at low cost. The wiring is all done on the inside of the lid and the layout is shown in Fig. 2. No dimensions are given because this will depend upon the size of the box and the meter. Begin by laying out the front panel components to achieve a balanced layout and mark out the positions with a pencil prior to attacking the panel. If it is metal, drill and file to fit the components in place. I have a useful little tool called a 'nibbler' which cuts thin sheet metal to almost any shape. This is a recent luxury and "drill and file" was, for years, my only method.

A good technique when beginning a project is to decide which will be the most expensive component. Then try to substitute something cheaper, as we are not in home construction to spend money! (If I ever became a CB-er — what am I saying! — I would call myself 'Mean Man'). The most expensive component here is the meter. A useful source of inexpensive meters are the surplus tape recorder meters sold by some dealers. These are much cheaper than manufacturer's purpose-made meters and may sometimes be called VU meters. What is required is a meter with a full scale deflection of 100 μA. "Here he goes", they say, "get it on the surplus market, but how do we know that any of those unmarked meters on the junk stall are 100 μA or even any good?" Well, after this, I will describe a fiendish little beastie which will tell all. These ex-tape recorder meters vary in shape and size, so make a simple template of the section that requires to be recessed into the panel, before it is cut out.

The switches S1 and S2 can be inexpensive slide switches arranged in rectangular holes cut and filed to size. When filing holes for these meters aim for a free movement of the slider, for ease of operation. It is a good idea to test such switches before mounting with an ohm meter as they can be notorious for bad connections. The transistor socket hole is drilled for a tight push fit, though the socket can be secured with *Araldite* if it is loose. Some constructors may find transistor sockets difficult to obtain but they are sold by the nationwide *Tandy* stores as a stock item.



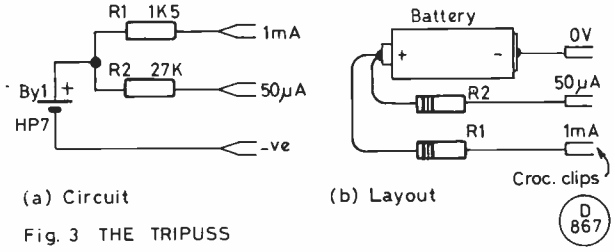
(a) Front panel



(b) Layout under lid.

Fig. 2 TRANSISTOR TESTER

D 866



(a) Circuit (b) Layout

Fig. 3 THE TRIPUSS

D 867

PB1 and PB2 are simple press-to-make push button switches of any type. The wiring of the circuit under the lid is shown in Fig. 2. The wiring is quite simple and point-to-point but a few factors have to be considered. There are three free standing solder junctions — R3/R4, R2/R3, and R1/R2. These joints must be made firm by twisting the leads before application of the solder; when they are soldered, they should be bent away from the front panel to avoid accidental shorting. Also the crossed wires on S2 must not make electrical contact and are best wired using PVC covered cable. The prototype used three types of transistor holder to increase the instrument's usefulness, these were wired in parallel with SK1.

Operation

The transistor tester is simple in use and much of the operation has already been outlined. The two parameters to be tested are the gain (Hfe) and the leakage (Ico) of the transistor. The leakage is simple, just plug in the transistor and it is indicated. The correct base connections have to be applied to the appropriate hole of SK1, and any good transistor manual will give this information. In the case of an NPN type, the leakage should be low, probably too low to get a clear reading. Older germanium PNP types are renowned for their high leakage and the times-10 button may have to be pressed. Naturally the lower the leakage the better, but even very leaky germanium types have some use; that is if the leakage does not exceed the gain! The leakage test is useful for determining the polarity of the transistor in the method previously described. Trying the transistor in the socket to obtain the lowest leakage reading shows its pedigree.

The gain (Hfe) is tested by depressing PB1. It is probably better to begin on the 100 scale and then use the 500 scale if the reading is too high. The actual gain can be compared against a known good transistor, or compared with the makers' figures in a data book. The procedure is very simple and the completed instrument can become a very useful item of test equipment.

The Tripuss

What about those surplus meters? So often they are just sold on a counter in a junk shop or rally stall without any indication of their full scale deflection or integrity. What is really required is a simple device which can both show if they are good meters and also give an indication of the full scale value. Such a device is the 'Tripuss', so called because when built it looks like an octopus with three arms. All the device does is provide a low voltage passing through a resistance to give the desired current flow to check a meter.

The Circuit

The circuit, what there is of it, is shown in Fig. 3a. It is simply a single 1.5 volt cell with a series resistor, or rather a choice of two series resistors. If a meter is connected between the negative lead and R1 a current of near enough 1mA will follow, and with R2 the current is 50 μA. This does not take into account the resistance of the meter, but this is normally so small compared with the values of R1 and R2 as not to be important. Besides — what do you expect for something which costs next to nothing and can be carried in the pocket? The termination on the leads consists of small crocodile clips which can be conveniently latched onto whatever connections are offered to the meter.

Construction

The Tripuss is simple to build and the method is shown in Fig. 3b. The only likely problem may come when soldering the leads directly onto the HP7 battery. The most difficult connection is the one to the negative, which is the zinc casing of the cell. Clean the end of the case very well with a knife edge, heat it with a soldering iron and let solder form a tinned surface on part of the casing. The lead can then be soldered to the tinned portion. Here we break my rules because it is not possible to make a secure mechanical joint before soldering on the wire. Just hope for the best! The two resistors are soldered onto the positive cap in a similar way, but this is usually easier. R1 and R2 are spaced apart along the side of the battery; leads are then added to the ends of R1 and R2. It is best to have unequal lead lengths for all three wires to prevent accidental shorting out of the circuit. The whole of the body of the Tripuss is covered with a binding of black PVC tape which holds the resistors in place and incidentally gives it the three-armed octopus appearance.

Operation

The use of the Tripuss is as simple as the circuit. The negative lead is connected to the negative side of the meter and positive lead to the positive, and the needle will indicate the appropriate current. 50 μA and 1mA were chosen for the two current values as a compromise which should be useful for quite a range of meter scales. Very few surplus meters are less than 50 μA full scale deflection and very few are over 100mA f.s.d. unless externally shunted. Try the test on the 50 μA scale first, then if the reading is very low try the 1mA range. The test is also very useful as an indication of the state of the meter as it instantly shows up non-working meters or ones with needles which stick. What happens if a dealer refused to let you try the Tripuss on a meter? — Take your trade elsewhere!

This first article has explored some of the basics of building radio and associated equipment. In future parts we will explore various construction methods, each to be linked with practical projects to build. Construction is not difficult and is certainly fun, so . . . plug in your soldering iron and begin here.

Sources of Components: The components for the Transistor Tester and Tripuss should be readily available as mentioned in the text, or from *J. Birkett* who advertises in *Short Wave Magazine*.

ICOM IC-202S SIDETONE MODIFICATION

N. R. PASCOE, G3IOI

THE writer considers his IC-202S 3-watt SSB/CW portable rig for 144 MHz an excellent little piece of gear and after 18 months use, still thinks it was one of his best buys. Excellent results have been obtained /P using just the internal whip whilst from the home QTH with a homebrew 7 element cubical quad, hundreds of European QSO's have been made during lift conditions.

There is, however, a design feature that almost certainly annoys those who use the rig in the CW mode, in that the output of the sidetone monitor oscillator is tied in with the audio gain control, as shown in Fig. 1. The result is that with the control at a high setting to copy a weak CW signal, switching to transmit and keying the rig is an earshattering experience. The design engineer was obviously not a CW man! A preset level of sidetone volume, independent of other controls is to be preferred and the circuit of Fig. 2 enables this to be done.

Remove the left side cover of the transceiver to reveal the AF gain control potentiometer, R2, behind the front panel. The writer must admit to requiring a magnifying glass to identify the

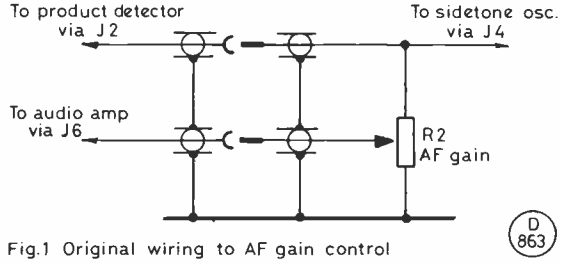


Fig.1 Original wiring to AF gain control

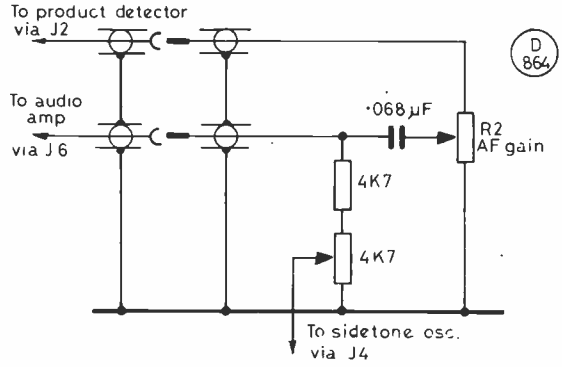


Fig. 2 Modified wiring to AF gain control with additional components to provide preset sidetone level facility.

connections to this component. The modification is then effected, using a small soldering iron, as follows:—

1. Disconnect the wire from the sidetone oscillator (the unscreened wire on the uppermost tag).
2. Disconnect the wire to the audio amplifier (the screened wire on the centre tag).
3. Connect a 0.068μF capacitor between the screened wire to audio amplifier and the centre tag.
4. Connect a miniature 4.7K skeleton potentiometer with a 4.7K ¼-watt resistor in series between the junction of the 0.068μF capacitor/screened wire to the audio amplifier and earthing tag located between the AF gain potentiometer and key and external speaker jack.
5. Connect wire from sidetone oscillator to the slider of the skeleton potentiometer.

Bearing in mind the compactness of the construction, make sure there are no shorts between the existing and additional components. The sidetone level can now be adjusted to ones personal liking. Finally, before replacing the side cover, stick a strip of insulating tape to it where it covers the mod. to ensure that it does not short to the new sidetone level adjusting potentiometer — and that's that!

160-METRE TRANSVERTER FOR THE FT-707

IAN KEYSER, G3ROO

BEFORE changing my car, the FT-707 was brought into the shack prior to re-fitting in the new vehicle, and during this period it was, inevitably, connected to a car battery (with microphone gain reduced to help lower the charging requirements) and the station rhombic to see how it worked. The receiver handled very well, even on Eighty and Forty at night, though the extra power didn't really make a tremendous difference in signal strength — this being confirmed by running the QRP rig in tandem. In the event, the set became a permanent part of shack equipment, with a number of accessories needed to complement the rig.

The first things that came to mind were a QRP PA to enable the rig to be used in QRP contests (it is not sufficient just to wind the power down as the rig must have a designed output power of less than 5 watts), and an external VFO. However, the real downfall of the set is its lack of 160m. The circuit was explored with the idea of changing one of the new bands to 160m., but this approach was soon discarded with thoughts turning to possible re-sale problems with a modified set. The next best thing was a transverter.

The FT-707 is fitted with a number of outputs on the backdrop, including a low-level ouput for transverter use, an 8-pin socket for the external VFO (*see* Fig. 6b), and a further 7-pin socket for other accessories. On exploring the circuit, the accessory socket did not have the required supplies, but the external VFO socket had everything needed — including 12 volts, 8 volts, and 8 volts on transmit. A complication here is that when the transverter is in use an external VFO cannot be used unless it can be plugged into the back of the transverter, and this requires a suitable switched socket to achieve the necessary switching. Rummaging through the junk box revealed the ideal thing — a 5-pin DIN socket with an integral two-pole changeover switch; actually, all that is required is a single break contact when a plug is inserted.

Design Considerations

It was decided to keep the power levels within the QRP range, and so 5 watts DC in was to be the target; after all, to go to the maximum permitted power would only give just over one S-point increase, and problems of stability would be compounded. Also, having just completed the "Tunbridge" (*Short Wave Magazine*, November and December 1981) I wanted to confirm that the RF circuits could be made to cover 160m. which really meant using a

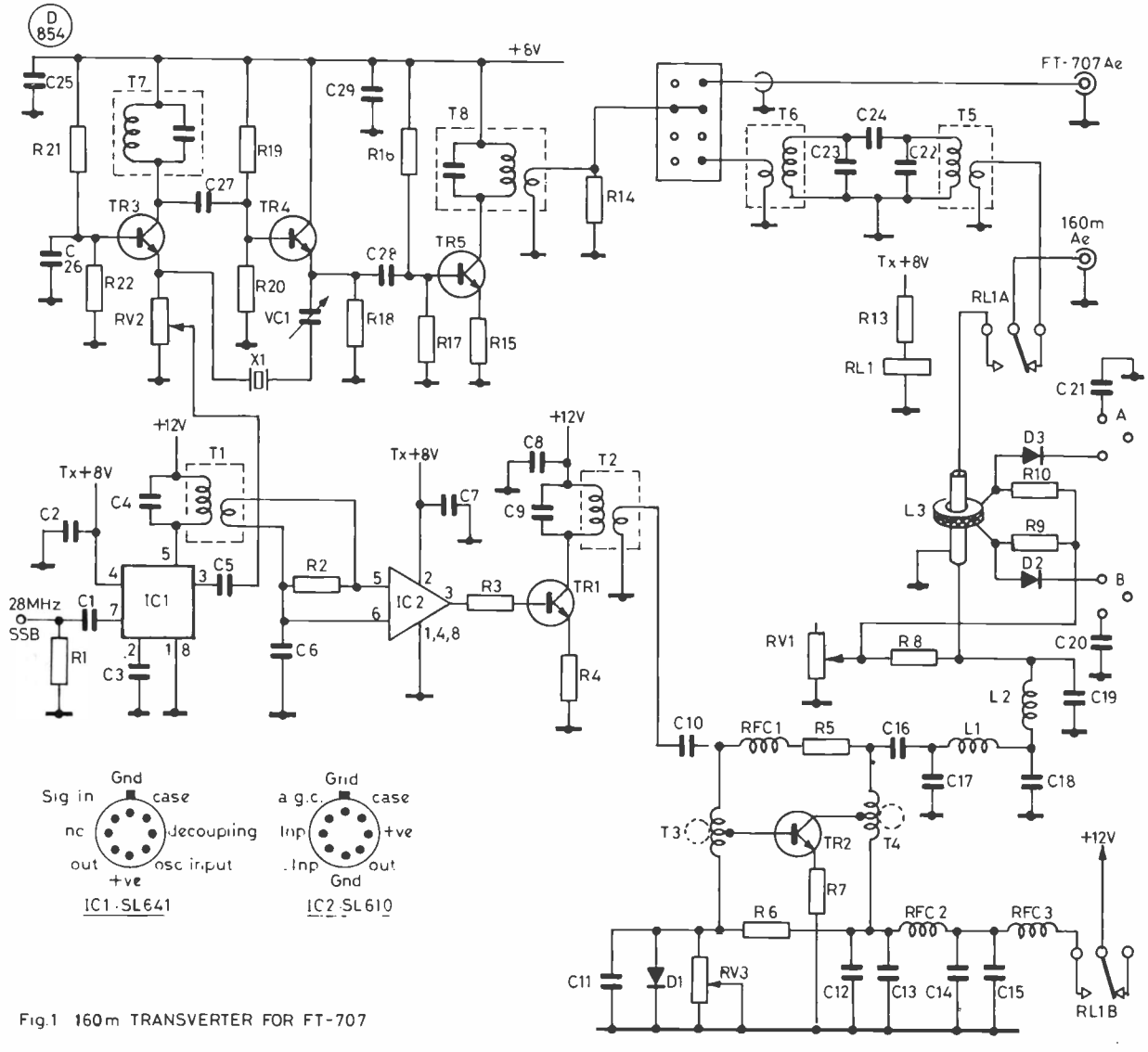


Fig.1 160m TRANSVERTER FOR FT-707

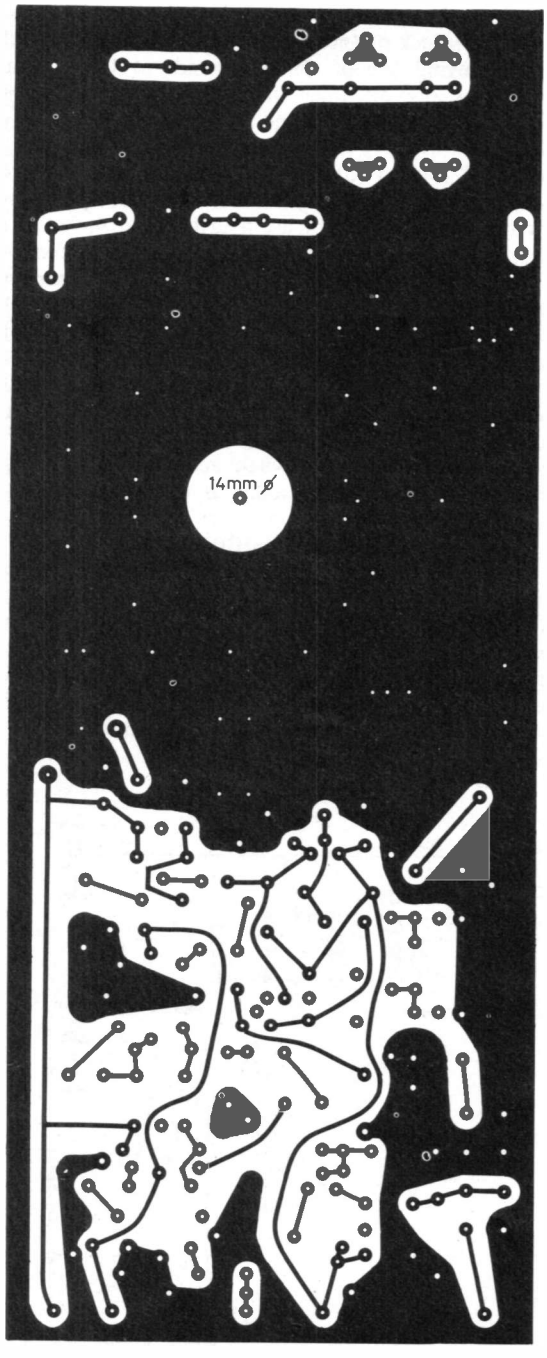


Fig. 2 UNDERSIDE OF PCB (Full size) D 855

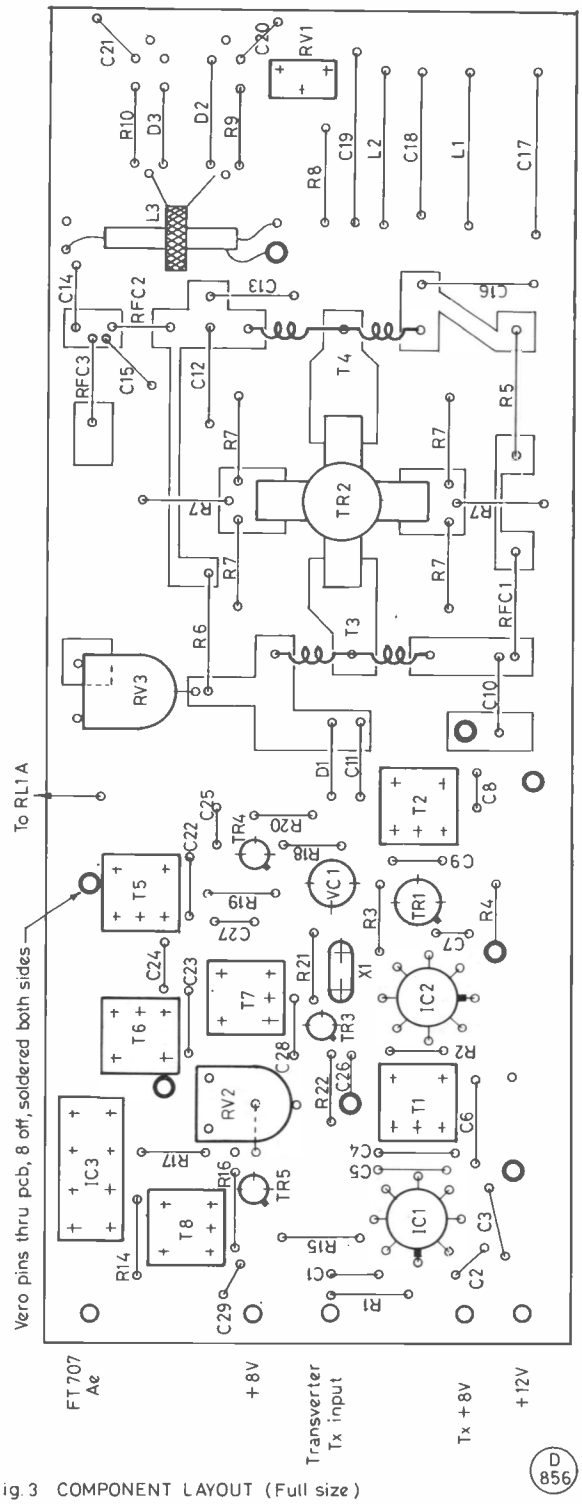


Fig. 3 COMPONENT LAYOUT (Full size)

similar circuit; there had been no problems with the "Tunbridge" — so why not? On the receive side, a "rat's nest" showed that an MD108 with oscillator injection on 27 MHz did not require preselection even at night when fed with a dipole, and that the insertion loss was not a problem due to the sensitivity of the FT-707 and the high noise level experienced on 160 metres. This could make for a very simple receiver section, but it was decided to play safe and include an overcoupled bandpass circuit "just in case".

There is no requirement for switching on the input (signal) to the transverter due to the availability of the transverter output socket, but the aerial side had to be switched. Pin diodes were considered but ruled out on the grounds of cost, after a small Claire relay with two poles of changeover had been found and purloined from G2ACG's junk box! There is no reason why pin switching could not be used for aerial switching: however, there is still the necessity for the 12v. supply to the PA to be switched, and the two functions are easily combined in a relay. As in the "Tunbridge", an SWR bridge is a 'must' — if only to put something on the front panel!

Description

To enable the FT-707 low power output to be used it is necessary to disable the PA unit in the rig. This is simply done by breaking the link in the power plug (Fig. 6a) which removes the base bias from the output stages, so cutting off these devices. The low level output from the 'Transverter' socket on the 10B range

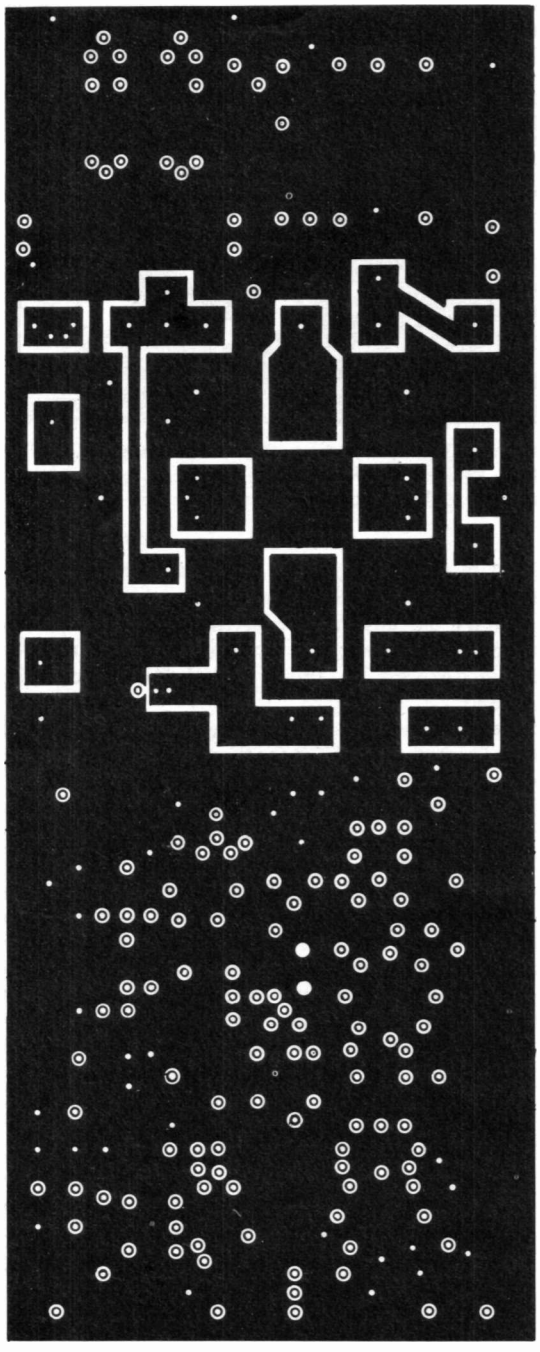


Fig. 4 TOP SIDE FOIL PATTERN (Full size). (D 857)

(28.5 to 29 MHz) has an amplitude of approximately 100 mV r.m.s., and this is fed directly to the signal input of an SL641 (IC1). Here it is mixed with the output of the of the 27 MHz crystal oscillator, and the difference signal is selected by T1 at the open collector output of the device. R2 is included to damp the tuned circuit, and at the same time reduces the tendency of the device up to IC2 from oscillating due to the inductance on its input. The output from IC2 (an SL610) drives TR1; a 2N3053 was used here, but in practice a BC109 should easily do the job and a maximum of just under 200 mW. was obtained from the link when R4 was reduced to 52 ohms. *See* Fig. 1.

The PA circuit was originally published in *Ham Radio* some years ago and although changed a little is still basically the same. It has proved a very simple and stable circuit to put into operation, and being run in Class-A it can use almost any RF capstan type of

Table of Values
FT-707 160m. Transverter

R1, R14 = 50R
R2, R3, R4, R15, R18 = 470R
R5, R8, = 5K6
R6 = 1K
R7 = 6 x 3R3
R9, R10 = 22R
R11 = *see* text
R12 = to suit meter lamp
R13 = to suit relay coil

R16, R19, R21 = 33K
R17, R20, R22 = 10K
C1, C2, C3, C5, C6, C7, C8, C20, C21, C25, C26, C28, C29 = 0.01 μF d/c
C4, C9, C22, C23 = 140 pF poly
C10, C12, C14, C16 = 0.1 μF C280
C11, C13, C15 = 500 pF s/m
C17, C19 = pF s/m
C18 = 2500 pF s/m
C24, C27 = 10 pF ceramic
IC1 = SL641
IC2 = SL610
IC3 = MD108 or SLB1 (Ambit International)
TR1, TR3, TR4, TR5 = BC 108
TR2 = 2N5590
D1 = 1N4001
D2, D3 = germanium signal diodes
T1 = 154 FN 8A6438
T2, T5, T6 = KANK 3333R
T7, T8 = MK XCSK 3464B
T3, T4 = 25 turns bifilar 26 *swg*, T-68-2
L1, L2 = 22t, 22 *swg*, T-50-2
L3 = 12t on FX 1596
RL1 = 2-pole 2-way hi-speed relay
Skt1 = 5-pin DIN skt. with switch

Note: All resistors are ⅛-watt rating; all coils and cores are available from *Ambit International Ltd.*, Brentwood, Essex.

transistor. A drawback is that it *is* run in Class-A in that there is a requirement for a larger-than-usual heatsink to dissipate the heat generated by the high standing current. In this design I only use a 2½-in. square piece of ⅛-in. aluminium, with a suitable cut-out for the drive input, pin-mounted on the back of the PCB and painted black. This is not really sufficient and ideally fins should be fitted to aid cooling. In practice it runs fairly hot on transmit, but cools on receive!

The low pass filter for the transmitter has been included on the PCB in the form of L1, L2, C17, C18 and C19. The output of the filter is fed *via* a short length of co-ax through the centre of L3 to provide an electromagnetic coupling into the reflectometer circuit, the reference signal being adjusted by the ratio of R8 and RV1. It is very important that the length of co-ax is only earthed at one end, the other end being insulated from earth — this way it acts as an electromagnetic screen only. The RF energy is switched to the 160m. aerial by a contact on RL1.

Receiver Section

In the receive mode the aerial is switched to the bandpass tuned circuits T5 and T6 by the relay RL1; these circuits are slightly overcoupled, and one should be tuned to 1950 kHz and the other to 1850 kHz. Due to the tight coupling between them there is considerable interaction in this procedure, and it should be repeated several times to get it right. The low impedence output of T6 drives the input of the MD108, and the sum output of the signal input and the local oscillator signal is fed to the aerial input of the FT-707. It must be stressed at this point that the link in the power plug must be removed (Fig. 6a) otherwise the accidental activation of the FT-707 Tx will destroy the MD108 — and they are not cheap!

Crystal Oscillator

To enable the digital dial of the FT-707 to read 'kHz' accurately, a 27 MHz third overtone crystal is used: this gives a tuning range of 28.800 to 29.000, to cover 1.800 to 2.000 MHz. Unfortunately these crystals do not seem to be available "off the shelf" in England; however, if you're going to Paris for the weekend. . . .

Transistors TR3 and TR4 form the oscillator circuit. The emitter load of TR3 is a miniature preset, RV2, to enable the injection to the mixer to be set up accurately, and an output is also taken from the emitter of TR4 to the base of TR5; this transistor is needed to increase the injection to the MD108 to the required minimum of +3 dBm.

Printed Circuit Board

The thought of making a double-sided PCB, especially for those who have never made a PCB before (there's a new series just for them starting in this issue! — *Ed.*), might be rather a daunting prospect, but with a little care it's not so bad, and when completed looks very professional!

Firstly, cut out a piece of double-sided PCB to the required size and, placing it under Fig. 3, accurately prick all the holes through to the board using a sharp scribe; using these marks, drill the board with a 1 mm. drill. Here I use my electric drill in a bench stand, the drill shank held in an *Eclipse* pin chuck which in turn is held in the power tool's chuck. (An important thing if you are going to buy one of these pin chucks is to make sure that the cross in the jaws has been accurately cut, as they do have a tendency to be out of centre).

Now carefully remove all burrs with fine emery paper and, using a $\frac{3}{16}$-in. drill and referring to Fig. 4, remove the copper from all the holes shown to about $\frac{1}{8}$-in. dia. to protect against the component leads shorting to the groundplane. All the other holes are earth connections, and when the PCB is working properly these leads should be soldered both sides of the PCB. The next move is to clean the PCB thoroughly: I use a clean green pan scrubber until the metal is shining on both sided, and then wipe over with a carbon-tetrachloride based fluid.

Drawing the Boards

Here I use a combination of Dalo pen and nail varnish (a relatively cheap way of buying a suitable resist and brush — and something which can often just be 'borrowed' from other members of the family when they're not looking!) Referring to Fig. 4 again, now carefully draw the pads onto the copper surface using the Dalo pen; don't rush this as it is the surface to be on view. A word of advice about the pen: if it is a new one I have found it better to lightly press in the nib to get the ink to flow then, having removed any excess (you may have pressed too hard if it is your 'first time' and flooded the pen!), put the cap back on and leave for a few hours. This way I find that the pen draws a better line, presumably due to a slight softening of the nib fibres.

Having done the pads, now do the more fiddly sections of the groundplane with the pen and complete the rest with the nail varnish. After checking that there are no missed areas, allow the surface to dry for at least an hour.

Now turn the board over onto a soft surface, such as a tissue, and referring to Fig. 2, draw this side of the board in the same way. When completed and dry, the board should be etched on its edge in a bath of ferric chloride; by inserting a couple of pieces of copper wire through holes at each end of the board it can be supported in the etching bath. When etching is complete the board should be washed in warm water and dried on an old piece of rag (don't use anything better as ferric chloride seems to permanently stain brown). The resist can then be cleaned from the board using a solvent, and finally the holes cleaned out using the drill by hand.

Ian Keyser, G3ROO, in his shack. Of particular interest in the picture is the FRG-7 *trans*ceiver, which was the subject of an article by G3ROO in the June, 1980, issue of *Short Wave Magazine*.

Next drill out the holes for mounting the power transistor and heatsink. The hole in the PCB for the power transistor should be large enough not to foul the transistor, and the metal shank of the transistor must sit flat on the face of the heatsink to ensure maximum heat transfer; a little silicon grease helps this process. Having done this and mounted the transistor, begin adding the smallest components, then the next largest, and so on, until finally the inductors finish the board. In this way the fiddle of getting the smaller components between the larger ones is avoided.

There is one link on the board, and this is under RV2 and must not be missed out. The relay in the prototype was fitted on the board, but it is unlikely that generally one small enough will be to hand, so the relay should be mounted in a convenient position on the chassis and the necessary connections made from the board.

Setting-Up

On receive, apply power and adjust the core of T7 while listening to 27 MHz on a general coverage receiver; sufficient pick-up will be obtained with a short piece of wire from the

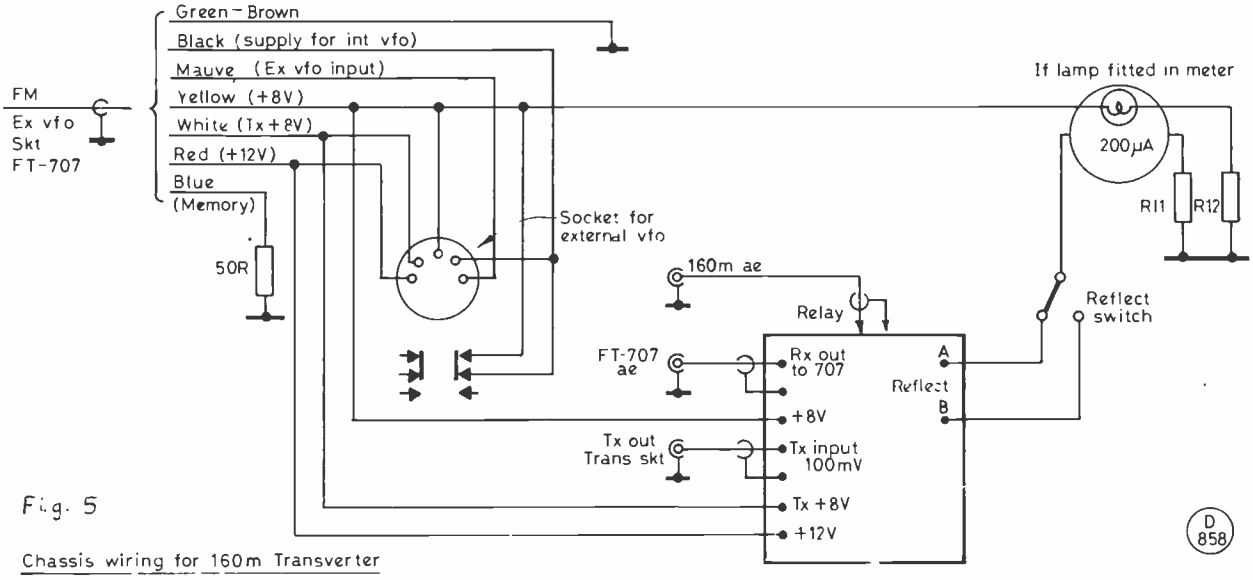


Fig. 5

Chassis wiring for 160m Transverter

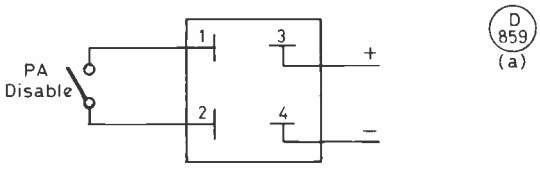


Fig.6a FT-707 POWER PLUG

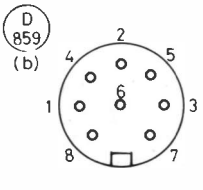
receiver aerial terminal lying close to the PCB. When the oscillator starts, adjust the core to the mid-point between the two settings where it does so. Now remove power for an instant to ensure that the oscillator commences without problem. Next, listening to the FT-707 tuned to about 28.9 MHz, peak T8 for maximum signal strength on any signal that can be found. Now find a signal at about 28.95 (1.95) MHz and peak T6, re-tune to 28.85 (1.85) MHz and peak a signal there. Repeat this procedure a couple of times to get it "on the nose". This completes receiver alignment.

Setting-up the transmitter is only a little more complex, and a 'scope or VTVM with an RF probe makes it very simple — providing there are no wiring faults! Firstly, to keep track of what's happening, use a multimeter on its 1 amp range in the 12v. supply to the PA to monitor its current, then set RV2 fully anti-clockwise and RV3 fully clockwise. Power should now be applied and if there are no obvious signs of stress (such as rising smoke), RV3 can be set to adjust the PA standing current to 400 mA. Ensuring that the link in the FT-707 power plug has been removed, apply drive from the FT-707 Tx on CW and with a little luck there will be a slight kick in the PA current. If no increase or kick, don't despair — with the VTVM and RF probe, or 'scope, check that drive is reaching the PCB: if it is, move the probe to the hot end of T1 and peak for maximum signal. Now move the probe to the collector of TR1 and peak the core of T2: there should be a noticeable increase in the PA current (in the case of the prototype it increased by 600 mA).

Next connect a dummy load to the 160m. aerial socket and connect the RF probe to measure the voltage across it. Under full drive conditions, now slowly reduce RV2 until there is a sudden drop in the output power — this is the correct setting point for RV2. All being well, re-tune T1 to 1850 kHz and T2 to 1950 kHz and then check that the response is reasonably flat over the whole band. If it isn't, it will be necessary to damp the offending transformer until it is.

After all this setting-up, the drive level might be a little low, but this can be re-set by reducing the value of R4; however, if it is necessary to reduce below 47 ohms there is something wrong, and the fault should be traced. The final value used in the original was 150 ohms, and this gave a PA current of 425 mA. at full drive.

It now only remains for the reflectometer to be set up. It will be evident which is the forward and reflected position of the switch by observing the meter. Set the switch in the reverse position and adjust RV1 for a null; now switch to the forward position of the switch, and select R11 for full scale deflection. This completes setting up the transverter.



Pin	Colour	Mode
1	Green	Earth
2	White	Tx 8V
3	Brown	Earth
4	Yellow	8V
5	Black	VFO (INT) Supply
6	Red	13·5V (or 12V battery)
7	Mauve	Ext. VFO in
8	Blue	Memory

Fig. 6b. Ex. VFO Socket of FT-707

Metal Work

One of the worst problems with home-constructed gear is the final 'boxing-up' of the equipment. It can either make or break a project, and as much time should be spent in the design of the case as possible. I always try and use the same size case for all equipment, and my 'standard' size is 6 x 3-in. front panel and 9-in. deep. However, *H. L. Smith*, 287-289 Edgware Road, London W2 will make cases to individual requirements at very reasonable prices; all that is needed is a sketch of the case and the gauge of the aluminium specified. I would suggest 16 s.w.g. for all casework, and 18 s.w.g. for screens.

Conclusion

The transverter is a fairly cheap way of getting on to 160m., and during QSO's reports have all been very favourable. As changeover is accomplished by the Tx + 8v. line, VOX and CW both work very well, and by using an external VFO split frequency working is possible. Incidentally, the external VFO for the FT-707 is to be the subject of another article in *Short Wave Magazine* in the near future.

Finally, I would like to thank G6LD for suggesting the idea and G2ACG for all his valuable help and time in the testing of the transverter during its entire evolution.

Latest addition to the *LAR Modules Ltd.* range is this Antenna Noise Bridge, which has a frequency range of 500 kHz to 200 MHz and can handle resistive loads up to 220 ohms. A review of this useful product will appear in an early issue of *Short Wave Magazine*.

CLUBS ROUNDUP

By "Club Secretary"

ALERT readers and Club members will notice that this time the piece is shorter than of late . . . if *your* club has disappeared, then you forgot to send us in the update.

Again this time we have the odd new club, but this month they appear in the alphabetical listing.

The Mail

"It's an ill wind that blows no-one a gain": the Hon. Sec. at **Acton, Brentford and Chiswick** has turned it into a subject for the discussion evening on Tuesday, June 15, at Chiswick Town Hall.

Next we have **A.R.M.S.**; this is the club for all who enjoy operating in the /M mode, whether at MF, HF, VHF or UHF. Details from the Hon. Sec.—*see* Panel for his details.

Over the water to **Antrim**, where the recently-formed group have a place in the Board Room, Antrim Forum on the third Thursday in each month; and they do like to see visitors or, even better, potential new members.

Biggin Hill have their place in the Memorial Library; on June 22, they have a film from RSGB, on microwaves.

One who took our hint about up-dating was the **Borders** Hon. Sec. They are still foregathering on the first and third Fridays in each month, but the venue has been moved to the "Waterloo Arms", Chirnside, Berwickshire.

Now to **Brighton**, where the Hq is changed from the Cromwell Road address to the YMCA in Marmion Road, on every second Wednesday. On June 16 they have an Evening Rally at the racecourse, no doubt as a sighting shot for the real thing—the Brighton Rally on July 18.

June in **Braintree** is noted in the diary as June 7 and 21; on the former date they will learn of the club's history from Bob Willicombe, and on the latter G3PEN will unravel the mysteries of VSWR and dummy loads. On July 11 they will go to Hatfield Forest for a picnic. As for the Hq, this is at Braintree Community Centre, Victoria Street, Braintree, next to the bus station.

On to **Bromsgrove**, where the Hq is at Avoncroft Arts Centre. June 11 is just described as a "club night", June 25 is a session on QRP, and on June 26 they will probably have a float in the Bromsgrove Carnival, and also a station in Sanders Park.

Normally the **Cambridge** group are at the Visual Aids Room, Coleridge Community Centre, Radegund Road, but on June 4 they move to Camberton Village Hall for a junk sale; June 11 is an informal at Coleridge C.C. and on the 18th G6GPH will talk about model aircraft.

At **Chelmsford**, the venue is the Marconi College in Lecture Room 1, and the subject of the June meeting is the Construction Contest—all we don't have is the date! for which we must refer you to the Hon. Sec.

Cheltenham have June 3 and 18 booked at the Old Bakery, Chester Walk; the former is down to Severn Sound for a talk, and the latter is a natter night.

On to **Cheshunt** and here the Hq is at Church Room, Church Lane, Wormley, and used every Wednesday evening. June 2 is down to G3TIK, and there is a natter session on 9th; on 16th G8NDR will talk about and demonstrate a video disc system, and on 23rd another natter. Finally, on June 30, they will be out with portable 144 MHz gear on Bass Hill Common.

Colchester are based on Colchester Institute in Sheepen Road; on June 10 G4JIG takes them "sailing round the Essex coast", and G3FIJ takes them on 25th into measurement of frequency and wavelength.

A new group to us is the one at **Connemara**, although they have been foregathering, in fact, for several months. For more details — and indeed for details of any activity in West Ireland—contact the Hon. Sec. at the address in the Panel.

On the second Thursday of each month, the **Conwy Valley** members make their way to Green Lawns Hotel, Bay View Road, Colwyn Bay; in June the AGM on 10th will be preceded by a sale of surplus equipment, so the scheme is to arrive sharp at 7.30 p.m.

Another new one to us is at **Copeland** where they meet on the first and third Wednesday in every month at the Market Hall, Egremont, West Cumbria.

Cornish have June 3 for a talk on AMSAT-UK; this will be at their usual place, the SWEB Clubroom, Pool, Camborne.

Turning now to **Coventry**, we find they are still taking every Friday evening at the Scout Hq in Nicholas Road, Radford, Coventry.

Crawley are at Trinity Church, Ifield, Crawley on the second Wednesday of the month; there is also an informal on the fourth Wednesday, which is held at the home of one of the members.

Cray Valley have meetings on June 3 for a natter, and June 17 for a talk on Radio and Aviation by G4FXR; both are at Christchurch Centre, High Street, Eltham, London SE9.

Last of the C's is **Crystal Palace** where the June meeting is at Emmanuel Church Hall, Barry Road, London SE22, and of course the third Saturday. As for the subject, amateur radio D/F is being tackled by Peter Lisle.

Every Wednesday evening, the **Derby** gang are to be noted heading for 119 Green Lane, Derby, where they have the whole Top Floor. For June we see: June 2, a junk sale; June 9, a technical quiz; June 16 a demonstration of SS/TV by G3KER; and on 23rd they will be having the Barbecue at Drum Hill, Little Eaton. Finally, June 30 will be a night-on-the-air.

Deadlines for "Clubs" for the next three months—

July issue — May 28th
August issue — June 25th
September issue — July 30th
October issue — August 27th

Please be sure to note these dates!

Next **Edgware**, at 145 Orange Hill Road, Burnt Oak, Edgware, on the second and fourth Thursdays. June 10 is a quiz evening, set up by G3PSP, while the informal on June 24 will include a briefing on VHF NFD.

June for **Fareham** sees natter nights on June 2, 16 and 30; in between they have June 9 for the Ferguson TX Concept, by G3GMW, and June 23 when G4ITF will talk about the use of the oscilloscope in fault-finding. As ever, look for them in Room 12 at Portchester Community Centre.

Our next stop is up in GM-land, to **Glenrothes**, where they foregather at Provosts Land, Leslie, every Wednesday evening and on the third Sunday.

For **Greater Peterborough** we have it that they have visits planned for both June and July; this being so we suggest you get a detailed assessment of what's on from the Hon. Sec.—*see* Panel.

We see June 11 and 25 as the dates for the **Guildford** crew; the former is a natter evening and the later one is down for G4BCY to talk about QRP, both being at the Guildford Model Engineers' club Hq in Stoke Park.

Moving on to **Harrow**, we find them gathering every Friday evening at Harrow Arts Centre, High Road, Harrow Weald. June 4 is "Practical and Informal", while June 11 sees a talk on orienteering. On June 18 there is a surplus sale, and on 25th it is again informal and practical. Harrow is one of the largest clubs in the London area, and part at least of their success is the way in which they contrive to involve all their newcomers in the club activities as soon as possible.

Hastings next, and for them the third Wednesday sees the main meeting at West Hill Community Centre. On Friday evenings they have their chat nights, at 479 Bexhill Road. One extra we notice for this time is that they have a Summer Social slated for June 16.

We have an update from the **Havering** group where the Hq is at Fairkytes Arts Centre, Billet Lane, Hornchurch every Wednesday. June 9 is informal, and on 16th they have a D/F hunt on Top Band starting from Hq. On June 23 they plan for VHF NFD, and on June 30 they have a film show.

Next we head for **Hereford**, who have their place at the Civil Defence Hq, County Control, Gaol Street, Hereford. On June 4 they have a meeting which was at the time of writing still 'open' as to subject. Next comes June 18, for the informal evening. In between they will be operating NFD of course, and on June 19 they will be going to the HF Convention at Oxford.

Over to EI, where we have the **IRTS** newsletter to hand; they have had their AGM, and things seem to be back on the rails after a bad year with the newsletter. For anyone who wants to know what is happening in EI-land, then a contact with the IRTS Hon. Sec. seems the correct answer.

Back in England again, to **Itchen Valley** where the club, formed in February, seems to be making good progress. Find them at the St. John Ambulance Hall which lies at the corner of Desborough Road, and Blenheim Road, on alternate Thursdays.

Over in **Limerick** the College of Art, Commerce and Technology have a club and station, which is at the College of Engineering, O'Connell Avenue: details from the Hon. Sec.—*see* Panel.

As for the **Lincoln** group, now celebrating their Diamond Jubilee Year, they are to be found at the City Engineers' Club, Central Depot, Waterside South, Lincoln. For the other details we have to refer you to the Hon. Sec, at the address in the Panel.

Fortnightly on Tuesdays the **Loughor** gang foregather at the local Scouts Hall, and they are putting together the best programme they can manage. Details from the Hon. Sec. in the Panel.

The **Malvern** group have their Hq at the "Red Lion", St. Annes Road, Great Malvern, on the second Tuesday in the month. They start with some Morse at 7.30, and the main meeting is at 8 p.m.

GW3SOW takes the floor at the June meeting of the **Meirion** club, on June 3; his subject is not mentioned. This lot get together at the Royal Ship Hotel, Dolgellau on the first Thursday of each month.

June 18 for **Melton Mowbray** is a visit to Radio Trent, so one assumes they will not be having their usual evening at the St. John Ambulance Hall, Asfordby Hill, Melton Mowbray.

Turning to **Midland** they seem to be settling in nicely at their Hq in 394A Broad Street, which is opposite the Birmingham Repertory Theatre. On June 15 they have a talk on 10 GHz given by G3KPT and G8ASW. Incidentally, Midland's G8FTU obtained some good publicity for the local anti-jamming activity, when he and some others visited a couple of known repeater-jammers in the Bartley Green area; G8FTU managed to get himself arrested and spent a night in the cells, before being brought up the next morning, when he was able to state his case and name the jammers. He has praise for all the people involved, police, prosecution, and magistrates for the way he was allowed to make his point.

The Mid-Ulster group are now QRT until the September meeting which will be on the first Sunday at the QTH of G14BAC in Banbridge; this one will also be the AGM.

Every Wednesday evening, you can find the members of the **Nene Valley** club at "The Royal", Knox Road, Wellingborough, and we understand they are putting together a full programme, with occasional Sunday meetings at the same place, too.

On to **Norfolk** which means the Crome Centre, Telegraph Lane East, Norwich; they are having a pre-NFD briefing on June 2 and an informal on June 9. On June 16, G4LDG presents a simple QRP transmitter and an equally simple ATU to go with it, and on 23rd there is another informal, which leaves the month to be rounded off on June 30 with the final VHF NFD briefing.

Some members of the Marconi Radio & Electronics Club, Seated, left to right, are Steve Rayfield, Dave Haggard G4HUM, Ray Westmeckett G4MRW, and John Wiles G8IRS; at the rear is Club Secretary V. G. Scambell G3FWE. Details of their Mary Rose Award were given in April's *CDXN*, p. 79.

The **North Wakefield** crowd would normally have every Thursday evening at Carr Gate Working Men's Club, but in June they have visits, on 3rd to Radio Aire, and on 24th to W. Yorks Metropolitan Police Control.

On alternate Thursdays the **Pontefract** lads are to be found at Carleton Community Centre, where they are setting up their own shack—they even offered your scribe a chance as an unskilled labourer! June 10 is down for a talk on VHF aerials by G8NDF, and on 24th they have a D/F practice night.

Now to **RAIBC** catering for the blind and invalid who enjoy their amateur radio, whether as listener or licensed to transmit. Of course to do this they need able-bodied folk too, as supporters and representatives. In the current copy of *Radial* we note that in the will of G3BID, RAIBC received a sum of £500, on top of the many years of active support Edgar gave in his lifetime. Details on the club from the Hon. Sec.—*see* Panel.

Reading Telephone Area club come next, and enclose a copy of the programme for GB2BT, which they are putting on to celebrate the end of the first year of British Telecom (this is mentioned in detail in "CDXN"). We could add that they are on the lookout for new members, and would like to be in contact with any other amateur radio groups within the British Telecom orbit. Contact them *via* the Hon. Sec.—*see* Panel.

At **Reigate** we find the locals in the upstairs committee room at the Constitutional and Conservative Centre, Warwick Road, Redhill, where on June 15, G3WZT will be talking about VHF DX, including Aurora and M/S.

The **Silverthorn** club are to be found every Friday evening at Friday Hill House, Simmons Lane, Chingford, E4. Details from the Hon. Sec.—*see* Panel.

The club called **Southdown** covers the Eastbourne area, the Hq being at the Chaseley Home for Disabled Ex-Servicemen, Southcliff, Eastbourne, on the first Monday of each month. Incidentally, we reckon the current issue of the Southdown newsletter is one of the best we have seen for a long time.

Stevenage comes next, and they have the first and third Thursday in each month, at the Staff Canteen, British Aerospace Dynamics, Plant 'B' in Argyle Way. On June 3 G3XAP will expound on Aerials, and on 17th they have a rig test evening.

There is a club in **Stirling;** they meet on the second and fourth Wednesdays of each month, in the upper lounge, "Checkmate", Baker Street, Stirling. Visitors and potential new members welcome of course to this recently-started club.

We turn now to **Surrey** and that means *TS Terra Nova,* 34 The

Names and Addresses of Club Secretaries reporting in this issue:

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STIRLING: E. D. Fleming, GM2BWF, 6 The Clachan, Ashfield, Dunblane, Perthshire FK15 0JL. *(Stirling 824207)*
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WORTHING: R. Poore, G8LBN, 30 Melbourne Avenue, Goring-by-Sea, Worthing, W. Sussex.
YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset. *(Yeovil 24936)*
YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

Waldrons, on the first and third Mondays, in the Mess Deck on the first floor. As they have just passed the AGM we await details of the programme — but they usually have something of interest. Details from the Hon. Sec. — *see* Panel.

Sutton & Cheam alternate their meetings between the Sutton College of Liberal Arts and the Banstead Institute. So, we must refer you to the Hon. Sec. — *see* Panel — for the dates and details. On a different tack, we wonder whether either of the two last mentioned clubs have ever thought of a visit to Sutton Waterworks to see the electronics there?

Thames Valley have June 1 for a talk about the 10 MHz band by G3JNB, at Thames Ditton library meeting room, Watts Road, Giggs Hill, Thames Ditton, Surrey.

June 4 and 18 are the dates for **Thanet**, the former being a business meeting followed by a natter, and the latter is a D/F contest. The venue is still Birchington Village Centre.

On June 2, the **Thornbury** club have their AGM, and the covering letter suggests that for more details you contact G8AZT at the address given in the Panel.

The letter from **Torbay** this month is taken up with details of the Mobile Rally on August 29, so we turn to our records to say that their Hq is at Bath Lane (rear of 94 Belgrave Road), Torquay, where they have informals every Friday evening. Incidentally the Rally just mentioned is at ITT Social Centre, handy for the beaches and all under cover, so you can't lose!

The **Tynedale** group have June 1 and 22 at the Falcon Hotel,

Prudhoe, Tyne and Wear, and we understand they have a programme mapped out. More details from the Hon. Sec., or why not just roll up and see?

Now we go to the **Vale of the White Horse**, where the meeting is on the first Tuesday of the month, and is at the White Hart Inn in Harwell Village. The start is at 7.30 and since the June meeting is provisionally down for a D/F Hunt we suggest a sharp arrival.

G3LXP is the speaker at the next meeting of the **Verulam** group, on June 22 at the Charles Morris Memorial Hall, Tyttenhanger Green, Tyttenhanger, near St. Albans. They also have informal sessions on the second Tuesday of each month at the RAFA, New Kent Road, St. Albans.

Now to **Wakefield**, where they are based at Room 2, Holmfield House, Denby Dale Road, Wakefield. June 1 is down for a VHF Fox-Hunt, and on June 15 the RSGB Region 2 representative, G4DAX, will be able to answer any queries. That leaves June 29 for an on-the-air and natter evening.

WACRAL is an association, world-wide, of Christian radio amateurs; details from the Hon. Sec. at the address in the Panel.

Our next stop is at **Watford**, and here the gang have a place on the first and third Wednesdays of each month in the Small Hall, Christ Church, St. Albans Road, North Watford.

A sigh of relief from G4DYF, having off-loaded his task as Hon. Sec. of **West Kent** — but he remains the committee member charged with finding the programme. June 25 sees them listening to G3BIA talking about his DX-pedition to Andorra, at the Adult Education Centre, Monson Road, Tunbridge Wells. Natter evenings run through the summer at the Drill Hall, Victoria Road, Tunbridge Wells, fortnightly from June 29.

The **Winchester** group have the third Saturday in each month booked at the Log Cabin, Stockbridge Road, Winchester — visitors and new members welcome.

There are two groups serving the *Wirral* area, and the one we are talking about is the one based on the Dining Room (first floor), West Kirby Concourse Sports Centre, on the second and fourth Wednesdays.

At **Worcester** on June 7 the club have a talk by Dr. Alfrey on the Ionosphere, at the Oddfellows Club in New Street. The informal is on June 21, at the "Old Pheasant" which also lies in New Street.

Worthing have a base at the Amenity Centre, Pond Lane, Worthing where they can be found on Tuesday evenings.

Yeovil have every Thursday evening at Building 101, Houndstone Camp, Yeovil; on June 3, G3MYM will talk about electromagnetic radiation, and on 10th G3KSK will tell how to double your Morse speed overnight. The shock of this is allowed to subside until June 17, when G3MYM comes back to talk about the club propagation research project; and on June 24 they have a committee and natter evening.

Finally **York**, and this means the United Services Club, 61 Micklegate, York, every Friday except the third one in each month. We couldn't help but laugh at the tale of the Construction Contest, and the entry from G4EMA which was an Electronic *Canary* — G4EMA's mother wanted a canary, but as he breeds budgerigars she had to be content with the electronic version — not a feather in sight!

With which happy thought we come to the end of the pile. July's news should be with us by now, and the dates for August are in the panel. Address, as ever, to "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ. Meantime, keep the weeds down and chase the DX!

Stolen Equipment

A KW-Ten-Tec "Delta" transceiver, serial no. 2415, was stolen recently between Chatham and Dublin. Information in full confidence to Rowley Shears, M.D., KW Communications Ltd. There will be a reward for information leading to recovery of this unit.

"A Word in Edgeways"

Letters to the Editor

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

Dear Sir — I was disappointed to read your May Editorial which I rather interpret as "new amateurs regardless of standards". It is evident by listening, on the two-metre band particularly, that your opening sentence under the heading "Information" is true. It is many years since that band had much relationship to an amateur band, and particularly in the last year it has gone "down the nick". Far from encouraging actions that would deteriorate operating standards even further, and the average intelligence evident even lower, I think that you should try and devise ways to send much of the 2-metre population on to 27 MHz where they evidently belong!

Perhaps you might also try getting the H.O./P.O. to push back their desks, being careful not to dislodge the piled up coffee cups, and *do something* about standards — especially the lack of use, and abuse, of callsigns.

A. Jaques, G3PTD

Dear Sir — I am writing *about* the letters page. In any magazine, I enjoy the letters pages very much as they are a forum for letting off steam, free speech and new ideas. However, *S.W.M.* chooses not to edit the letters (actually, we do! — *Ed.*), which means that only three a month get published.

I have found the recent "diatribe" between G3NXC and G8ADD most interesting, but to print a 700-word letter in full on a single-sided letters page is a bit much.

Of course, you could expand the column — but if you don't, "entries" should be cut down to no longer than this letter in order to get in a reasonable spread.

Now — MCC. I realise that I am not in a position to talk about this, but I have observed and kept log for an organised club station (G8KUC/G3UKC) during contests, and the impression I get is this: far too many of the contests are too long. Four hours is a short contest, but it is a long time for an individual; thus clubs, who can work shifts, have an advantage to add to their usually better gear. I know you will receive letters from people who regularly operate eight hours at a stretch, but why not have a one or two hour contest — or possibly one that runs for an hour a day over a few days.

J. P. Gilliver, G6JPG (confirmed)

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

THE VK2AOU and DJ2UT PERIODIC MULTIBAND ANTENNA SYSTEM

THIS ARTICLE WAS FIRST PUBLISHED IN THE GERMAN MAGAZINE "QRV"

Authorised Translation by
H. M. LILIENTHAL, F6DYG/DL7AH

History

THE first multiband beam antenna designs are known to have been tried out as early as 1942. They featured the trap-principle and were operated successfully fed by a single line. Unfortunately, a design with traps in the elements will not satisfy the builder in every respect,as some inherent properties are outright contrary to each other: a high Q of the traps yields an undesired small bandwidth. For best results, however, the traps should be physically small, yet still be able to handle a fairly high amount of power. Radiation losses due to the drastically reduced antenna surface of a trap beam are most adversely felt on the 20m. band; here, the elements are shortened to a length of only 7.5m., representing quite a reduction as compared to their full-size lengths of around 10m. Physical size in proportion to the wavelength, tied in with the effective surface of the antenna, are fundamentally consequential factors for the resulting radiation resistance, the formation of the radiation pattern and, finally, the obtainable gain.

It appeared to be obvious, that only a complete new design using full-size elements would have a chance of success. Here, VK2AOU (ex-DL1EZ) found already 20 years ago the leading conclusions towards a radically new multiband antenna system which rightfully carries his name. Several articles by DL1FK and DL7BB describing it were published at the time in *DL-QTC*. Rothammel, DM2ABK, has incorporated its complete design in detail into his antenna book.

It has, however, taken many years of experimenting and testing in order to render VK2AOU's ingenious idea entirely foolproof. Although its operating principles are easily understood, a detailed description is given hereunder in order to do away with some misconceptions circulating about it.

The VK2AOU 3-Band-Element

The so-called "Fuchs" resonant circuit may be known to everyone. Suppose such a tuned parallel-resonance circuit (for example on 28 MHz) is being connected to the "hot" end of a half-wave radiator. Properly fed, it would result in a resonator length of some 5m. This simple antenna can easily be extended to a full wave system by adding a second radiator of 5m. length to the cold end of the coil. A collinear array with a 2dB gain over a dipole will be obtained by feeding this system in the coil centre; obviously, this antenna of a length of 10m. can be used as a half-wave dipole on 14 MHz. The centre resonance circuit tuned to 28 MHz will then be of neglible importance. This 2-band antenna by VK2AOU becomes a 3-band system by adding another parallel resonant circuit to be placed in the centre of the radiator. The next best band would be 15m. An intelligent selection of the L/C ratio of both resonant circuits as well as a perfect approach to the correct element lengths will result in a 3-band element which covers 14, 21 and 28 MHz and is the basis of the VK2AOU-DJ2UT multiband-beam. It is designed as a parasitic element and acts as a director.

In actual practice, the inductances needed consists of so-called "hair pins" made of 10mm. o/d aluminium tubing with 7mm. o/d aluminium bows, sliding in-and out on trombone fashion. The "C" component is made of pieces of RG213/U co-ax cable placed inside the element. All the connections are made weather-proof and are effectively sealed. Fig. 1 shows the basic circuit diagram. The voltage distribution on each band shows clearly that the system is energized as a collinear full-wave element on both 10m. and 15m., but as a typical half-wave dipole on 20m.

Imagine now three of the 3-band elements be put together to form a complete beam antenna. As a result, a different technical problem will appear on each of the 3 bands considered. As seen from Fig. 1, the Periodic 5 beam antenna makes use of two more mono-band elements. Their function will be explained hereafter.

On *20m.* the Periodic 5 operates quite similar to a ZL-special (HB9CV) antenna, in fact like a log periodic broadband system. The heart of the antenna is a so-called "periodic log cell", consisting of two 3-band elements being fed by a phasing line. The director element being itself a 3-band element, is placed 2m. in front of the log cell. The multiband phasing lines are hardly active, even when operating on 20m.

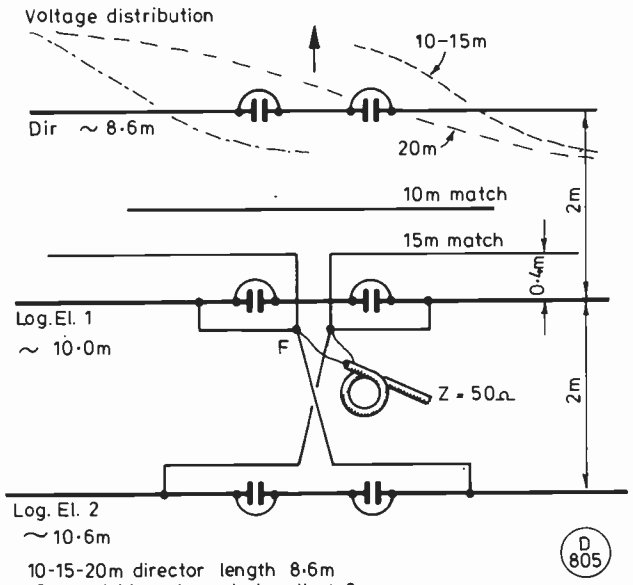
Element spacing, as well as element lengths, have been designed to favour a best possible forward gain within the bands whilst keeping a most favourable front-to-back ratio. Although log periodic antennas are known to possess exceptionally large band widths, some of the width reaching frequencies out of band was forsaken in order to insure forward gain. An expensive double T-match system permits offering an almost purely resistive load to a 50 ohms co-ax cable. The log elements 1 and 2 have been cut to the customary monoband antenna lengths of 10m. and 10.6m. respectively.

On *10m.* the 3-band elements are energized in collinear fashion. Each voltage "null" lies at about 2.50m. as measured from each element tip. The tie-in points of the double T-match feed lines have been selected to present an impedance of between 250 and 400 ohms. At this feed-point, a unique 50 ohms matching impedance equally suitable for all bands cannot be obtained without applying a fairly simple trick. It permits getting the 'Z' down to an acceptable 50 ohms without altering any 15m. or 20m. settings. An additional parasitic element, being cut to the correct length and adjusted to the right spacing, acting as a director only on 10m. leads to a perfect 50 ohms match. It is self-understood that the introduction of a parasitic element increases both antenna surface and gain.

Operating on 10m, the phasing line has a length of 0.2λ, which yields slightly more pronounced horizontal and vertical apertures of the radiation pattern. By means of scaled down antennas, these increased apertures can be reproduced easily. Unfortunately, this type of measuring procedure has no really significant meaning as far as the antenna gain for DX communications is concerned. Be it as it may, the Periodic 5 antenna has a gain on the 10m. band, which corresponds to the gain of a 3-element full-size beam. The low-loss multiband phasing lines allow operation of the antenna also on 10m. using input powers which may without fear be "Californian Kilowatts"!

For perfect operation on *15m,* still another parasitic element comes into play. It is placed 0.4m. in front of the log element 1 and is actively fed, just like the latter. The log element 1 as well as the 15m. matching element present either predominant 'C' or 'L' properties on their respective resonance frequencies. As a net result, the antenna offers a purely resistive load of about 50 ohms within the amateur band. Placing the 15m. matching element in front of the log element 1 and 2 had another inportant reason. The phasing section between log element 1 and 2 has not got the required length on 15m. by virtue of the elapsed time taken by the HF-energy to travel to the matching element sitting at 0.40m. distance, the effective electrical length of this phasing section is shortened to 1.6m. which equals a desirable phase-shift of 0.1λ, thus creating again an ideal matching condition.

At the outset it was feared, that the parasitic as well as the forced coupling of elements would give rise to undersired side-



10-15-20m director length 8·6m
10m matching element length 4·9m
15m " " length 6·7m
10-15-20m log element 1 (driver/radiator) length 10·0m
10-15-20m " " 2 (reflector) length 10·6m
10-15-20m reflector (only on Periodic 6 CZ antenna) 11·6m

Fig.1 P5 ANTENNA by VK2AOU - DJ2UT

lobes. However, this was not the case; the performance of the Periodic 5 antenna equals a full-size 3-element beam. There are no input power restrictions on 15m. either. The antenna is fed by 50 ohms co-ax cable at feed point F, through a decoupling coil which is absolutely indispensable for a correct functioning of the array. Omission of the choke coil renders the beam almost useless. It must be realised that the element centres on 15m. and 10m. carry voltage loops and are thus high-impedance points.

The designer must insure that the feed point — at which there is also a voltage loop — stays well decoupled from the feeder line itself. Otherwise the outer braid of the co-ax cable, located close to the metal antenna support would badly detune the antenna. The feed line would become a parasitic element, and uncontrollable standing wave problems would appear.

For the above reasons it is understood, that probes for impedance — or SWR — measurements cannot be connected directly to feed-point F but only *via* the indispensable decoupling coil which is in fact an integral part of the antenna It permits decoupling the feed-point from the co-ax feeder line and must be manufactured of exactly the same type of co-ax cable as the feeder itself; normally, co-ax cables of the types RG8/U or RG213/U are used. The decoupling choke has 6 turns and a diameter of 0.2m. which equals a cable length of some 3.5m, representing $\lambda/4$ on 15m.; the 6 turns are wound close-spaced. The choke coil is then connected to the feed-point F.

Many amateurs possess some lengths of 60 or 75 ohm co-ax and would like to feed their Periodic 5 antenna with it. Experience, however, has shown that the SWR rises out of proportion using that type of co-ax and can only be controlled by altering the spacing of the beam element as well as the phasing section.

A 1:1 balun could replace the decoupling coil. However, *none* of the known baluns are either sufficiently broadbanded or flat enough as a coupling device to stand up to the not exactly prudish power levels sometimes use by some individuals. Finally, no other decoupling device is as practical and cheap as the choke coil made of a few turns of co-ax cable.

Mechanical Considerations

In comparison with trap-beams where the longest elements measure only about 7.5m., the Periodic 5 antenna, with its full-size elements throughout, requires another approach as to tapering-off of the aluminium tubing. By a sensible choice of outer diameters and thicknesses as well as top quality alloys, it can be ensured that the entire array would not only 'give' in a heavy storm, but that the elements would flex in response to sudden gusts. A very heavy line squall in northern Rhenania in 1972 proved these considerations to be important. An 18m. high heavy steel tower at DJ2NN was twisted by 55° in azimuth despite its guy wires; the Periodic 5 antenna elements took momentarily the form of half moons, element tips moved at times ± 3m. horizontally. When everything was over, it was found that the beam had not suffered in any way at all. In contrast to that, a 20-ele. 144 MHz Cush-Craft array with a very much smaller wind surface area was entirely destroyed.

The Periodic 5 aluminium tubing is tapered off as follows: 30mm. o/d by 26mm. i/d, 25mm. o/d by 21mm. i/d, 20mm. o/d by 17mm. i/d, 15mm. o/d by 13mm. i/d, 12mm. o/d by 10mm. i/d. The boom consists of two parallel 25mm. o/d by 21mm. i/d tubing possessing the inherent elasticity to give way should a twisting motion be induced. No superfluous masses should be installed on top of a tower. The Periodic 5 antenna fulfils this requirement and represents statically and dynamically the option obtainable in this respect. Damage due to high winds or even nasty line squalls are the exception indeed. A boom to mast plate of heavy aluminium angle stock accepts masts up to 50mm. o/d.

Problems and Limiting Areas

Every system has its physical limits, and the Periodic 5 antenna is no exception. We need not underline the need for an installation location free of parasitic wires or high-tension lines. Yet, there are always a few thoughtless radio amateurs who would install their DX-antenna a few metres above a steel-reinforced roof; still others would install a 40m. dipole horizontally just 1m. under or 3m. over the beam. We have seen a W3DZZ-antenna installed in the immediate vicinity of the beam. Well, everything is possible, but the beam would loose its properties and its owner become disappointed!

A thumbrule in TV-antenna construction tells of a one to two wavelength minimum distance required between two antennas. Transforming this rule into HF-antenna considerations, a distance of only 3m. to the skin of a metal roof or to an open wire line would just be a nonsense. Nobody would attempt to mount a 2m. Yagi antenna just 0.30m. above a sheetmetal roof.

The Periodic 5 antenna is highly adaptable to varying locations, though every beam must be pre-tuned at manufacture. However, a fine tuning can be performed at the operating location itself. For instance on 10m. within the relatively large amateur band from 28.0 to 29.7 MHz, the gain of the antenna is not distributed in an equal fashion. An adjustment is possible, permitting an increase of antenna gain commensurate with an increasing frequency up to a point around 29.6 MHz where the gain drops rapidly. On the other hand, its gain may be optimized on 28.5 MHz with a marked decrease around 29.0 MHz. Intermediate settings are possible. This is not inherent in the Periodic 5 antenna. Quite contrary, however, most monoband- and trap-Yagis exhibit smaller bandwidths. They permit only CW- or Phone-settings. The Periodic 5 covers a full megahertz within which its SWR stays well within 1:2 or better. Still better SWR-curves are maintained on the much smaller 15m. and 20m. bands.

Even at rather confined operating locations, the Periodic 5 antenna can be optimized easily within each of the bands. Granted, to optimize doesn't mean to arrange for best conditions surrounding the beam. It is a fact that especially low-loss beams with their increased absorption surface are very sensitive to a disadvantageous operating location. It appears that compromise-antennas react much less violently to poor surroundings than a high-class low-loss beam. Be it as it may, an excellent 50 ohms dummy-load doesn't react either to poor surroundings and nobody would ever consider it to be a good antenna.

EQUIPMENT REVIEW

THE LAR MODULES HF OMNI-MATCH

THE *pi*-network has been a popular PA tank circuit in transmitter designs for many years. When transmitters were built like battleships, the plate tuning and output loading capacitors were continuously variable, enabling optimum matching to be achieved between the PA valve and an unbalanced-fed aerial system. When more compact equipment became the norm, many manufacturers designed their transmitters and transceivers for a nominal 50 ohms output impedance, thus replacing the bulky variable capacitor by small, fixed ones selected by a band switch wafer, but still retaining the plate tuning variable "C". Today's transceivers, particularly those aimed at the mobile operator market, tend to have no tuning controls at all for the PA stage, the designers having adopted the broadband, three octave amplifiers. This means that one must provide as near a 50 ohms, non-reactive load as possible to avoid damaging very expensive power transistors and/or to ensure that maximum power is delivered to the aerial system.

The text books tell us that the radiation resistance of a half wave dipole in free space is 72 ohms, but for practical cases, this could be anything from 20 to 100 ohms. Likewise, multiband *Yagi* and vertical aerials are nominally 50 ohms impedance but often vary widely from band-to-band, with considerable reactance to cope with away from resonance. Consequently, as equipment has become "one knob" control, eliminating all driver and PA tuning controls, aerial matching units between transceiver and aerials have become virtually essential.

Over the years there have been many designs for ATU's, mainly using air wound coil stock. These tend to make for rather bulky items by the time they are respectably boxed. For example, the reviewer's, home-built *Transmatch* dwarfs the *IC-730* transceiver and looks rather ridiculous. The present generation of ATU's no longer use air wound coils, but instead utilise the range of powdered iron toroids now available. These make possible the production of very compact ATU's capable of handling several hundreds of watts of RF. The **LAR HF Omni-Match** is a typical, British example.

The Circuit

The basic circuit is a very simple one; the "T-network" as shown in Fig. 1. C1 and C2 are twin-gang, broadcast-type variables with a 170 pF swing per section. L comprises three coils, two wound on toroids, the third being an air wound one. There are six band switch positions covering 1.8, 3.5, 7 and 10, 14 and 18, 21 and 24, and 28 MHz, selected by a two-wafer, four-pole ceramic component. In the 1.8 and 3.5 MHz band positions, the two gangs of each capacitor are switched in parallel, while in the other four positions, they are switched in series. One of the toroids is only in circuit on 1.8 MHz, the other being progressively shorted out as higher frequencies are selected. Only the small, air wound coil is used on 24 MHz and part of that is shorted out on 28 MHz. The through power of the unit is 250 watts p.e.p. or 120 watts on CW, dictated no doubt by the saturation characteristics of the iron powder material in the toroids. The aerial impedance range is 10 to 250 ohms, plus reactance.

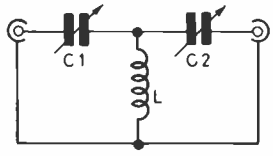
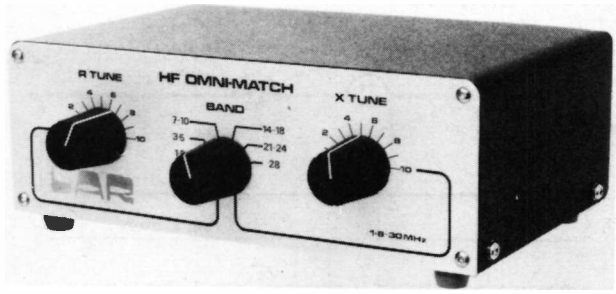


Fig. 1 The "T" Network, the basic circuit of the LAR HF OMNI-MATCH (D 868)



Construction

The components are mounted on the chassis part of a sturdy case of cadmium-plated, passivated steel. Since the capacitors cannot be grounded, nylon fixings are used and to avoid hand capacity effects, the extension shafts on the capacitors are of insulating material. The three knobs are smart, collet-fixing types and the silver finished front panel carries bold, black lettering. The input and output sockets on the rear are SO-239 types. The inverted "U" forming the top and sides of the case is finished in dark blue crackle paint. Four nylon feet are provided.

Tests

The **HF Omni-Match** was first connected between a 3.5 to 30 MHz transceiver, incorporating a VSWR bridge, and a 50 ohms dummy load. It was not possible to try the 1.8 MHz position but all others, including the three new ones, were investigated. For guidance as to setting up, the approximate positions of the knobs marked "R-TUNE" and "X-TUNE" are shown in Fig. 2. Obviously, different input and/or output impedances will result in different settings; that is what the unit is for, after all! Low power was used to set up the ATU initially, full power being used for final, fine adjustment.

Frequency MHz	"R-TUNE"	"X-TUNE"
1.8	not tried	
3.65	6.2	5.8
7.05	7.8	7.2
10.125	4.4	3.7
14.175	5.6	5.8
18.118	3.0	3.3
21.225	3.0	4.0
24.94	1.2	2.0
28 85	2.7	3.2

Fig. 2 Settings for R-TUNE and X-TUNE knobs for nominal 50 ohms output Tx into 50 ohm dummy load (D 869)

Next the unit was used with a ground plane aerial made from half the driven element of an old tri-band *Yagi* and mounted vertically about five feet above the lawn with three sets of three radial wires for the 14, 21 and 28 MHz bands. The characteristics of this makeshift aerial were measured with an antenna noise bridge, the resonant frequencies and impedances being respectively:— 28.700 MHz at 90 ohms; 21.112 MHz at 78 ohms, and 14.581 MHz at 30 ohms. The **HF Omni-Match** enabled a 1:1 VSWR to be achieved on any frequency in all three bands.

No aerial matching unit can be loss-less, so an attempt was made to ascertain the power loss through the **HF Omni-Match.** The only frequency at which the transceiver showed a 1:1 VSWR into the dummy load direct was 3.4 MHz., the power being 95.9 watts. With the ATU in circuit, carefully adjusted to give a 1:1 VSWR at the same frequency, the power was 89.5 watts, representing a loss of just 0.3 dB., a quite negligible amount. This compared to a 0.5 dB. loss through the aforementioned *Transmatch* ATU with its air wound coils.

Conclusions

The **LAR HF Omni-Match** proved to be a very useful and versatile ATU for home stations use, doing all the maker claims for it. Its usefulness can be further extended to cope with balanced feeder systems by the addition of an external balun transformer. The price of £69.25 seemed a bit high, at first, for such a rather simple product, so a parts cost exercise was undertaken, using equivalent items from several well-known component supply houses. This totalled about £22 — it is surprising how expensive twin-gang capacitors are, nowadays — to which has to be added something for development, manufacturing time and overheads, company profit, advertising, dealer mark up and, not least, VAT. Taking all these often overlooked costs into account, the retail price seems fair.

The ATU was kindly loaned by the manufacturer, *LAR Modules Limited,* of 60 Green Road, LEEDS, LS6 4JP, and came with an explanatory leaflet and a "mini-article" entitled, "The Plain Truth about SWR — Does it Matter?" and which contained some down-to-earth comments on the subject.

N.A.S.F.

Footnote: Since this review was completed *LAR Modules Ltd.* have informed us that, in response to popular demand, the **HF Omni-Match** can now be used with an end-fed wire. A robust wing-nut earth terminal on the rear panel has been fitted, and an end-fed wire can now be plugged into the antenna SO-239 socket, either by PL-259 plug or a 4mm. banana plug. Providing the impedance is within those quoted on the leaflet, the **HF Omni-Match** will do a good job of feeding this Marconi-type antenna. In practice, the wire (including earth) needs to be near a quarter-wavelength (or odd multiples thereof) at the frequency in use.

MODIFICATIONS TO THE TRIO TS-520S FOR 10 MHZ OPERATION

H. Allison, G3XSE

DOES the sight of the 'AUX' switch on your TS-520S (or SE) give you thoughts about adding the new 10 MHz band to the rig? Then—read on, but remember this is not an 'official' modification and could have a bearing on your Warranty position. Also, bear in mind that this modification is based on experience with just two transceivers. So—go carefully!

Technical Bit

The IF of the transceiver is 3.395 MHz (CW, transmit); the VFO runs 5.5 to 4.9 MHz, and we want to transmit 10.1 – 10.15 MHz. Doing a sum indicates that a crystal around 18.5 MHz from the junk-box is needed, but obviously we can have a crystal almost at 19 MHz and still get this narrow band within the range of the main tuning dial. Purists, and rich people who buy their crystals, can do the sum more carefully and obtain a rock to make the band edges line up at chosen points on the dial.

The Easy Bit

Open the rig up, top and bottom as shown in the manual—or by commonsense if you haven't got a manual. Locate the heterodyne board, X44 – 1160 – 00, at the front and underneath. This board has lots of crystals on it, and a clear marking shows where the AUX crystal goes. Fit your crystals here—and notice you don't have to remove the board to carry out this operation. Now look for the holes for the AUX coil. All the coils are four pin ones with only the top two pins used. 'Tops' here means the uppermost two of the four while the transceiver is upside-down. To resonate at 18.5 MHz, 28 turns on a ¼-in. former with a slug are indicated. With coil and crystal fitted, stand the rig on its edge, and connect a 'scope to TP3, which is the output of Q7, *via* a probe, and tune for maximum 18.5 MHz RF. *Do not* hang the probe on pin OL of the board, which looks a likely spot to try: the crystal oscillator won't start on this, or any, band—not good for weak hearts!

The Receiver

Assuming you have obtained your 18.5 MHz RF output as in the last paragraph, locate board X44 – 1170 – 00, and on that board locate the AUX coil position. Again we need the top two holes with rig inverted. These holes may be linked, just to confuse you. Cut the link, and install a coil, 30 turns on ¼-in. former with slug. Switch on, and poke a fairly hefty signal up the aerial hole—10 mV should do. Work out where the dial should be set, to get 10.1 MHz, and set it there. Put the drive control at mid-swing and tune the coil with the slug for maximum on the S-meter. Do not be despondent at the low sensitivity; instead, locate board X44 – 1180 – 00, find the AUX holes, cut the link, and install another coil of 30 turns on a ¼-in. former with slug. Switch on, set as in the previous step, and again tune for maximum urge at 10.1 MHz. Receive sensitivity should now be OK.

The Transmitter

Place the 'scope probe on TP1—almost V1 grid—and switch on. Switch to CW, short out key jack and go to 'Transmit'. Admire the 1 volt peak-to-peak, or more, of 10.1 MHz RF you are generating. Switch off, and locate board X44 – 1190 – 00, and the AUX coil position on it. Once again, cut the links and install a coil of 30 turns on ¼-in. former. Turn the rig on, go to 'Tune' position, key down and peak this coil for maximum drive as seen on the rig meter, turning down the drive as necessary. WARNING—the coil you have just fitted and tuned has 300 volts on it.

The Hard Bit—The PA

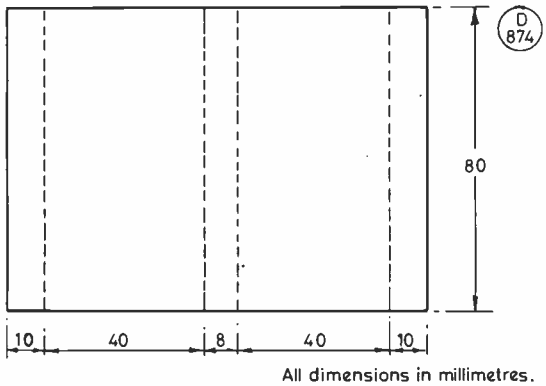
This is where we *nearly* gave up! In the AUX switch position you are stuck with the ten-metre coil; thus you have three options. *1.* Rewire the PA coil assembly (not recommended—look!). *2.* Open up one of the shorted sections of the PA coil—the 14 MHz one works well. *3.* Add extra capacitance to the PA 'Tune' control. Either of the last two require a switch to be fitted in the PA compartment. To do this, remove PA shielding, drill a hole above the ident. plate, and bolt in a switch. If you opt for the capacitance (which G3XSE did) then you want about 600 pF worth of at least 1kV working rating. The Q is a bit low—but it *works!*

Check the output with an absorption wavemeter to make sure, put all the covers back, put the rig back on the bench, connect aerial and ATU, tune up, and work all the people with "Ben" transceivers!

A SIMPLE TWO-METRE WINDOW MOUNT ANTENNA

A. RENOUF, GJ8SBT

A HANDY antenna which can clip easily onto any car without the need to drill holes can be extremely useful. In conjunction with a portable rig this antenna allows you to descend on any unsuspecting car and instantly turn it into a mobile installation.



All dimensions in millimetres.
Mat'l : 2mm thk. Aluminium.

Fig. 1

Construction

The antenna uses a 'window mount' which is made of thin aluminium sheet. The bracket is cut out and bent as shown in Figs. 1 and 2. The diagram shows two 'lips': one is used to mount the antenna socket on, whilst the other makes it easy to move and position the antenna from inside the car.

A 4-hole chassis mounting N socket is fixed to the lip of bracket using 6 BA steel bolts. For use on two-metres it is perfectly adequate to use only two bolts as long as an identation is made in the bracket with a file. If the design is used on other bands the fixing can be made more secure by using all four mounting holes.

Finally so the mount cannot scratch the window, black PVC tape is wrapped around the mount. If this is done carefully, a professional finish can be obtained.

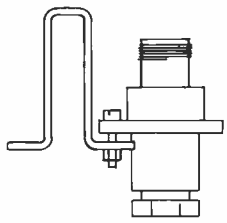


Fig. 2

The Whip

Construction of the whip is very simple. A 60cm. length of stainless steel rod is taken and clamped in a vice. One end of this is filed down to a point in the same manner as the pin in the N plug. The thicker PTFE ring from the plug should be drilled out to the diameter of the whip; the parts are then assembled as in Fig. 3. A small amount of *Araldite* is mixed and pushed into the plug. After this has set, the pin must be checked to make sure that it is central. If there are no problems fill the rest of the plug, making sure to overfill it so that in use water will run off easily.

The antenna can now be tuned in the normal way. An almost perfect SWR was obtained when the whip length was 52cm. This is measured from the top of the N plug as the section inside behaves like a normal piece of transmission line.

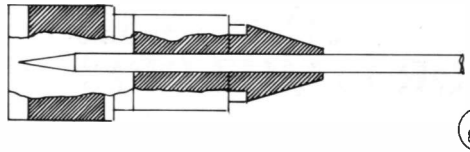


Fig. 3

Use

The antenna is simply passed through the car window which is then shut. In practice the mount is very secure and long whip lengths can be used at high motorway speeds. As the window almost completely closes there were no problems in the rain, also the use of N type connectors ensures no water can seep in between the whip and mount.

When using UR43 there may be a problem getting the window to hold the mount firmly. This problem may be overcome by passing the co-ax through the next window or by using thinner cable, depending on how much output power is being used.

Although this design is not the best method for a permanent installation it can provide a quick and cheap answer for going /M at a moment's notice.

A TEN-METRE TO TWO-METRE CONVERTER

G. ROBINSON, G4AKW

MANY of the older general coverage receivers, whilst being adequate for the LF amateur bands, lack the stability and sensitivity required on the higher bands. The problem is generally most acute on 10 metres. As my main receiver fell in this category I was prompted to construct this converter which enabled the 10 metre band to be received on the station 2 metre receiver.

The Circuit

An attempt was made to keep the circuit, shown in Fig. 1, as simple as possible. The tuned circuit formed by L2, C4 and C5 is resonant at about 29 MHz and input signals are coupled to it *via* C3. Mixing occurs in TR2 between a 116 MHz signal provided by TR1, and the input 10 metre signals. Sum and difference frequencies are produced and the output tuned circuit L3 and C7 selects the sum frequencies around 145 MHz.

Construction

The converter was built using the normal VHF breadboard method. A sheet of copper-clad board measuring 3" by 2" was used as the 0v ground plane on which to mount the components. The three coils are all self-supporting and were wound using a pencil of diameter 7mm. as a former. L1 is 3 turns of 20 s.w.g. and

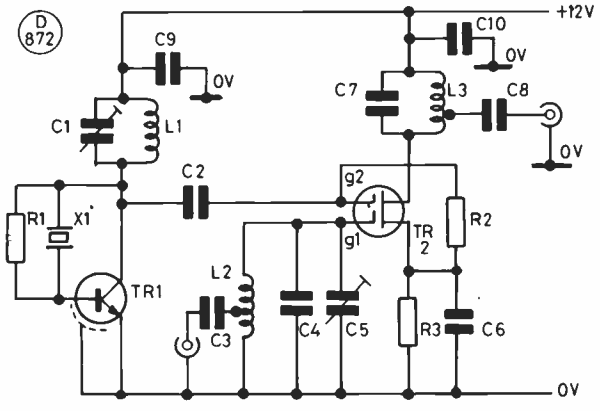


Fig. 1

Table of Values
Fig. 1

R1 = 220K	C5 = 60pF trimmer
R2 = 100K	C7 = 10pF
R3 = 100R	C9, C10 = 10nF
C1 = 10 to 40pF trimmer	L1, L2, L3 = *see* text
C2 = 2n2	X1 = 116 MHz HC18U crystal
C3, C6, C8 = 1nF	TR1 = 2N918
C4 = 27pF	TR2 = 3SK51

has a total length of about 8mm; L2 consists of 9 turns of 22 s.w.g. close-wound and tapped 2 turns from the earth end; L3 consists of 3 turns of 20 s.w.g. tapped 1 turn from the + ve supply end, and is about 12mm. long None of the components should have lead lengths greater than approximately 5mm., and the decoupling capacitors C9 and C10 should be as close to the supply end of the tuned circuits as possible. Once constructed C1 should be adjusted until oscillation occurs, and then C5 peaked for maximum output.

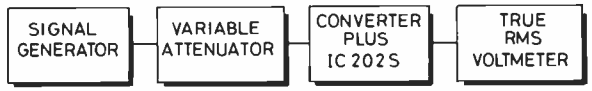


Fig. 2

D 873

Performance

The sensitivity of the converter in conjunction with an Icom IC-202S was measured as shown in Fig. 2. An HP-8654A signal generator, Marconi TF-2163 variable attenuator and an HP-3400A true r.m.s. voltmeter were used. The sensitivity was measured as — 121dBm for 12dB s + n/n (SINAD) which is equivalent to about 0.2μV. For comparison the sensitivity of the IC-202S was also measured at the same time, without the converter, and it was 4dB better at — 125dBm for 12dB s + n/n. Although it was not possible to measure the intermodulation and strong signal performance of the converter it appeared, after much listening, to be quite good. With regard to the converter's bad points, the main one appeared to be its lack of rejection of signals at around half the input frequency. The rejection of these 14 MHz signals was measured as only about 30dB. This however did not cause any real problems and the converter has, on the whole performed very well.

ALTRON SM30 MAST

IN the review of the **Altron SM30** aerial mast on page 146 of the May issue of the *Magazine,* doubt was expressed that the size of concrete base suggested in the manufacturer's original leaflet was adequate. In a telephone conversation with *Messrs. Allweld Engineering,* it transpired that their engineer had allowed for some "passive resistance" when designing his foundation whereas this reviewer did not. Some further explanation is necessary to put this matter into context.

When a free-standing mast is subjected to any sideways load, it imparts a rotational effect, called an overturning moment, to the base in which it is set. This is inescapable. It is resisted in two ways, the more obvious and important of which is the righting moment provided by the self weight of the mast and base acting about the edge of the base. The second effect is the passive resistance of the soil, its effectiveness depending upon the nature and consolidation of the soil immediately surrounding the base. Obviously, a well compacted, firm and cohesive soil will be much more effective than loose, dry sand or waterlogged ground. It must be appreciated that passive resistance can only occur once there has been some movement.

To take an example. If, during tilting the mast down, the top of the base moved a quarter inch relative to the bottom, this would "amplify" to about 2½ inches at the 35ft. aerial level when the mast was re-erected and wound up to maximum height. In any average cohesive soil, there is virtually no chance that this mast, set in a 1'-6" square concrete base, could tip right over whilst being tilted over since it would require the complete shearing off of a large volume of earth. Therefore, when it was suggested that the whole lot would tilt over, it did *not* mean fall right over, or collapse but rather that, at some time, the re-erected, extended mast might not be truly vertical.

During the exceptional summer of 1976, large cracks appeared in the lawns and between the lawn edges and concrete paths. Many were an inch wide and quite deep, Under such conditions, soil surrounding the base of a mast could shrink away. This would be a scenario for the above-described tilting phenomenon and a reason why, in this engineer's opinion, passive resistance should not be relied upon to any large degree. However, all this has become rather academic now because in their current leaflet, *Allweld Engineering* are recommending a 2'-0" by 2'-0" concrete base, 3'-5" deep and this is sufficient to provide a factor of safety against overturning of 1.89 when tilting over the retracted mast with a fifty pounds load at its head, without any need to take passive resistance into account.

Nowhere in the review was it inferred that the **SM30** was anything other than a perfectly sound design. In any case, the manufacturer invited would-by customers to seek his advice on installation matters as part of the service. Incidentally, a ground socket is now available for an extra £22, into which the ground post can be inserted. So, if you move, you would not have to leave behind the ground post, only the concrete base. Additionally, this makes the mast genuinely a temporary structure thus probably not requiring planning permission.

N.A.S.F.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

Here and There

CONDITIONS seemed pretty fair up until mid-April, after which the warm weather accompanied the typical signs of "summer conditions."

With the BYs back on the air — there are some seven reported on 15 and 20m. CW — one has to expect that some sort of a diseased mind bootlegging them would appear. It has. Another favourite in piratical terms is ZA, and now the BYs are back, EA2AJH/ZA in strength seems to be possible which would remove another favourite Phoney. It is understood that there have already been 8 QSOs as a demonstration to the Albanian authorities and hopes are high for a full-blown DX-pedition by the EAs. We'll believe it when we have been shown the QSL card — or got one ourselves.

Trindade seems to have been put out for the count by the Falklands business; the two PYs who were going had their military transportation cancelled. And the Mellish operation by VK2BJL and Company, featuring the boat *Banyandah* is due to be operational as this is being put to paper — but a quick peep doesn't reveal a pile-up as yet. But the name of the boat, and her skipper KB7NW seems to warrant this one as a goer.

Looking a little further ahead we wonder about Heard Is. — this time with the support of WIA, says the *DX Bulletin*. The proposition talks of a couple of weeks in January or February of next year.

During the coming month we hear, SM0AGD will be on from Tokelau ZM7, with future stops mentioned as T31 in July, then KH1; Kiribati and American Pheonix respectively. Other stops are hinted at E. Kiribati, Tuvalu, Wallis, Tonga, New Zealand, Australia for a refit to the boat; then in 1983 they will be looking to operate from Willis, Mellish Reef, Solomons, Nauru and Spratly. Thus *TDXB,* but we doubt that last one.

The Bands

We have already indicated that we have come into the summer doldrums, but at the time of writing the forecast seemed a bit 'iffy' with some good and some bad ones to come.

Top Band

David Whitaker (Harrogate) reckons his catch of the season as being an F — the first one ever logged. As the SMs are now licenced for the band (1830-1845 kHz) he will doubtless add that one. In addition of course, the East Coast Ws have been in evidence around dawn, as did some Caribbean signals, leaving the evenings to Europe and the Asiatic Russians providing the nightcap.

Now G2HKU (Minster) who seems to be well on the mend now, and battling against the spring influx of insect life into the shack, although at the time of his letter the wasps had only sent a few reconnaissance parties out. Ted says he will fight them from prepared positions! His Top Band SSB contactsd with PA0PN are still going, and on CW Ted offers UT5AB, OZ1W, 4N0SM, GJ6UW, SM4AXY, SM7BIC, F6ETO and SM1JBM.

G3PKS (Wells) says he hasn't been on the band much, as he has been having a shack clear-out in the course of which he came across a 1951 copy of the *Short Wave Magazine* and "DX Commentary" by G6QB included a note from G3ATU — which station Jack had just worked!

Eighty

A much maligned band in terms of DX, particularly on CW; but it has a further virtue says G3ZPF (Dudley) in that he has strong evidence that his RF, from aerials always relatively low to the ground, is a guaranteed shot-in-the-arm for plants which happen to be beneath the voltage points. While looking to the improvement of the garden, David worked JX5VAA, and lost CX5AO; some East Coast Ws and a couple of PYs were noted but no attempt made to work them, as the size of the pile-up on these was a bit off-putting.

D Whitaker says it's pretty well the end of the DX season on Eighty — true enough, but it's quite surprising what may turn up in the 'close season'! Around midnight he noted VO2CW and VP9IJ, and at 0100 8P6JQ and VP9KX; but the early-morning sessions seemed to pay off better with CE6COR, W6, W7, PY5AJK, 9Y4JW, HK5CKH, V2AAW, ZF2FL, and J3AE all logged. The last for the morning was at 0800z when WB8LDH/J3 was noted down.

G3PKS says he found the band rather patchy in daylight, with some local noise areas; in the mornings some Ws were noted about an hour after dawn.

G2HKU played his QRP game on Eighty, and managed to find G6AB, G6JJ, ON5AG, G4AYS, PA0CMP, G3VIP/P and PA0PN — all of course on CW.

G2BON (Aldridge) has an IC-701 plus a G5RV at about.25-30 feet, and on Eighty this led him to swap SSB reports with CT2ARA, V2AH (Antigua), ZB2GW, CY1IF (Newfoundland), and DA2AR/HB0.

G2NJ (Peterborough) stuck to Eighty CW, and notes his best CW QSO was with UA1AOB who had just one watt. PA3BFE near Amsterdam was a 599 signal with a rig which he said was made from old TV parts and ran ten watts. On the mobile front there was a long QSO with G3CLJ/M who was keying in fine style between Rugby and through to Chesham in Bucks. Turning to the /MMs, Nick listened to PA3ARE/MM, a booming signal one afternoon, working a couple of PAs; unfortunately he went QRT before G2NJ could give him a shout.

"CDXN" datelines for the next three months—

July issue — June 3rd
August issue — July 1st
September issue — August 5th

Please be sure to note these dates

Forty

Much neglected in the U.K. due to the very high noise level generated partly by receiver overload; but the savvy operators can still drag a few interesting ones to book, and there isn't any shortage of DX — but the Red Army Choir doesn't exactly assist matters!

G2HKU mentions just one QSO; that was a CW one with VC3IXE who turns out to be a special prefix for Canada.

Turning to G2BON, Tom obviously believes in the adage about early rising — all his 7 MHz SSB QSOs were made around or just after dawn. For instance: HR5MVO/HR1, TI2WR, PY3CDL, KG4W, PP8AHK, and PY4KM.

Very changeable in the mornings, says G3PKS, and not much good for inter-G daylight QSOs either. However, all was not lost as K2LNS and VC3IXE were both hooked for practice.

SWL Whitaker's report indicates that he has added couple of new ones in KP2A/KP1 and CE0DFL (Easter Is.) to bring him to 236C heard on the band, all-time. David is ready to tackle the band at any time; between 0600 and 0800z he

found VP2MGQ, VP2EC, FG0DYM/FS, SM0GMG/CT3, VP9AD, VP2EX, 6D5PEP, HP3FL, HT1ZGB, HC5MRZ NP4A, TI2CCC, J73PP, CE0DFL, VE6JD, TI3RFS, KV4FZ, 8P6EZ, KP4BZ, and KP2A/KP1. The evening stint started at around 2100z and carried on until 2300 and a bit. In time order again this period showed with UF6FBX, OE1EHB/YK, UP0L22, ZP5JAL, CM7RM, YV5DPO, UI8ZAC, 7Z2AP, A92P, and UK0AAB.

Jottings

Lloyd and Iris Colvin's stop in PJ2 resulted in some 9000 contacts with 148 countries; and a total of 56000 QSOs on this trip. They are back in the U.S.A. but will be off again in the Autumn.

Those AM, AN, and AO prefixes from Spain are, it would seem, related to the World Cup, and are used respectively by stations whose normal prefixes are EA, EB and EC. Rather more worthy of note is the EX prefix being used to commemorate 1500 years since the foundation of Kiev.

We mustn't forget that invaluable contest listing from W1WY; Frank notes the main contest of the month as the All-Asian Phone, June 19-20. In this one, the multiplier for non-Asians is the sum of the Asian *prefixes* on each band, and QSO points are three for a QSO on Top Band, two on Eighty and one per on the other bands. The contest exchange is report times age of operator (YLs send 00).

Still with Frank, he encloses the results from the 1981 CQ WPX CW shindig; the single-op world top score in the all-band category was YT2D with 2,826,075, and no UK stations in the top ten. In the single-op single band listings we find G3KDB in fifth place on 14 MHz, and G4BWP second on 7 MHz. In the multi-op single transmitter category, G6UW came in eighth. Congratulations to all.

With the 10 MHz band now open to some 40 countries, we must say we are surprised at the lack of interesting reports since the first flush of enthusiasm back in the winter. Offers please!

G4HZW (Knutsford) was a little startled to hear 'G4HZW' working a W6 on 28MHz; he took a double-take and confirmed for himself that the pirate was indeed sending G4HZW and calling himself Peter. So, G4HZW called the W6 to point out that he'd just worked a pirate — we can just imagine the confusion in that W6's mind to have two successive QSOs with the same station!

10MHz

Only two reports this time, and one of those a 'Nil', in the shape of G3FPK (Purley) who says something had to go when the painting and papering business was brought into question, and the summer QRN was enough to turn the scale!

G2HKU is obviously enjoying his con-

Douglas Byrne, G3KPO, recently visited Brigadier General Kamchai Chotikul, HS1WR, in Thailand. HS1WR, who operates on all bands in all modes, has one of the strongest 20-metre signals heard from the Far East — perhaps his full-size 5-element Yagi atop a 140-ft. lattice tower (complete with red warning lights) has something to do with it! Kamchai obviously believes in starting off his young son in the right direction, as he can be seen here feeding signals into the SSTV computer; the camera is on the right of the picture.

valescence with plenty of radio activity; on this band the CW accounted for OZ1W, PA3BWZ, DL7CY, and G6CJ — Mister Aerials himself.

Twenty

G3PKS only bothered with one quick peep just to be sure everything was OK; and that quick look included CW to VE3PT.

G3FPK mentions working ZM7WU in Tokelay on CW; Carl was going on to Niue and Rarotonga, after making some 7500 contacts from Tokelau. Otherwise about all that Norman reckoned worthwhile were FP8HL, JT1AU, and ZK1CQ.

Twenty for G2HKU included SSB contacts with ZP6DN, 6Y5DZ, PJ8UQ, HV1CN, KA4GKZ, ZL3FV, and ZL3RS; then CW to LU9CV, VK2AHK, VU2BK, HC2XA, and KG6I — who turned out to be in Oregon, would you believe!

We have two letters to hand from G4LDS (Chelmsford); Chris says that Ten has finally died on him, and so he has looked to 21 and 14 MHz for the pay-dirt. He mentions, on this band, SV9PR, VK2CU/2, VK3WJ, ZL0AAF, K2JFE, WB1AOK and sundry small fry.

Although he hasn't been too active on this band, G3NOF (Yeovil) reckons it hasn't been too bad; the morning openings around 0630 took in VK, ZL, the Pacific and sometimes W6-7 long path, and then around 1700 the VKs and W6 were sometimes audible by short path. SSB contacts were made with FM0GA, FO8BI, K6SMF, VK3PA, VK5ZD, VK6IL, VK6ZX (Lord Howe Is.), VK8NE, YJ8RG, ZL4OY/A, and 8P6OR.

Turning now to G2BON, Tom stuck to SSB and hooked up with VK3DLZ, W5ZR (Louisiana), VO2CW (Labrador), AH2L (Guam), TI2J and TI2CCC, ZL4OY/A (Campbell Is.) and VR6TC.

21 MHz

Plenty of DX, but problems with BC stations and propagation black-outs seems to about sum it up, certainly as seen from G3NOF. Don noted the long path to VK opening around 0900z, and the short path at around 1000 to VK, ZL, the Pacific and the Far East. Some Africans were noted around 1600z and South Americans around 2200; but conditions to the U.S.A. were not too good. The list of SSB contacts with G3NOP is long, and takes in AC3Q/KX6, AE6R, DF2AL/ST3, ET2TY, FK8DV, FR7ZN, HS1AMH, HI4AGE, HK0FBF, J3AH, JA1DNG/YI, JAs, JT1BG, OG7AA, P29NSF, SV1LA/SV5, SV0BV/SV5, TL8CK, TU2JL, TU2JQ, VC4AG, VK8NE, VK8KRD, VK9NS, UA0FCL in Zone 19, VQ9JB, VU2AVG, VU2RPS, XZ9A, ZB2CJ, ZB2GW, ZK1CG, ZL1BQD, ZL4PO/C, 3X3JA, 5T5ZR, 5W1DQ, 5Z4CX, and 7Q7LW.

G3PKS mentions a CW QSO with UA0BL which was notable for the fact that the UA0 was such a weak signal even though he reported 'PKS at 579.

At G3FPK it was CW all the way; this yielded Abu Ail (J2OZ) for brand new one number 311, and an oddity was 8J5SUN from Japan. 3X5DX was heard on the afternoon of May 6 and worked quickly, just in time to hear the rest of the world reacting; by the end of the QSO the band was awash with JAs calling him. Others of interest included FP0FSZ who said QSL to VO1FB, and HL5AMU.

G2HKU split his time between QRP CW and the high-power stuff. The QRP CW raised UW9SU which is quite a far

haul in distance for just four watts; and on the FT101ZD JA0EKI, VK2DY, and OZ1W were all raised.

Conditions have finally gone for 28 MHz, says G4LDS in accounting for his change of scene to 21 MHz. We wouldn't reckon to take money on that one! Chris notes JE1FIG, 6W8DS, PY8BI, 5N9ACO/8 who came back to a CQ and was followed by AH8AA over the Pole, ZL1CD who was 53 on both paths at once, local lad ZL0AAF who is G3PMX on holiday, TJ1CK notable for a very quick QSL *via* DL1HH, JA1FUE, JA8RCA, VK4OX, VE1AI/1 on Sable Is., KA1ED, WA4TWS, WA3CKN, K0ADY, EP2TY who nowadays QSLs *via* JR3WRG, JA9QD, and JH9EAF. Then KB6JK, VS5DD, 4Z4MK, VE1BYD who was a handsome 59 off the back of the beam, VE3JW, EA8QY, J6LTH, and an assortment of JA and Ws stations. One of the latter being WB9JLL who is a manager of WPLY; this resulted in a long chat and some tape-exchanging.

28 MHz

Despite all the moans and groans, it really does seem that there has been DX about at times. The locals around Dudley use the band too for a local net, says G3ZPF, and of course there is always the odd CB-er to move along. On that question, the writer is a bit annoyed to see the increasing numbers of hand-held CB sets on sale which are based around 50 MHz.

Once G4HZW had recovered from the shock of hearing himself as already related, he got to work with his TS-820 and home-brew Quad, using SSB. Tony reckoned the band died off around April 19 with few Ws audible after that date, while the real onset of summer conditions was signalled by a hearing of the DL0IGI beacon on May 3. G4HZW's SSB signals penetrated to 4K1A (the Russian Antarctic Expedition station), 5Z4CV, 7Q7LW, 8Q7DL, 9U5WR, A4XGC, AM8YD, F6BGY/ST2, FR0FLO (Reunion), G4DMR/MM off Japan, GM4FIW by back-scatter, H5AHF, HL1SF, J28DL, J73PD, JAs, J2D/Z, all W call areas, P29NAB, RH8HCV, SV4NJ, TA1NAG, VC1YX, VK2VDY (by way of the long path, and the VK running four watts to a two-element Delta Loop), VK4NBR, VK3DUP, VK9ZH (Willis Is.), VQ9WB (Chagos), ZL3AAM on the long path at 2300z, ZL2BFU, ZL4DZ with a ⅝-wave vertical on the house guttering, and ZS2HW/M. On a less happy note the spring gales have made the Quad look a bit sad — and the owner of the essential ladder has most inconsiderately emigrated to VE!

". . . wake up Sid, I think we've got into a repeater. . . ".

G3NOF describes the band as patchy and becoming very poor towards the end of the month; VK/ZL/CR6 openings on the short path occurred on occasion around noon, and the Africans were sometimes good in the afternoon. Don worked A4XJN, DL2VK/ST3, DU1RD, HP1XRJ, HS1AMH, J6LZA, JE1LZZ, S83H, TL8CK. TN8AJ, UA0WAM, VK4AGF, VK9NND, VU2ALQ, 5H3BH, 8P6PG and 8P6PO.

Turning to G3PKS, Jack reckoned the band was no great shakes, and on at least one morning a 15-minute CQ-calling session raised precisely — nothing. Better days saw CW to HS1ALF, UA9UGD, W3NZ, UO5BEX, UA6ATR, UA9TEW, JH7AKT and JA7AZY.

Moving on to G3FPK, Norman took it as he found it; on April 2 P29JD was raised on SSB for the 309th country, while CW fished up DJ6SI/3X for number 310. One evening at 2304z a weak ZL was heard on an otherwise dead band and worked quite happily. Again as late as May 4, Norman cranked the bandswitch to Ten at 2325z and was surprised to find some East Coast Ws, of whom one was N2IT. Several 10-UK members have been worked late at night too, around 28.305 MHz. And of course there are always the CB intruders, who are quite effectively removed by a spot of CW practice, usually by giving them a beat note of between 800 and 1000 Hz.

G2HKU notes an odd effect with the Woodpecker noises in that on his ZL contacts, when the FT-101ZD noise limiter is effective, the limiter on the TS-530 at the ZL end is not; and *vice versa*. Wherefore, he enquires, though your scribe must admit he has noted that on his rig the noise limiter doesn't always kill that Pest. To return to 28 MHz, Ted used the Big Rig to work OZ1W, and the four-watt job saw off UK5QCM and UL7GAA.

G2BON stuck to SSB as usual, and he found this got him over to JG1NBD, RH8HCV, VK5RX, H5AIR, and H5AIF; a shorter than usual list which Tom blames onto the garden.

Finally G4LDS, who offers VK4VAG, UA4NAG, A4XIU, ZS6EJ, UA6LWB, a station signing DX1TRC and claiming to be in Manila at a time when there was nothing else about save Southern EUs, 9H3BN, K4KQJ, AK4C, KH5HZD, WB2WLD, UK7NAQ, JH9GAT, VK6UA, K1JWB, H5AHF, VS6JW, VK2VWJ, CP8AL, PY2FOA/P, UO5OFB, VK2VWJ, 9J2DS, a K6 with an exotic suffix we just can't decipher (!) and of course the usual crop of small fry; and after April 17, just — silence.

Scraps

Most of the letters mention the spring gales and the effect on aerials; my own new aerial went up for its first test and wouldn't load up at all, at which time I had to go away on business for a few days, returning to find the aerial had obeyed the dictates of gravity and a sickly stay that had parted in the high winds. Repairs had to be put off for a few days, but once it was into its constituent parts I discovered that the feeder had been connected across the metal centre-piece of the director instead of the nylon centre-peice for the driven element. Perfect proof to the NHS that your scribe needs new specs! But it is a point of interest that one probably thinks of wire stays on a mast as being far and away best: in this case the offending stay didn't show any serious signs of weakness externally but was very bad inside, out of sight. Worth remembering!

Finale

That's about it for another time; *of course* we can always use more reports, if they get here on or before the dates mentioned in the deadlines 'box', and are addressed to "CDXN", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ. Meantime, may your mower-blades be always sharp!

July issue due to appear on Friday, June 25th.

NEW QTH's

This space is for the publication of the addresses of holders of new callsigns, or change of address, in EI, G, GJ, GU, GD, GI, GM and GW of stations not already listed. All addresses published here will appear in the U.K. section of the American "CALL BOOK" in preparation. Please write clearly on a separate slip and address to QTH Section. Be sure to give correct County designation and post-code. In the case of direct subscribers needing Change of Address, please state for card index adjustment. Address items for this space to: "QTH Section," *SHORT WAVE MAGAZINE, 34 HIGH STREET, WELWYN, HERTS. AL6 9EQ.*

EI5BD, A. Hopkins, Hollyhill, Blackberry Lane, Delgany, Co. Wicklow *(re-issue)*.

EI8EK, J. A. Ward, Sessiaghoneill, Ballybofey, Co. Donegal.

G3APO, I. R. Richard, 9 Havelock Street, Wokingham, Berks. RG11 2XT. *(Tel: 0734-790369) (re-issue)*.

G3GCW, B. G. Jones, 44 Winner Hill Road, Paignton, Devon. TQ3 3BT. *(Tel: 0803-551806) (re-issue)*.

G3IJO, N. E. Wicks, 3 Chyngton Gardens, Seaford, East Sussex. BN25 3RP.

GM3MLW, W. R. Cook, 4 Liberton Brae, Edinburgh. EH16 6AE. *(Tel: 031-664-9760) (re-issue)*.

G3TWV, G. Francis, 2 Wyke Lane, Farndon, Newark, Notts. NG24 3SP *(re-issue)*.

GM4KGZ, S. A. S. Low, 2 Bruntsfield Avenue, Whitehirst Park, Kilwinning, Ayrshire. KA13 6RY. *(Tel: 0294-54109)*.

G4KQR, K. R. Riddell, 32 Barton Road, Bedworth, Warks. CV12 8HG.

G4KWG, E. Kershaw, 97 Winter Hey Lane, Horwich, Bolton, Lancs. BL6 7PJ.

G4KZA, R. Matten, 97 Drake Road, Harrow, Middlesex. HA2 9DZ.

G4LKF, B. G. C. Thompson (ex-G8JJE), 21 Birling Place, Corby, Northants. NN18 0LZ.

G4LTK, P. R. Hinks (ex-G8FOJ), 1 Richard Joy Close, Holbrooks, Coventry, W. Midlands. CV6 4EY.

G4MCU, G. J. Slow (ex-G8LFJ), 14 Headley Road, Billericay, Essex. CM11 1BJ.

GM4MFZ, A Nicoll (ex-GM8BQP), Druim Dearg, Muir of Ord, Ross-shire. IV6 7XL.

G4MHI, C. J. Last (ex-G8WGL), 213 Rushmere Road, Ipswich. IP4 3LN.

G4MKM, A. J. McMillan, 205 London Road, Wokingham, Berks. RG11 1SP. *(Tel: 0734-786143)*.

G4MLS, R. K. Woodman, 3 Gladstone Cottages, Wimborne Avenue, Norwood Green, Southall, Middlesex. UB2 4HD. *(Tel: 01-571-1443)*.

G4MLW, I. F. Jones, 54 Milton Road, Liversedge, Heckmondwike, West Yorkshire. WF15 7BH.

G4MNB, R. W. Sharp (ex-G8IHY), 77 Cloche Way, Upper Stratton, Swindon, Wilts. SN2 6JN.

G4MOU, J. A. Oates, 3 Canadian Avenue, Chester. CH2 3HG. *(Tel: 0244-22039)*.

G4MOW, D. M. Foster-Bazin, 31 Lockeridge Close, Blandford Forum, Dorset. DT11 7TT. *(Tel: 0258-53930)*.

G4MRR, H. V. McEvoy (ex-G8WWH), 5 Blackmore, Letchworth, Herts. SG6 2SX.

G4MTQ, A. P. Tapp (ex-G8TFZ), 55 Frobisher Drive, Saltash, Cornwall. PL12 4PN.

G4MUY, D. A. Lane, 1 Norman Crescent, Metheringham, Lincoln. LN4 3DN. *(Tel: 0526-21179)*.

G4MVX, M. J. Gardiner (ex-G8KTL), 206 Caulfield Road, East Ham, London. E6 2DQ.

G4MZC, B. J. Horsman (ex-VS6AC), 18 Blackstone Close, Farnborough, Hants. GU14 9JW.

G4NJC, Capt. P. F. Henny, 97 Heathermount Drive, Edgcumbe Park, Crowthorne. RG11 6HJ. *(Tel: 03446-4775)*.

G4NKO, S. Harding (ex-G6DEX), 15 Burgess Walk, St. Ives, Cambs. PE17 4AS. *(Tel: 0480-61112)*.

G5CW, E. S. Wilson, 3 Waters Edge, Aldwick, Bognor Regis, Sussex. PO21 4AW. *(Tel: 0243-825566) (re-issue)*.

G5ECV, J. M. A. Elias (ex-ON4JW), "Rosebank", Higher Merley Lane, Corfe Mullen, Dorset. BH21 3EG.

G6DCP, B. J. Newman, 8 Cole Gardens, Hounslow, Middlesex. TW5 9RJ.

G6DQC, D. R. Owen, "Delamere," 12 Wolverley Avenue, Wollaston, Stourbridge, West Midlands. DY8 3PJ.

G6DQF, A. H. Marshall, 1 Moore Road, Barwell, Leicester. LE9 8AF.

G6DRA, P. R. Paling, 15 Longfellow Road, Banbury, Oxfordshire. OX16 9LB.

G6EBL, M. J. Brundle, 48 Northlands Avenue, Orpington, Kent. BR6 9LY. *(Tel: Farnborough (Kent) 52460)*.

G6ECM, M. Cuckoo, 15 Fairoaks, Herne Bay, Kent. CT6 6EU.

G6FVG, F. Goodliffe, 7 Lancaster Road, Uxbridge, Middlesex. UB8 1AP.

G6GFP, R. K. Astley, 33 Colman Road, Norwich, Norfolk. NR4 7AL. *(Tel: Norwich 53300)*.

G6GHT, A. F. Sephton, 16 Bloemfontein Avenue, Shepherds Bush, London. W12 7BL. *(Tel: 01-749-1454)*.

G6GKZ, J. J. Vinton, "Cheriton", Alexandra Road, St. Ives, Cornwall, TR26 1ER. *(Tel: 0736-795860)*.

G8DUW, I. E. Redfern, "Baldrics", 41 The Oaklands, Kidderminster, Worcs. DY10 2SB *(re-issue)*.

G8KOT, Mrs. M. B. Grayson, 88-A Kaye Lane, Almondbury, Huddersfield, West Yorkshire. HD5 8XU *(re-issue)*.

Change of Address

G2HII, R. S. Ashley, Moorcroft, Beck Garth, Hutton-Le-Hole, North Yorkshire. YO6 6UD.

GM3BTQ, J. B. Staker, 9 St. Fillans Crescent, Aberdour, Fife.

G3FMR, C. L. T. Dwyer, 197 Windhill Old Road, Thackley, Bradford, West Yorkshire. BD10 0TR.

G3GDJ, R. B. Wilson, 100 Almond Street, Derby. DE3 6LX.

G3HDJ, L. J. Smith, 118 Charnwood Avenue, Westone, Northampton. NN3 3DY.

G3IVZ, W. E. Stephen (ex-GM3IVZ), 44 Petty's Brook Road, Sherfield Park, Chineham, Basingstoke, Hants. RG24 0RW.

G3JUT, T. J. Jones, 12 Cardigan Crescent, Weston-super-Mare, Avon. BS22 8NT.

G3KIW, G. W. Jenner, 33 Silhill Hall Road, Solihull, West Midlands. B91 1JX.

GU3LPV, A. H. J. Catts, School Flats, High Street, Alderney.

G3MPF, C. F. Smith, Flat No. 1, 11 Leicester Street, Southport, Merseyside.

G3NUG, E. N. Cheadle, Further Felden, Longcroft Lane, Felden, Hemel Hempstead, Herts. HP3 0BN.

G3PHN, S. B. Lord, "Bridgehouse", Upper Packington Road, Ashby-de-la-Zouch, Leics.

G3RKH, Rev. J. L. Marshall, The Rectory, Ordsall, Retford, Notts. DN22 7TP. *(Tel: Retford 702515)*.

G3RUI, R. K. Furness (ex-GM3RUI), "Brambletye", Wacton Common, Long Stratton, Norfolk. NR15 2UP.

G3SGH, J. R. M. Hewitt, 19 Rectory Way, Kennington, Ashford, Kent.

GW3SSY, D. F. Jones, 2 Dalwyn Houses, Llanover Road, Blaenavon, Gwent. NP4 9HY. *(Tel: 0495-791617)*.

G3UOF, M. R. Wadsworth, Corporation Farm, Walpole Marsh, Wisbech, Cambs. PE14 7JH.

GW3YXC, J. F. Bulcraig, Ty Mawr Farm, Rhiwsaeson, Pontyclun, Glam. CF7 8NX.

G4EMT, J. Tawn, 147 St. Helens Road, Eccleston Park, St. Helens, Liverpool. L34 2QB.

G4GMP, B. C. Wheaton, 27 Pendarves Street, Troon, Camborne, Cornwall. TR14 9EG.

GM4HKV, J. Henderson, 1 Rossiebank Crescent, Westmuir, Kirriemuir, Angus. DD8 5LB.

GM4HKW, J. W. Henderson, 1 Rossiebank Crescent, Westmuir, Kirriemuir, Angus. DD8 5LB.

GW4IED, R. Keyes, 4 Glanmor Crescent, Newport, Gwent. NPT 8AX.

G4JPL, P. Morgan, 2 Cliff Road, Worlebury, Weston-super-Mare, Avon. BS22 9SF. *(Tel: 0934-26903)*.

G8BXQ, T. N. Hordley, 3 Blandford St. Mary, Blandford Forum, Dorset. DT11 9LH.

G8CQC, R. Mills, 48 Lady Bank, Birch Hill, Bracknell, Berks.

G8XDZ, P. A. Long, 11 Bailey Dale, Stanway, Colchester, Essex. CM3 5LB. *(Tel: 0206-331234)*.

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Sale: Yaesu FT-207 2-metre synthesised portable, YM-24 extension speaker/mic., spare nicad, with charger, as new, in original packing, £140. — Ring Simms, 0934-514541 (Avon).

Selling: Datong UC1 up-converter and mains unit, excellent condition, £65. — Ring Reading 883114.

Sell or Exchange: Pye AM-25B high-band radiotelephone, unmodified, with PSU, manual, and FM mod. boards. Offers invited, or exchange for Heathkit HW-8. W-H-Y? Send s.a.e. for list of VHF auxiliaries, valves, components, xtal cals., uncompleted kits, going cheap. — Smith, G8BAF, QTHR. (Tel: 0376-514912, Essex).

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Sale: Yaesu FT-101ZD, FM, with FC-902, new, must sell. — Ring Derby 557705.

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Good Price paid for copy of "Antenna Theory and Design", Vol. 2, by H. P. Williams. — Ring Mason, G6GED, 0752-25508 evenings.

Wanted: Heathkit SB-620 Scanalyser and Advance SG63E FM/AM signal generator. Details of condition and price please. — Hughes, Electronic Engineering Dept., UCD, Merrion Street Upper, Dublin 2, Eire. (Tel: Dublin 761584 ext. 222, office hours).

For Sale: Trio R-300 receiver with ATU, £125. Sony CRF-5090 receiver with BFO, box, as new, £80. Both mint condition. — Ring Watson, 0480-65403 evenings.

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