The SHORT WAVE Magazine

50p

VOL. XXXIX AUGUST 1981 NUMBER 6

take a trip around the world tonight take a trip around the world tonight take a trip around the world tonight take a trip around the world tonight take a trip around the world tonight take a trip around the world tonight take a trip around the world tonight take a trip around the world tonight

TRIO *pacesetter in amateur radio*

TR9500 *70 cm FM, SSB and CW multimode mobile*

The TR9500, a 70 cm multimode mobile giving SSB, FM and CW operation in a compact rig based on the phenomenally successful 2 metre 9000. Combining the convenience of FM with the "DX ability" of SSB on the 70 cm band this is the rig all discerning VHF and UHF amateurs have been waiting for. Used alongside your existing 2 metre equipment a new spectrum of contacts becomes available. Repeaters, satellite working simplex and with the addition of your 2 metre rig Duplex communications are at your finger tips. Of course the matching accessories SP120 speaker, BO-9 system base and PS20 power supply are all available to enable you to build a base station system second to none.

The TR9500 features:

- FM, USB, LSB and CW.
- Similar in size to the TR9000.
- Two digital VFOs.
- Multiple scan facilities for various modes.
- 6 memories, 5 for simplex or repeater shift — and the sixth memory for a non-standard offset.
- Digital frequency display.
- Covers 430 to 440 MHz.
- Up/down microphone for manual band scan.
- RIT (Receiver Incremental Tuning) for SSB and CW.
- RF gain control.
- Mobile mounting bracket.
- Led indicators for on air and busy.

Optional Accessories

- PS20 fixed station power supply.
- SP120 fixed station external speaker.
- BO9 system base — with power switch, send/receive switch, memory back-up power supply and headphone jack.

£482.54 inc VAT carriage £4.50

TS530S *building on proven success*

The all new TS530S is firmly based on the reputation of the TS520 series and incorporates many of the features of the superb TS830S. Included are the three new bands and, of course, the rig has both digital and analogue frequency readout. Also available for the TS530 is a complete range of matching station accessories, the SP230 speaker, the VFO240 and, of course, the AT230 antenna tuning unit.

TS530S features:

- Single conversion receiver and transmitter using 8.83 MHz. I.F.
- LSB, USB and CW on 160-10 metres including the new 10, 18 and 24 MHz. bands.
- Built in digital display with 6 digits and also analogue dial.
- IF shift (passband tuning).
- RIT (Receiver Incremental Tuning) and XIT (Transmitter Incremental Tuning).
- Built in speech processor.
- Narrow and wide filter switching.
- Noise blanker threshold level control.
- Also retained are the rugged reliable 6146B PA valves and the easy to use controls.

Optional Accessories

- SP230 external speaker with selectable audio filters.
- VFO 240 external matching VFO.
- AT230 antenna tuner/SWR and power meter/antenna switch, 160 to 10 metres including the 3 new bands.

£561.20 inc VAT carriage £4.50

Have your thought about selling or trading in your QSL cards?

Not so daft as it seems, since our collectomaniac Director — John Wilson — is willing to buy or trade in QSL cards. They must be postally used, in other words have stamps on, and been sent to you from abroad. Particular interests are cards from former African colonies and places like Ascension, St. Helena, and so on.

If you are interested, why not contact John Wilson at Matlock; it's an easy way to turn waste paper into money.

A DATE FOR YOUR DIARY AUGUST 15th

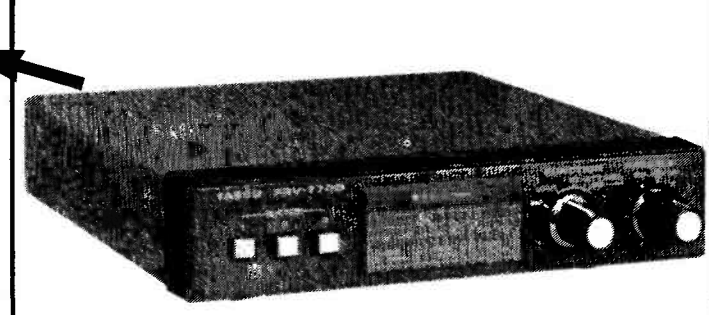
LOWE ELECTRONICS' OPEN DAY

On Saturday, the 15th of August, here at Matlock, we are having our first Open Day. All the staff will be in attendance, including the back room boys and girls. You will have the opportunity to meet them and find out how we tick. Guided tours by G3PCY and G8GIY.

FRT-7700

ATTENTION FRG·7700 owners!

Exploit the full potential of your receiver with YAESU's new FRT-7700 antenna tuner and FRV-7700 converter.



FRV-7700

New on two!

FT-290R All-mode 2m portable

10 memories, 2 VFO's, LCD display, C size battery, easy car mounting tray, 2·5 watts out.

New on seventy!

FT-780R All-mode 70cm mobile

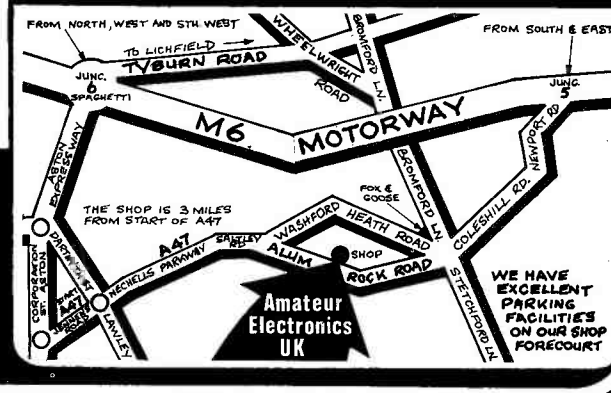
4 memories, memory and bandscan from microphone, conservative 10 watts out–All the features of the FT-480 on 70cm.

AGENTS

NORTH WEST – THANET ELECTRONICS LTD, GORDON, G3LEQ, KNUTSFORD (0565) 4040.
WALES & WEST – ROSS CLARE, GW3NWS, GWENT (0633) 880 146.
EAST ANGLIA – AMATEUR ELECTRONICS UK – EAST ANGLIA, DR T. THIRST (TIM) G4CTT, NORWICH 06925 865
NORTH EAST – NORTH EAST AMATEUR RADIO, DARLINGTON 0325 55969
SOUTH EAST – AMATEUR ELECTRONICS, UK – KENT KEN McINNES, G3FTE, THANET (0843) 291297

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.

WHERE TO FIND US



SMC SERVICE

Free Finance on many items. Two year guarantee on Yaesu. Free Securicor on major Yaesu items. Access and Barclaycard over the telephone. Biggest Branch, Agent and Dealer network. Ably staffed, courteous, Service Department. "B-Services" Securicor contract at £3.50!! Biggest stocks of amateur equipment in UK. Twenty-two years of professional experience.

GUARANTEE

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

FREE FINANCE

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

YAESU MUSEN

As UK Agents, we show some major Yaesu items; a new VHF multimode handportable, 2 general coverage receivers, multimodes for VHF and UHF FM transceivers for VHF, UHF and VHF/UHF, 4 HF transceivers (SSB, CW, FSK, AM, FM) and a fistful of VHF and UHF handhelds. Remember there are 150 accessories to complement these lines . . .

FULL RANGE OF MATCHING ACCESSORIES

FT290R

LOOK

SMC 2.2 A/Hr NiCd £2.70 inc.

£229 inc.
VAT @ 15% & POSTAGE

- ★ 144-146MHz (144-148 possible)
- ★ Multimode USB, LSB, FM, CW
- ★ 2.5W PEP, 2.5W RMS/300mW out
- ★ LED's; 'ON AIR', 'BUSY'. MC meter; S.PO
- ★ Integral telescopic antenna
- ★ Bandwidth 2.4KHz and 14KHz @ — 6dB
- ★ Optically coupled main tuning
- ★ 100 Hz backlit LCD Frequency display
- ★ 10 memory channels "5 year" backup
- ★ FM: 25KHz and 12.5KHz steps
- ★ SSB: 1KHz and 100Hz steps
- ★ Any TX & RX split with dual VFO's
- ★ ±600KHz repeater split 1750Hz burst
- ★ Mobile mounting bracket available
- ★ Matching 10W linear Amplifier
- ★ Up/down tuning from microphone
- ★ AF output 1W @ 10% THD
- ★ 58 (H) × 150 (W) × 195 (D) (1.3kg)
- ★ Rx, .70mA, Tx; 800mA (FM maximum)
- ★ 8 'C' Ni cads or Drys. 8.5-15.2V DC External

FRG7

- ★ "Industry standard" receiver.
- ★ 0.5-3MHz.
- ★ SSB (LSB/USB), CW, AM.
- ★ Selectivity of ±3kHz at — 6dB.
- ★ Wadley-loop triple conversion.
- ★ 10kHz Direct dial readout.
- ★ Well calibrated "sharp" preselector.
- ★ AM Automatic noise suppression circuit.
- ★ Antenna Hi to 1.6MHz, 50ohm to 30MHz.
- ★ 3 position RF antennuator.
- ★ 3 position AF filter (LP, WBP, NBP).
- ★ 110-240Vac and 12Vdc.
- ★ Lights: battery economy switch.
- ★ Illuminated edge type "S" meter.
- ★ Optional Battery holder £5.00.

£199 inc. VAT @ 15% & SECURICOR

FRG7700

NEW MATCHING ATU, LPF AND FOUR VHF CONVERTORS

- ★ Incredible new receiver.
- ★ 0.15-30MHz.
- ★ SSB (LSB/USB), CW, AM, FM.
- ★ 2.7kHz, 6kHz, 12kHz, 15kHz, @ — 6dB.
- ★ Up conversion 48MHz first IF.
- ★ 1kHz digital plus analogue display.
- ★ No preselector, auto selected LPF's.
- ★ Advanced noise blanker fitted.
- ★ Antenna 500ohm to 2MHz, 50ohm to 30MHz.
- ★ 20dB pad plus continuous antennuator.
- ★ Constantly variable tone control.
- ★ 110 and 240Vac and 12Vdc option.
- ★ 12 channel memory option.
- ★ Signal meter calibrated in "S" and SIMPO.
- ★ FRG7700M £389. Memory option £83.95.

£309 inc. VAT @ 15% & SECURICOR

SOUTH MIDLANDS COMMUNICATIONS LIMITED

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

AGENTS: G, GW, GM, GI, GJ.

G3ZUL	Brian	Stourbridge	(03843) 5917
GI3KDR	John	Bangor	(0247) 55162
GM8GEC	Jack	Edinburgh	(031685) 2420
GI3WWY	Mervyn	Tandragee	(0762) 840656
GW3TMP	Howarth	Pontybodkin	(035287) 846/324
GW8EBB	Peter	Swansea	(0792) 872525
GJ4ICD	Geoff	Jersey	(0534) 26788
G4EQS	Simon	Redcar	(0642) 480808

LEEDS

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

CHESTERFIELD

★ S.M.C. (Jack Tweedy) LTD
N Roger Baines, G3YBO
E 102 High Street,
W New Whittington,
Chesterfield (0246) 453340
★ 9-5.00 Tuesday-Saturday

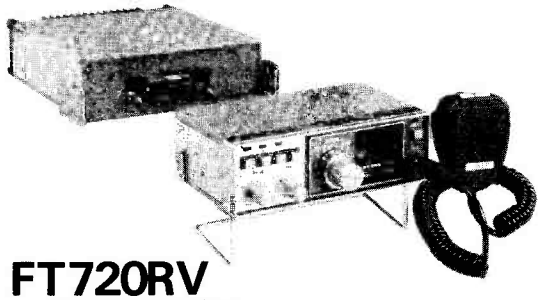
WOODHALL SPA

★ S.M.C. (Jack Tweedy) LTD
N Jack Tweedy, G3ZY
E 150 Horncastle Road,
W Woodhall Spa, Lincolnshire.
Woodhall Spa (0526) 52793
★ 9-5.00 Tues.-Sat. (+ appointments)

FT780R

- ★ 430-434 MHz (440-445 possible)
- ★ USB-LSB-CW-FM (A3J, A1, F3)
- ★ Input; 30W (PEP A3J + A1/F3)
- ★ GaAs Fet RF for incredible sensitivity
- ★ NMOS four bit micro control
- ★ Bandwidth 2.2KHz and 14KHz @ −6dB
- ★ 'Dial set' clears non integral steps
- ★ Very bright blue display to 100Hz
- ★ Display indicates Tx and Rx (inc RIT)
- ★ Manual tone switch on microphone
- ★ String LED displays for S and PO
- ★ Digital receiver independent tune (±10KHz)
- ★ Advanced effective noise blanker
- ★ 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
- ★ Memory scanning with slot display
- ★ Up/down tuning from microphone
- ★ Priority channel on any memory slot
- ★ Satellite mode allows tuning on Tx
- ★ Scanning for busy or clear channels
- ★ Size (case): 10" D, 2.3" H, 6.9" W
- ★ LED's on air, clear, hi/low, FM mod
- ★ FP80 mains PSU + SC1 console available

£409 inc. VAT @ 15% & SECURICOR



FT720RV

FT720 Control Head

- ★ For easy write-in memory channels
- ★ Rx priority channel (auto check)
- ★ Scanning of band/memory for empty/busy
- ★ Up/down tuning/scanning from mic.
- ★ Optically coupled tuning control
- ★ Manual and automatic tone burst
- ★ String LED's for 'S' and PO, status LEDs
- ★ 1½ W of audio to internal/external speaker
- ★ 3.3 (4.3)" D x 6" W x 2 (2.2)" H
  720RV 10W, 2M deck **720RVH** 25W, 2M deck
- ★ 144-146MHz (144-148MHz possible)
- ★ 12½ KHz sythesizer steps, 600kHz Shift
- ★ 0.3μV for 20dB quieting
- ★ Rx 0.5A. Tx RV 3.5A, RVH 6.5A
- ★ 5.8 (6.5)" D x 6" W x 2(2.2)" D
  7209RU 10W, 70cm. deck
- ★ 430-434MHz
- ★ 25KHz synthesizer steps, 1.6MHz Shift
- ★ 0.5μV for 20dB quieting
- ★ Rx 0.5A, Tx 4.5A
- ★ 5.8 (6.5)" D x 6" W x 2 (2.2)" D
  S72 Switching box
- ★ Pushbutton bandswitching between two decks
- ★ Auto change of synthesizer steps/splits

£253 inc. VAT @ 15% & SECURICOR

CPU2500RS

- ★ Covers 144 to 146 or 148MHz
- ★ 25/3 watt or 10/1 watt model(s)
- ★ CPU controlled digital synthesiser
- ★ 10KHz (+ 5KHz up) synthesised steps
- ★ Optional 25KHz steps in St version
- ★ 6 digit readout + memory channel number
- ★ Main tuning, by optically coupled encoder
- ★ Up/down tuning/scanning from microphone
- ★ Scanning for empty or occupied channels
- ★ Band scanning up or down the band
- ★ Four normal memory channels
- ★ Further memory for 'odd' split
- ★ Can scan memory channels only
- ★ ± 600KHz plus any split (to 4MHz)
- ★ Sub audio tone squelch option
- ★ Manual (EU) and Auto (UK) tone burst
- ★ High or low (1/10) power switch
- ★ Low noise mosfet RF stage
- ★ LED's for:— 'on Air' and 'Busy channel'
- ★ VSWR and reverse polarity protection
- ★ Punch in frequency on keyboard mic (K)
- ★ 0.5A Rx, 2.5A LTx, 6 A HTx (25). 13.6V DC
- ★ Case; 7" wide, 2¾" high, 10½" deep
- ★ Sensitivity: 1.3 μV for 20dB
- ★ Selectivity: 12KHz ★ −6bD (2:15F)

£235 inc. VAT @ 15% & SECURICOR

FT480R

- ★ 144-146MHz (143.5-148.5 MHz possible).
- ★ USB-LSB-CW-FM (A3j, A1, F3).
- ★ 30W PIP A3j, 10/1 W our A1 F3.
- ★ Bandpass filter no tune design.
- ★ Excellent dynamic range sensitivity.
- ★ Bandwidth 2.4kHz and 14kHz at −6dB.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx and Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ Digital receiver offset tuning.
- ★ Advanced effective noise blanker.
- ★ 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.
- ★ Memory scanning with slot location 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 model.
- ★ Matching PP80 Mains PSU available.

£359 inc. VAT @ 15% & SECURICOR

FT101ZDFM

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

FT101ZAM	£515.00inc.	SP901	
FT101ZFM	£529.00inc.	FV101Z	£121.90inc.
FT101ZDAM	£585.00inc.	FV101DM	£225.00inc.
FT101ZDFM	£599.00inc.	FV901DM	£223.45inc.
FL2100Z	£385.25inc.	WMT101Z	£12.00

*Option.

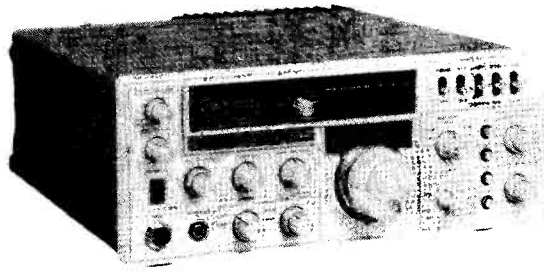
£599 inc. VAT @ 15% & SECURICOR

FT902DM

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

FT902DM	£799.00inc.	YR901	£369.00inc.
FT902DE	£713.00inc.	YVM1	£142.60inc.
FT902D	£724.50inc.	YK901	£115.00inc.
YO901P	£302.45inc.	FTV901(2)	£263.35inc.
FC902	£126.50inc.	WMT901	£12.00

*Option. **£799 inc.** VAT @ 15% & SECURICOR



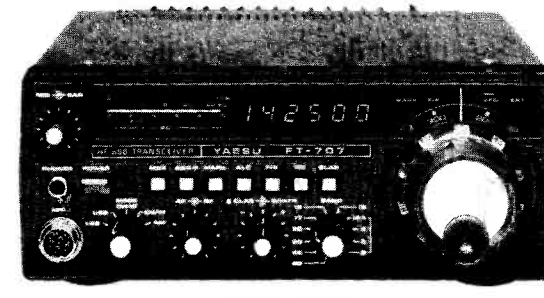
FT107M

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

FT107M	£690.00inc.	FC107	£102.35inc.
FT107MDMS	£775.00inc.	FP107	£97.75inc.
FV107	£92.00inc.	FP107E	£106.95inc.
FTV107	£110.40inc.	Filters	£23.00inc.
SP107	£27.60inc.	WMT107	£12.00

*Option

£690 inc. VAT @ 15% & SECURICOR



FT707

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

FT707	£529.00inc.	FTV707	£82.00inc.
FT707S	£455.00inc.	70TV	£80.50inc.
FP707	£109.25inc.	144TV	£101.20inc.
FC707	£80.50inc.	430TV	£175.95inc.
FV707DM	£186.30inc.	WMT707	£10.00

*Option

£529 inc. VAT @ 15% & SECURICOR

FT208R

- ★ 144-148MHz (144-148 possible)
- ★ 12.5/25kHz synthesiser steps
- ★ 4 bit CPU synthesiser control
- ★ Keyboard entry of frequencies/splits
- ★ LCD digital display with backlight
- ★ Ten channels of memory
- ★ Memory back up '5 year lifetime'
- ★ Up/down manual tuning
- ★ Manual or auto scan for busy/clear
- ★ Priority channel with "check back"
- ★ Memory scanning feature
- ★ Scan between *any* two frequencies
- ★ Scan with auto pause/restart
- ★ Any split + or − programmable
- ★ Quick change NiCad pack
- ★ 1750Hz tone burst
- ★ ±600kHz repeater split
- ★ Built in condenser microphone
- ★ 500 mW AF to int/ext speaker
- ☆ External speaker/mic option
- ★ 2.5 or 0.3W RF output
- ★ Rx; 20mA squelch 150mA max AF
- ★ Tx; 800mA at 2.5W RF
- ★ 0.25μV for 12dB SINAD
- ★ Dual conversion 16.9MHz & 455kHz
- ★ Keyboard provides 16 tone DTMF
- ★ 168 (H) x 61 (W) x 49 (D) mm
- ★ C/w NiCad pack and helical

FT208R
£195 inc.
VAT @ 15%
& POSTAGE

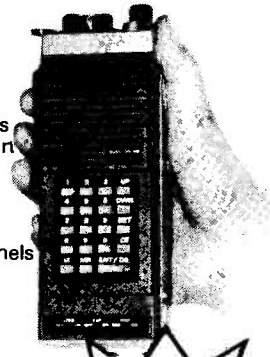
FT708R

- ★ 430-440MHz (440-450 option)
- ★ 25KHz synthesizer steps
- ★ 4 bit CPU chip frequency control
- ★ Keyboard entry of freqencies/splits
- ★ LCD digital display with backlight
- ★ Ten channels of memory
- ★ Memory back up 5 year lifetime cell
- ★ Up/down manual tuning
- ★ Manual or auto scan for busy/clear channels
- ★ Priority channel with search back
- ★ Memory scanning feature
- ★ Scan between any two frequencies
- ★ Auto scan restart
- ★ Any split + or − programmable
- ★ Quick change NiCad pack
- ★ 1,750Hz tone burst
- ★ ± 7.6MHz EU split standard
- ★ Built in condenser microphone
- ★ 500 mW AF to int/ext speaker
- ★ External speaker/mic available
- ★ 1W or 100 mW RF output
- ★ RX: 20mA squelch, 150MHz (max AF)
- ★ TX: 500 mA at 1W RF
- ★ 0.4μV for 12dB SINAD
- ★ Dual conversion 46.255MHz & 455KHz
- ★ Keyboard offers 16 tone DTMF
- ★ 168(H) × 61(W) × 49(D) mm.
- ★ C/w NiCad pack, helical

FT708R
£199 inc.
VAT @ 15%
& POSTAGE

FT207R

- ★ 144-148MHz (144-148 possible)
- ★ 12.5KHz synthesizer steps
- ★ 4 bit CPU chip for freq. control
- ★ Keyboard entry of frequencies
- ★ Keyboard lockout safety features
- ★ Digital display to hundreds of Hert
- ★ Display auto shutdown timer
- ★ Four Channels of memory
- ★ Memory back up disable
- ★ Up/down manual tuning
- ★ Bandscan for busy or clear channels
- ★ Memory scanning features
- ★ ±600KHz split built in
- ★ Any split + or − programmable
- ★ Easy change Ni Cad packs
- ★ BNC antenna connector
- ★ "On Air" and "Channel Busy" LEDs
- ★ Built in condenser microphone
- ★ 200mW AF to internal/external speaker
- ★ Extenal speaker/mic available
- ★ 2.5/0.2W of RF output
- ★ Rx; 35mA squelch, 150mA full vol.
- ★ Tx; 250mA low, 800mA high
- ★ 0.3μV for 20dB quieting
- ★ Double conversion 10.7MHz and 455KHz
- ★ Two tone encoder built in
- ★ 1.7 (2.2)" D x 2.5 (2.7)" W x 6.7 (7.2)" H
- ★ C/w NiCad pack, helical and case



LOW PRICE

FT207R
£175 inc.
VAT @ 15%
& POSTAGE

FT202R

- ★ 144-146MHz (144-148 possible)
- ★ 6 channel capability
- ★ 1 watt of FM RF output minimum
- ★ Rx; 30mA/200mA — squelch/500mW AF
- ★ Tx; 400/500mA — 300mW/1W
- ★ Dual Conversion 10.7MHz and 455kHz
- ★ 67 x 49 x 171mm
- ★ Built in speaker and mic, remote option
- ★ Operates on 'AA' NiCads or drys
- ★ C/w helical, case, xtalled S20, 21, 22

FT404R

- ★ 430-440MHz (Tx 2MHz, Rx 5MHz Spread)
- ★ 6 Channel capability
- ★ 2.5W of FM RF output
- ★ Rx; 7mA/160mA — squelch/400mW AF
- ★ Tx; 4005900mA — 200mW/2.5W
- ★ Dual conversion 21.4MHz and 455KHz
- ★ 68 x 55 x 171mm
- ★ Built in speaker and mic, remote option
- ★ Operates on quick charge NiCad pack
- ★ C/w NiCad pack, helical, case, 1 Channel

FT202R
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FT404R
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D15/1296	Double 15 slot-fed	34.00	(1.50)
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MT75/50	75/50 ohms	3.60	(0.50)

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5m remote cable kit		25.00	(n/c)

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CDE AR40 (5 core cable)	59.80	(1.50)
Channelmaster 9502 (3 core)	42.00	(2.00)
Sky King SU4000 (6 core)	75.00	(2.50)
Jaybeam KR400 (6 core)	99.00	(2.00)
CDE alignment bearing	7.75	(1.00)
Channelmaster alignment bearing	11.75	(1.00)

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AM202G Mobile safety mic.	20.95	(n/c)
AGM202S Mobile safety mic.	20.95	(n/c)
AM202H Mobile safety mic.	29.00	(n/c)
AM502G Base station comp. mic.	39.00	(n/c)
AM802G Base station 3 outputs	59.00	(n/c)

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Mosley TD3JR 20/15/10m wire dipole	34.50	(1.50)
Mosley "Mini-Beam" 20/15/10m 2 ele. 600w	99.00	(2.00)
Mosely "Mini-Beam" 20/15/10m 2 ele. 2Kw	129.00	(2.00)
Mosely TA32 20/15/10m 2 ele. 600w	89.70	(2.00)
Mosely TA33 20/15/10m 3 ele. 600w	133.40	(2.50)
Mosely Mustang 20/15/10m 3 ele. 2Kw	166.75	(4.00)
Hy-Gain 12AVQ 20/15/10m vertical	43.00	(2.00)
Hy-Gain 14AVQ 40-10m vertical	60.00	(2.00)
Hy-Gain 18AVT/WB 80-10m vertical	87.00	(2.50)
HF5 80-10m vertical 200w	48.00	(2.00)
Radial Kit for HF5	28.00	(2.00)
Sagant EL40X 80-40 dipole (79′ long)	38.00	(1.50)
Jaybeam TB3HF 3 element 2Kw	167.90	(4.50)
Jaybeam VR3HF vertical 2Kw	42.50	(3.00)

2 METRE PORTABLES

AR245 (previously AR240A) 2m FM 5w	178.00	(1.50)
AR245 carrying case	4.10	(0.50)
AR245 optional helical	4.10	(0.50)
AR245 12v DC car adaptor	4.10	(0.50)

VHF/UHF MONITORS

TM 56B FM Scanner 12v DC/230v AC	89.00	(n/c)
008 8 channel FM monitor	69.00	(n/c)
M161 16 channel FM monitor	59.00	(n/c)
MF083 Marine/Broadcast scanner	85.00	(n/c)

	£	£
BEARCAT 220FB 66-512mHz	258.00	(n/c)
SX200 26-512mHz	240.00	(n/c)
SR9 Tuneable 144-148 or 156-162mHz	46.00	(n/c)
AR22 2m FM synthesized handheld	83.00	(n/c)
AR22 flexible antenna	3.00	(n/c)

STOP PRESS!

Many price increases coming!

Check stock situation

DATONG PRODUCTS now in stock

YAESU FT290 £229.00
2m all mode portable

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SP200 1.8-160mHz 20w-200w-1Kw	59.95	(n/c)
SP300 1.8-500mHz 20w-200w-1Kw	79.95	(n/c)
SP400 130-500mHz 5w-20w-150w	59.95	(n/c)

SHORT WAVE LISTENER AERIALS

3-30mHz Inverted "L"	9.95	(1.00)
3-30mHz Broad band dipole	29.00	(1.00)
Mosley RD5 all-band dipole	40.00	(1.00)

AIR BAND PORTABLE MONITORS

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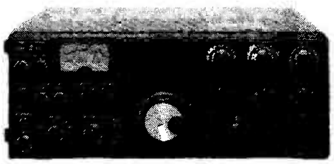
INGERSOLL MW/FM/Airband monitor	12.95	(0.75)
R517 Professional Air Monitor	49.50	(0.75)

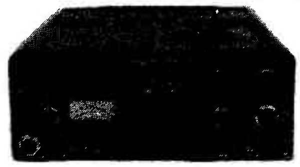
OUR PERSONAL SELECTION FROM TRIO RANGE

TRIO TS830S £725.00



A brand new model having all nine bands fitted and providing 200 watts input SSB/CW. Built-in 230V ac supply, 6146B tubes and full digital and analogue display. Plus a really comprehensive variable selectivity and notch filtering system. The DX'ers dream.

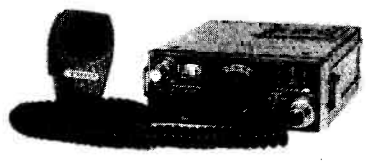
TRIO TS130S £547.00



Base or mobile this solid state HF transceiver covers eight bands SSB/CW with a genuine 100 watts output. No tune up, IF tuning and speech processing are just a few of its features. 12V dc operation with full digital display plus optional PS30 for 230V ac operation.

TRIO TR2300 £166.00

Still at old price!

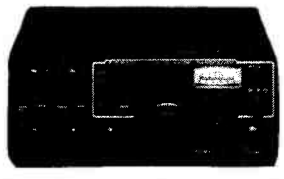


The TR2300 still amazes us at its value for money. Portable, mobile or base station it is equally at home in all 3 situations. 1 watt 80 channels complete with ni-cad ac charger. An ideal rig for the beginner.

TRIO R1000 £305.00

The receiver that revolutionised short wave listening. Full 30 band coverage 200kHz to 30MHz SSB/CW/AM. Both digital and analogue readouts are provided together with 230V or 12V dc operation facilities. Trio engineering at its best and at a very competitive price.

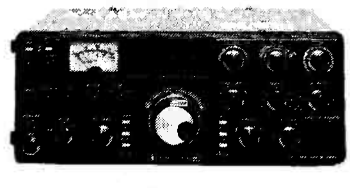
TRIO TR9000 £345.00



An all mode 2 metre transceiver that serves the dual roll of mobile and base station. Features include digital readout, 12½ or 25kHz steps in FM, five memories band scanning and a lot more! Send for coloured leaflet.

NEW

TRIO TS530S £561.00



At last a budget priced HF transceiver with a lot of extra features built in. 9 bands, SSB, CW, digital readout, speech processing etc. Get your orders in now at this super price!

MONDAY—SATURDAY 9 - 5.30 **WATERS & STANTON ELECTRONICS** EARLY CLOSING WED 1.00 p.m.

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'DATONG' THE INNOVATORS...

KEYBOARD MORSE SENDER
Historically the electronic key superseded the straight key for the simple reason that it reduces sending fatigue by reducing hand movements.
But progress continues. There are now at least four good reasons why the Datong Keyboard beats an electronic key. First, it reduces hand movements even further. Second, it cuts the need for mental concentration so you can save the effort for receiving (a task for which the brain is uniquely suited). Third, learning to use it is very easy **and** it's a useful skill anyway (unlike "paddling" or "pumping"). Fourth, even a beginner can reliably send error free morse, and remember that good morse means better copy.
Now check the summary below to see why the Datong Keyboard beats other keyboards

- CONVENIENCE: no need for a power cable, four internal pen cells last for 300 hours **and** give continuous memory back up.
- EXCLUSIVE COLOUR CODED KEYBOARD DESIGN: Separate key switches beneath a tough polycarbonate membrane combine excellent "feel" with a splash proof wipe-clean surface.
- LAVISH MEMORY: four 64-character memories with auto-repeat and programmable "pause" function, for all the routine sending.
- BUFFER MEMORY: ensures perfect sending despite less than perfect typing.
- COMPREHENSIVE CHARACTER SET: includes punctuation, procedure signals, accented letters. Plus a "merge" key for making any non-standard character.
- BEAUTY AND STYLE: only one inch thin and with four-colour panel Model MK looks every bit the thoroughbred it is.

Model MK is supplied with output leads and spare connectors but without batteries (four HP7 pen cells).

Model MK

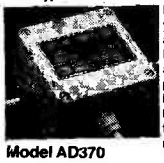
G8's – ARE YOU MISSING OUT?
Unless you can monitor the other bands you are missing a lot. If you have a 2 metre all-mode receiving set up, just add Model PC1 in series with its antenna and you have a superb general coverage receiver. What better way to listen in to all the non-VHF amateur bands, not to mention everything else from 60 kHz to 30 MHz? For sheer value for money there is no better way to get high performance general coverage reception. After all what a waste it is if your expensive 2 metre all-mode rig covers one band only?

Model PC1

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

MINIATURE RECEIVING ANTENNAS
If you don't have enough space to put up traditional receiving antennas, our active antennas are the answer. They need no tuning yet have constant sensitivity from 200 kHz to well over 30 MHz.
Results are quite comparable to full size conventional antennas but the space saving is enormous. The indoor version (AD270) is 3 metres long and the outdoor version (AD370) is 2 metres long.
A TV-type feeder cable of any reasonable length can be used yet because the antennas are balanced dipoles any interference picked up by the feeder is rejected.
Because of their wide frequency coverage Datong Active Antennas are ideal accessories for modern general coverage communications receivers.

Model AD270

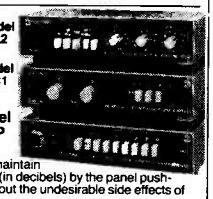


Model AD370

Model DC144/28

YET ANOTHER 2 METRE CONVERTER?
Yes but not **just** another. Model DC144/28 is designed to overcome the overload and spurious signal problems experienced by conventional converters. It uses a Schottky diode balanced mixer with about 7dbm of local oscillator drive. This, coupled with a 3SK88 r.f. amplifier, gives an excellent combination of low noise figure and strong signal handling capability. Its input and output gain controls also help you get the best out of your main receiver without flattening it with excessive gain.
Model DC144/28 is available either as a complete cased unit (die cast box. S0239 connectors) or as a ready built and tested PCB module.

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



Model FL2
Model PC1
Model ASP

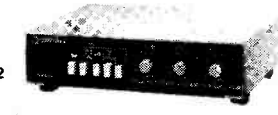
MODEL D70: THE GO-ANYWHERE MORSE CODE TRAINER
For building up your morse code reception speed there is no better method than the Datong "Morse Tutor".
You learn the code with the characters at normal speed but with an extra delay between each one. As you improve you reduce the "DELAY" control until, with it fully reduced, you find you are reading code at the chosen speed and with correct spacing.
An important feature is that the unit is completely portable. This allows you to practise wherever and whenever you find it most convenient. The all-CMOS design gives about 60 hours of practice from a lowcost PP3.

Model D70

Model FL1

IMPROVE YOUR SELECTIVITY
Model FL2 transforms the selectivity of your receiver yet simply connects in series with the loudspeaker. It contains three high performance audio filters (lowpass, highpass and notch) which can be used separately or together to give optimum results for any mode and any conditions.
Since, with most receivers, the built-in selectivity is a compromise, adding Model FL2 can greatly improve your ability to reject interference from overlapping SSB or CW stations.
Model FL1 works in a similar way but has the unique feature of being able to notch out interference whistles automatically.
The cost of a Datong audio filter is little more than the cost of a single accessory crystal filter, yet in terms of versatility and performance the audio filter is far superior.

Model FL2



Products not shown in this advertisement
Model Datest 1 Transistor Tester
Model Datest 2 Transistor Tester
R.F. Speech Processor Model D75
Model RFC/M.R.F. Speech Processor PCB Module
Model MPU, Mains Power Unit
Accessory Leads
Model VLF

DATONG ELECTRONICS LIMITED

INGENIEURBÜRO ULRICH HANSEN

VHF & UHF PREAMPLIFIERS: A range from Ulrich Hansen of West Germany
A range of high quality in-line preamplifiers for 2 metres or 70 cms. featuring ultra-low noise figures and state-of-the-art design. The range includes R.F. switching capability from 60 watts P.E.P. to 500 watts P.E.P. and choice of silicon low noise devices or the latest gallium arsenide MESFETs for the best possible noise figure. Indoor or mast mounted options are also included. Full details free on request. These units represent a cost-effective way of improving your DX receiving capability.

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

FL1	59.00 (67.85)	VLF	22.00 (25.30)	AD270	33.00 (37.95)	MPU	6.00 (6.90)
FL2	78.00 (89.70)	D70	43.00 (49.45)	AD370	45.00 (51.75)	DC144/28	31.00 (35.65)
PC1	105.00 (120.75)	D75	49.00 (56.35)	AD270 + MPU	37.00 (42.55)	DC144/28 Module	25.00 (28.75)
ASP	69.00 (79.35)	RFC/M	23.00 (26.45)	AD370 + MPU	49.00 (56.35)	Keyboard Morse Sender	140.00 (161.00)

DATONG ELECTRONICS LIMITED
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ADVERTISERS' INDEX

SHORT WAVE MAGAZINE

(GB3SWM)

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CONTENTS

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

Inspection and Entry Next?

In the course of correspondence with his MP, a certain amateur asked some questions about CB. The MP passed on a letter to the questioner from Mr. Timothy Raison; in this letter Mr. Raison stated that power of entry and inspection by police of CB stations was being proposed, and that serious consideration was being given to the question of extending this power to amateur radio stations.

This raises some quite horrifying possibilities—not least of which is the lack of knowledge or training in amateur radio or electronics of the average police officer. The police themselves do not know of this proposal at local level, officially, but we can say that their reaction was one of horror—partly because of their lack of suitable knowledge and partly because of the thought of yet another "non-police" task of monitoring being dumped upon already overloaded local constables.

We suggest that Mr. Raison's letter was probably just another feather-brained effort from someone not noted for political nous—but we have seen to it that the word has been passed to RSGB, and we have tried to ensure that some rather brighter members, of both Houses, are aware of the letter and asking questions. Should we not receive some appropriate response after a reasonable time, we will suggest the next steps to be taken by readers.

G3KFE.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

Top Band

HERE, things on the inter-continental line struggle on through the static crashes; the band users are divided into two distinct tribes these days, the third category of local net operations having all but disappeared. The first tribe are the Faithful Followers, who know all about split-frequency working, and which countries have what bit of the band. The other tribe including those who come on the band for the Europeans, care not – or, indeed, know not – of things like the DX Window, and split frequency working. It is a little sad at times to find the two tribes in contention, as happened to a degree last weekend, with a European Top Band CW contest on at the same time as a DX opening. The result was some of the contest stations missing good DX, while the DX-chasers were a bit sad to hear said good DX disappearing under contest signals sending CQ!

States-side, the biggest news for years is that they are going to have all the band and the daylight-or-dark power limit variations removed, which should please some by releasing pressure on the DX Window.

However, let G4AKY (Harlow) have his say first. Dave noted a new operating skill, deployed by PY1ARS, who seemed to be able to choose the moments when his signal was at its loudest to pass on the vital parts of his over, and being quite handsomely copiable through the static crashes. One interesting point about the South Americans is that many seem to dislike the established system of split-frequenciey operation; G4AKY has QSOs with them on frequencies like 1828, 1821, 1822, 1826, 1837 and 1848 kHz in his log, and as he says, when a PY appears, intending to work simplex, his every CQ results in something akin to a volcanic eruption, often with the result that no one this side knows just who he came back to! Dave didn't find any Asian stations this time, but contrived to work Europe, North America, South America, the CW contacts being somewhat like this: PY1RO, PY1ARS, PY1MAG, PY1ZAE, LU1DZ, LU9EIE, VE1BVL, VO1HP, C31IU, OH2BNP/OH0, OH1MA/OH0, LA1EKO on the Ekofisk oilfield, and sundry Europeans; and of course some Europeans were worked on SSB.

Next we have G4KKI (Swinton) who has something of a problem in that he lives in a terrace house, with a tarmacked back yard. He requires ideas for some way of getting out better on Top Band than the present set-up which comprises a twelve foot whip, base loaded, and fed with a single wire down to the shack; the earth side goes from the shack to the cold water pipe in the bathroom, and is aided by some 66 feet of wire 'lost' under the carpet. We would suggest straight away that the earth be taken down to the pipe as near where it enters ground as can be. However, the AT-5 managed CW with G4AKY, PA0DW, G3HZM, G4JHQ, UR2RCU, G2HW, G4KKZ, OK1DFF and for this month's chuckle an F station gotaway who came back to the call with "Sorry, DX only" and proceeded to call for 90 minutes without result. Strange how desire doth outrun performance.

Poor old G2HKU (Sheppey) has had an accident which has him nicely set up with right leg horizontal, which keeps him out of the shack and *away from the mower* – a fiendish scheme! As a result of all this, Ted has only his usual SSB sked with PA0PN.

Here & There

G3ZPF (Dudley has a copy of the program for SS/TV and Hellschreiber, both for use on an Apple 2; both have been "Europeanised" as to their timings, by PA0KLS. David says that if anyone would like a copy, either on tape or disc, they can send him the tape or disc, plus a suitable S.a.e. – he doesn't want to receive a sum to cover postage, as it leaves him all the hassle of finding an envelope, stamps, writing the address, and so on.

We have a letter from the Dutch QSL Bureau, about their changed address – it is now: Dutch QSL Bureau, P.O. Box 330, 6800 AH Arnhem, The Netherlands.

Now to a matter one would rather forget; the question of forged QSL cards. K6LPL wrote a letter to the *DX Bulletin* on May 26 this year and as far as we can understand it, under the flannel and waffle, K6LPL thinks the QSL card has caused the degeneration of the hobby of DX-chasing into a mere mad flap for cards which can be offered up for DXCC credit, regardless of whether they are genuine or otherwise. As we understand this letter (it is hard to translate it from jargonese to English), K6LPL and the other thirteen amateurs he says he talked to, have sent out many blank QSL cards, and QSL cards for operations which were phoney. Gardner has apparently now turned in his own DXCC membership – which is a bit of an irrelevancy – and it would appear that the QSL Managers concerned were all kept in the dark about the business, which seems a bit of a tall story. In sum, it seems that there are some amateurs who have, knowingly or unknowingly submitted QSLs for countries to which they aren't entitled, either because they filled in a blank card or because the expedition was phoney. ARRL's DXCC staff have to consider what to do – if Dr. Gardner is right in his claim that some 25K cards were involved, they have a problem. About all we can add at the time of writing is that we know that ON4QX, EA2IA, and W6NZX have been disqualified for submitting QSL cards either forged, altered, or whatever; but we don't know whether these three and their misdeeds have a direct relation with the K6LPL group's activities. The whole thing stinks.

"CDXN" deadlines for the next three months —

September issue – August 6
October issue – September 3rd
November issue – October 1st

Please be sure to note these dates.

Activities

The blockbuster of the month goes to the group who appeared from Burma without notice. JA8BMK reports they got the permission and were on the air next day; May 22 to May 27 was the DX-pedition period, and they managed to get two locals on, XZ5A and XZ9A. Most of the activity is XZ5A as Laydoh Moo is, like the rest of us, forced to work for a living! JA8BMK is handling the QSL side for the moment, and right as this was being written we are advised that XZ5A has now got a tri-band beam up in the air.

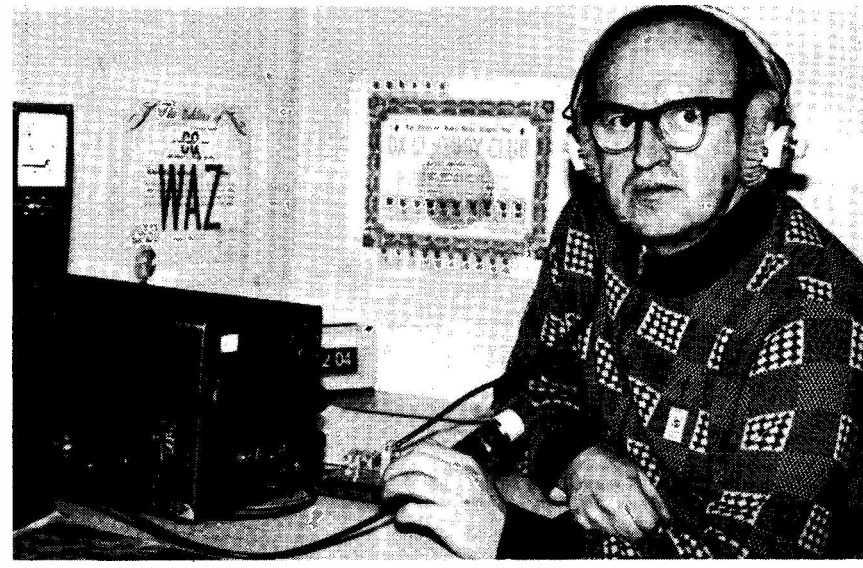
The other biggie this time was the Desecheo effort; seventeen operators in seven days ran up a total of over 40,000 contacts; they had their problems, but despite dropping a TS83OS and a Sears 2.5kW generator in the sea, they

certainly made a merry noise, including some 100 QSOs on 50 MHz and 200 on Top Band.

Illegal is the word for amateur radio in Malawi; but the 7Q7LW at present to be heard is giving out all the signs of being genuine, claiming to be ex-G3JSU, and giving Box 24 Mtakataka as his QSL address. So – what is it all about? Your scribes view is one of scepticism; on the other hand we are open to be proven wrong.

On the matter of whether or not there is any likelihood of BY operation, there seems to be quite a lot of smoke-signals, some indicating JAs, some saying that VE7BC, will be the first to be operational – the latter is of Chinese nationality. Again, however, we have been talking about this for so long that it is hard to suspend disbelief.

However, we must turn to the activities on the bands again.



Top Polish DX-er Tadeusz Raczek, SP7HT (ex-SP8HT) is on the DXCC Honour Roll with a score of 335 worked and 315 confirmed, and achieved using entirely home-brew gear. He now needs only San Felix, Heard Island and Laccadives to complete the DXCC List.

Eighty

This is a favourite hang-out for the QRP lads, and the natterers. G3ZPF says with summer conditions the band has fallen away and nothing new has been heard, although some South Americans were in evidence.

G3RJV (Birmingham) – Mister QRP himself – has been a bit inactive of late, what with his current constructional project and giving talks to clubs around the area about QRP. However, George has been playing about with a "Skelton Cone" aerial, which sounds like a couple of 102-foot G5RV aerials with a spacing angle of 30 degrees and common feed from the centre by way of open-wire feeder and an ATU. On Eighty, one watt input to the Tedco rig gave QSOs with G4JFN, G4KIK, G4HOM, GM4FDD, G2HLL, G4GPK, GW4JKH/A, all of whom were also on QRP, plus a QRP two-way with OK1DLE.

G2NJ found June afternoons not very good on this band, although on occasion there was something to be had for the searcher; after tuning the whole CW part for a signal a repeat exercise turned up PA3AOI/MM in the North Sea heading for Sweden. GM2CAS/P was at Coldstream on the River Tweed, G8CK/M at Stourbridge was on CW, as was G5NX/M, and then there was the midnight contact with a YL, EA1AWO, Ofelia, in Navia.

Forty

Not many reports here; G4BUE (Upper Beeding) mentions in passing a QRP contact on the band with GJ3EML on the afternoon of June 28, while John was running his HW-8 and G4BUE his Argonaut.

G3ZPF says this band is a favourite for Sunday afternoon contacts up and down G and the nearer parts of Europe, including the one with PA0ADC, which resulted in the Apple programs mentioned earlier in this piece.

On Sheppey, G2HKU has been somewhat inactive, as we have mentioned, but four watts of QRP got him a SSB contact with GB2BWS, and CW at the same level raised G3AQF, plus G3LP and G5DEH both of whom were on QRP.

Ten

Here we have the summer conditions to put people off; an apparently dead band and a sound of frying eggs . . . but the CW end of the band is alive with CB-ers, who need to be driven off. However it was nice to hear that locally amateurs, CB-ers, and the police could put away their differences to take part in the hunt for a missing four-year old girl. Better still to hear the combined operation was a success.

A new document covering Ten Metres is "News and Views" which is prepared by G3LWM, G3YPZ, and G3ZEV. In their first offering, they prepare a cogent argument as to the fact of Ten being a useful VHF-type band for local activity, using decent aerials and FM, rather than the trap vertical and deaf receiver they claim is the norm. We have grave doubts as to their argument about deaf receivers, as we suspect that their pre-amplifiers do little more than raise the hiss level and reduce the dynamic range of the receiver, thus giving an illusion of greater sensitivity. However, the point is very valid indeed that we will find Ten swamped by the CB-ers if we don't watch out; simply because of lack of use by amateurs and the pressure on the CB channels. The 29.6 MHz net in the Harlow/Bishops Stortford region is a good effort, but we must comment that it seems to us that putting local nets up at that end of the band is an error – we should be concentrating our activities on the lower end of the band, be it with slow Morse transmissions, local nets on mixed CW/Phone as a help to Class A aspirants, or just plain CQ calls. We do agree with their comment that all CB activity in the band should be reported in detail to both the Home Office and the RSGB. Your doings on the band can be reported to: G3LWM, The Oaks, Cricketfield Lane, Bishops Stortford, Herts.

One who practises the use of ten metres for local nattering extensively is G3ZPF – their local group is on 28.325 kHz.

Now to G3NOF (Yeovil) who says that the summer conditions included many short-skip stations during the day, but in the evenings, around 2200z the band has occasionally opened up to North America and the Caribbean. Don's only QSO was with KP2A/D on Desecheo.

HF QRP

Last time out we mentioned G4BUE and his reducing power to quite comic levels while still making the QSO; during the last month he has been able to calibrate his power meter to give readings from 200 microwatts up to ten watts in three ranges in a 52-ohm line. Taking this into account, G4BUE has managed: at 100 mW output, UK9OAC in Zone 18 on 21 MHz; at 75 mW out,

The shack of Mirko Voznjak, YU1AD, in Belgrade. On the extreme left, from the bottom, is an Astro 200 transceiver with SWR bridge, a Trio TR-9000 2m. multimode, and a Trio Monitorscope. The vacant space at the top is for a Mirage 80 amplifier. The rest of the gear is purpose-built test equipment for engineering and development work. Mirko usually spends three months each year in England when he works as a service engineer for *Radio Shack Ltd.* in London.

JA9FAI on 21 MHz; at 60 mW JA3BYF and LU9EIE respectively on 21 and 28 MHz; 30mW on 21 MHz landed JA1YXP; 15mW raised UL7MAR on 28 MHz and OX3NB on 14MHz; 4mW got out to YU0A, UK2PRC, W0WP, and 4N0RA; and with 1½ mW W1RX and UW3UO were worked on 21 MHz. Dropping down still further, 625 microwatts got out to K8HV and HA5KFL on 21 MHz, 450 microwatts managed VE3PCA on 21 MHz, and, finally, 200 microwatts was enough to work KB8SX, again on 21 MHz. As Chris says, as these were all raised during the contest, one must give credit for the best pair of ears on the band to KB8SX! Just consider it – one thirtieth of the power in a car sidelamp bulb! As to how the Argonaut was made to do these things, the first move was to switch off the PA board altogether and take output from the driver; and a mad moment allowed Chris to look at the output from the pre-driver mixer and to find powers on some bands in excess of those used for the contacts above.

Fifteen

In the few days since your scribe has had the TS-830S back following the fixing of a minor fault (and CW filter fitted at the same time), conditions appeared rather poor with not much DX to be heard; however, the newly-erected 21 MHz sloper array is a considerable improvement over the vertical. Doubtless next month, when the effectiveness of the filter will have been checked out, we shall have something to offer.

G3NOF says he found this band also 'summery', poor to North America during the day, little heard from the West Coast, Africans about between 1500-1800z, and some short-path openings to the Pacific were noted in the mornings. Don made SSB contacts with AO5IC (Columbretes Is.), AP2MQ, C31SJ, D4CBC, DL2VK/ST3, EP2TY, FOWV/FC, FY7BC, G4HHL/MM, HI8MRF, HK0FBF, HS1AM, HAZ1AB, J3AH, JAs, JTOWA, KP2A/D, KX6ZZ, P29NRL, TYA11, W5VTH/KH8, XT2BG, YB6ADZ, YB0ZM, and 5Z4YV.

For G4BUE there was a contact with 9U5WR, to make all-time country number 297, even though he didn't manage to make the XZ5A Burma station.

Another one to mention an all-time new one is G3ZPF, who was mildly surprised to realise he hadn't made it to UD6, let alone UD6HD, before. This one was in a contest with a difference, in that the exchange was report plus operator's age!

Just one QSO from G2HKU, again on the QRP rig; KN5G, on CW and with some 3 watts input.

Twenty

Largely ignored by most reporters, but still has much to offer. G3NOF found Ws right through the night and going away at 0600z; then from 0600 to 0800 some good openings to the Pacific, and late evenings were good to the Americas. It added up to SSB contacts with A35JL, AH6AY, G3MUV/-CE0A, HT2CGB, KP2A/D, KS6DV, VKs, VK9NL, XZ5A, ZL3PA/C, ZM7JS, ZM7KD, 4U1ITU, and 5T5CJ.

For G2HKU there were the usual morning skeds with ZLs, which were more difficult to make this year than last; ZL1VN, ZL3SE, ZL3RS, ZL3FV, all SSB; CW went out to LU7AMU, UK0KAG, and ZD8RH, while the QRP rig was enough to hook UC2LAK.

Round-Up

First off, for the RTTY buffs, and their contest activity. The March shindig saw some 63 entrants make all continents, probably largely due to the presence of four PY stations; and there were also some SPs, they have had permission for RTTY since November 1980. A pity is that Europeans don't, in general, look hard enough for DX, which is rather a shame for others as well as themselves. The main thing is that the UK entry was well up on last year.

Now to W1WY's Contest Calendar, and for August we can see the Rumanian contest for the first weekend, and the European CW the second weekend; over August 15/16 we have the SEANET Phone contest and the SARTG RTTY; the Asian CW contest covers August 22/23, and the last weekend is fairly free save for a couple of QSO Parties. The latter should please the non-contest types at least.

Finis

For this time at least – for next time, the dates are in the 'box', to arrive at Welwyn. And, don't forget, we can always do with more letters; scores, comments, chuckles and whatever – let's have them and share the fun. The address, as ever, is "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. 73, and 88 to the YLs.

September issue due to appear on Friday, August 28th.

THE S.C. DELUXE, PART III

CONCLUDING THE SERIES ON IMPROVING THE S.C.D. TRANSCEIVER

REV. G. C. DOBBS, G3RJV

THOSE faithful readers who have remained with this series of articles from the first on the S.C.D. to the present one, will no doubt have concluded that the number of amendments, improvements and experiments with such a simple project are almost endless. If so, they have grasped the main idea. Construction of low power, low technology amateur radio equipment and its use on the bands can be a source of almost endless fun. So sell your £500 'grey box', buy the XYL a secondhand Mini and she will be so pleased that she will let you have as much time as you wish to enjoy this fun. As for the S.C.D. project, this article will conclude the series, but I hope many readers will use the articles as a basis for their own experimentation and spend many happy hours with their soldering irons and Morse keys.

This final article deals with a couple of simple methods for equipment protection, and two ideas for effective use of the transceiver on the air. There are many myths about the vulnerability of solid-state equipment from the "transistor is the fastest fuse on three legs" school of thought. Although it is true that in the days of all-valve equipment it would take a cruise missile to sneak in under the radar to destroy an 807, with a little care transistors need not curl up and die at the press of a Morse key. Fig. 1 shows the PA stage of the S.C. Deluxe, TR4 and its associated components. The two added zener diodes and the fuse will afford protection against the more common causes of danger.

Equipment Protection

The single most common cause of equipment failure in the G3RJV shack is connecting the power supply the wrong way round. This is so easy to do when trying circuit modifications, with constant removal and connection of the power source – and transistors do not like reversed supply polarity. The simplest method, not shown here, is to connect a diode capable of handling all the current to the equipment in series with the supply line: if the connections are reversed the supply will not reach the equipment. This is simple but limited since the diode reduces the line voltage and any supply surges or faults are still present in the equipment. ZD2 in Fig. 1 together with the fuse F1 serve the purpose better; the zener diode will help protect the S.C. Deluxe from excessive voltage and will cause the fuse to blow if the supply is connected in the wrong polarity.

Another problem with transistor transmitters can be blowing the PA transistor during an output mis-match or unterminated output. ZD1, a 36 volt, 1 amp, zener diode may be connected as shown in Fig. 1 across the output of the PA transistor; the connection is between the collector and earth and short leads should be used. The diode prevents the V_{ce} (collector to emitter voltage) from rising beyond 36 volts. It may also help in cases of spikes or surges on the DC power line. This simple addition is especially useful when tuning up the transmitter into an aerial *via* an ATU, when mis-matches can occur which could blow the PA before matching is completed. A simple precaution which is all too often never considered by transistor PA builders.

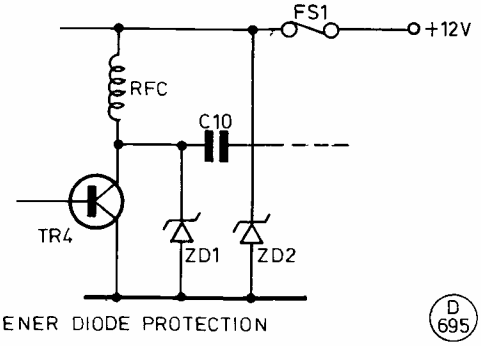


Fig 1 ZENER DIODE PROTECTION

D 695

Safer SWR Bridge

The S.C. Deluxe is designed for a 50-ohm load and must be either used into an aerial with a 50-ohm, or thereabouts, termination such as a half-wave dipole, or be matched *via* a suitable ATU. When only using a few watts, the RF power is precious and operators of QRP equipment, if they are wise, ensure that as much RF as possible gets into the aerial. Many QRP operators use simple wire aerials, indeed few use beams because this is against the philosophy of low cost operation. Such operators become very concerned about using the best aerial for the available space and the close matching of that aerial to the transciever output. These are concerns which all operators ought to have, but so often operators who assume they have power to spare pay little heed to aerial matching. Therefore it would be unusual not to see a simple standing wave bridge in use with a QRP transmitter. The final article in the S.C.D. series gave details of a simple SWR bridge, and such bridges are so simple to build that no self-respecting amateur would wish to buy one for QRP power levels. The SWR meter is an essential tool when matching a QRP transmitter to an aerial *via* an aerial tuning unit.

The problem of presenting the PA of a solid-state transmitter with a simple fixed pi-network PA, like the S.C. Deluxe, with mis-matches during the tuning of the ATU is mentioned above: such a mis-match can blow the PA transistor. However it is possible to arrange for the SWR bridge to contain an attenuation pad which presents an almost constant load to the PA transistor with just a sample of the RF output being used to match the aerial; this has the advantage of never presenting the PA stage with a severe mis-match during tune up. It also has an additional bonus in that only a very small signal is radiated during tune up. Although a QRP transmitter may not cause severe problems to other stations when tuning up, it is better manners to radiate as little signal as possible when loading up the transmitter on the band. Such an SWR bridge is presented in Fig. 2.

For those who recall their school physics, this circuit is yet another variation of the Wheatstone Bridge. R2 and R3 form one arm of the bridge, with R1 and the aerial load as the other arm. The input voltage, which is the output from the transmitter is applied at the junction of R2 and R1. The null detection is measured between the junction of R2 and R3, and the junction of R1 and the aerial load. D1 and C1 detect the RF present which appears as a voltage across the load of R4 and RV1; RV1 is used as a sensitivity control for the meter reading on M1. The values of one side of the bridge are equal (R2 plus R3) at 50 ohms and 50 ohms each. R1 is also 50 ohms, so when the load at the aerial approaches the same value, a zero reading should occur on the meter. Thank you Mr. Wheatstone – do you remember the Post Office Box?

This type of SWR bridge requires a little more switching but this is a simple matter with a suitable wafer switch. When S1 is set on position 1, in Fig. 2, the output from the transmitter goes into the bridge without an aerial load. The mis-balance on the bridge will have a high reading across the bridge. This can be used to set up the meter with RV1 to give full scale deflection; it also serves to show the full output from the transmitter. So in this position the SWR bridge can be used as a simple RF indicator.

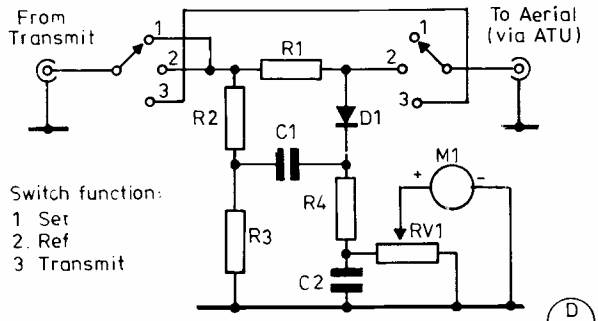


Fig 2 SWR BRIDGE CIRCUIT

In position 2, the aerial load is applied to the bridge. The meter now indicates the balance, a low reading showing that the load of the aerial is approaching 50 ohms. When an ATU is used it is placed between the output of the SWR bridge and the aerial; the ATU is then adjusted until as low a reading as possible is obtained on the meter. The load being presented to the transmitter should now be near to the ideal of 50 ohms. Position 3 can now be switched in and the RF from the transmitter bypasses the bridge and goes *via* the ATU into the aerial. During these adjustments no extreme mis-match is seen by the transmitter output. It is important to recall that when the switch is in position 1 or 2 transmission will not occur, although there will be a small amount of RF output in position 2. It is still possible, however, to hear incoming signals with the switch in any of the three positions.

A Simple Aerial

What aerials may be used for QRP operation? As mentioned above very few QRP operators seem to use beams or commercial aerials, most seem to favour inexpensive home-made wire aerials. The S.C. Deluxe will work very well into a dipole cut for the band in use; it will also work into any reasonable length of wire. A suitable ATU for an end-fed wire antenna was discussed in the S.C.D. article in *Short Wave Magazine*, April, 1980. There are many types of wire aerial which would obtain good results with the S.C. Deluxe and many of these can be found in the various handbooks on this subject. A good introduction to the subject can be found in William Orr's "Simple Low Cost Wire Antennas" which can be bought from *S.W.M's* Publications Dept. A well-tried aerial which is capable of good results at little cost and effort is the W3EDP antenna: I have used this for fixed station and portable use with low power transceivers with good results.

Fig. 3 shows the W3EDP arrangement with a suitable ATU for 40 and 20 metres, the two bands covered by the S.C. Deluxe. This aerial is convenient for most sites. The radiator is 84 feet of end-fed wire, and short counterpoises of 17 or 6½ feet are required. The 84 feet of wire might seem to imply a requirement for 84 feet of open space, but the W3EDP can be bent to fit available space, in fact my best example of this aerial had four bends in the 84-foot section to allow it into my available space; the counterpoises are small enough to be lost

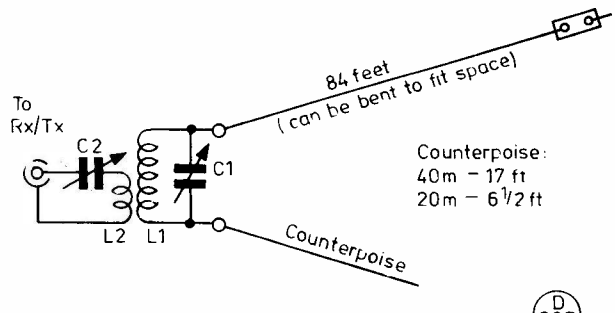


Fig. 3 W3EDP AERIAL WITH ATU

Tables of Values

Fig. 1

ZD1 = 36v. 1 amp zener diode
ZD2 = 18v. 1 amp zener diode
F1 = 1 amp fuse

Fig. 2

R1, R2, R3 = 51R
R4 = 1K
RV1 = 10K linear
D1 = OA91
C1 = 0.001 μF
C2 = 0.01 μF
S1 = 2-pole 3-way wafer switch
M1 = 1 mA or less

Fig. 3

L1 = 12t, 26 swg enam. wire on 1-in. dia. former
L2 = 3t, 24 swg PVC-covered wire over centre of L1
C1, C2 = 2-gang solid dielectric tuning capacitor from scrap Japanese AM radio.
Note: One section for C1, both sections for C2 connected in parallel

around the shack floor. In theory they ought to be at right angles to the main wire, but I have never managed such a neat placing, having to be contented with them under carpets, along window ledges and just generally tucked out of the way.

How does it work? The nice thing about the W3EDP is that it is an 'oldie' and very few modern books seem to mention it. The only full text on it I know is in the RSGB *Handbook*, Second Edition, 1940. If you ever see any of these old handbooks in junk sales, buy them – the aerial information is good, lucid and written before the days coaxial cable appeared to dissipate our power. In those days most amateurs used tuned feeders – how wise! – and the W3EDP is an adaption of this method. The idea with tuned feeders is to bring the whole system, into resonance, and this is the principle of Zepp and Marconi aerials – though Marconi aerials used tuned counterpoises rather than tuned feeder lines. W3EDP worked out experimentally a system for doing this with short lengths of wire for the counterpoise, using an ATU inductance and capacitance (L1 and C1 in Fig. 3) to resonate the system. He called it "an excellent solution for awkward locations". Since we all lie in 'awkward locations' as far as aerials are concerned, it remains an excellent system.

The ATU in Fig. 3 was built from junk. The two tuning capacitors are the semi-airspaced types taken from cheap Far Eastern transistor radios. This is part of the joy of QRP operation, little junk tuning capacitors perform well in ATU circuits which only handle a few watts. The coil is wound on a plastic pill drum of about one-inch outer diameter. L1 uses respectable enamelled copper wire, any gauge near 26 *swg* will serve and L2 is just three turns of plastic covered solid core hook-up wire wound over the centre of L1; L2 provides the 50 ohm coupling into the transceiver. A series capacitor C2, which uses both sections of the dual-gang radio capacitor is provided for final adjustment of the SWR ratio.

The tuning up procedure is simple. When the SWR meter has been set to show full RF output on the SET position, the bridge is switched to the REF position; C1 is then adjusted for the lowest reading. This may be further reduced by adjustment of C2. The aerial is now tuned for use. The first evening on the air with the S.C. Deluxe and the W3EDP gave me a first QSO with ZB2EO, followed by a DK1 and several G stations.

The whole point of the S.C.D. and the S.C. Deluxe series of articles has been to show that good results, coupled with good fun, can be had on the amateur bands today when spending the minimum of money. Even if you are not totally convinced by my arguments in favour of QRP operation, why not try some of these circuits. They are so simple and inexpensive that nothing can be lost . . . except interest in your Far Eastern 'grey box'!

SMALL-SPACE AERIAL SYSTEM FOR 80-10 METRES

F. G. RAYER, T.Eng (CEI), G3OGR

There have been some requests for aerials for reduced space, and the system described here can be adapted to suit circumstances and need not exactly copy the method actually used. Among the advantages of the system is the ability to work any band from 3.5 to 28 MHz, without needing to prune the aerial length, and low-angle radiation on some HF bands in favoured directions. Disadvantages include the narrow bandwidth, and thus the need for re-adjustment when making other than small changes in frequency.

Fig. 1 is the whole system as used, but it is best dealt with in two sections — aerial proper, and matching circuit.

Aerial

This extended from a short pole on the chimney, to a small tree about 8ft. from the house. The latter serves to keep the sloping down-lead (part of the aerial) well away from the building. It was at first intended to arrange the down-lead as a vertical, but a path made this difficult. To gain the advantages of low-angle radiation in at least some directions, a vertical or nearly vertical portion ought not to be more than about ¾-wavelength at the highest frequency band wanted; naturally, for lower frequencies, extra length is of advantage. The wire put up was 25ft, from chimney to strain point insulator, plus 15ft. sloping down-lead; there is no particular advantage in this exact length. Lengths probably used in somewhat similar cases, and depending on the relative positions of supports, would be from about 20ft. to 60ft. or so.

A sloping wire which is one wavelength long has lobes at about 40 to 60 degrees to the wire. So if the wire is at about this angle, there is some chance of low-angle radiation. To plan along these lines, check with aerial diagrams.

There is the possibility of using the same feed method for a self-supporting or wire vertical; or for an aerial in which a part is horizontal.

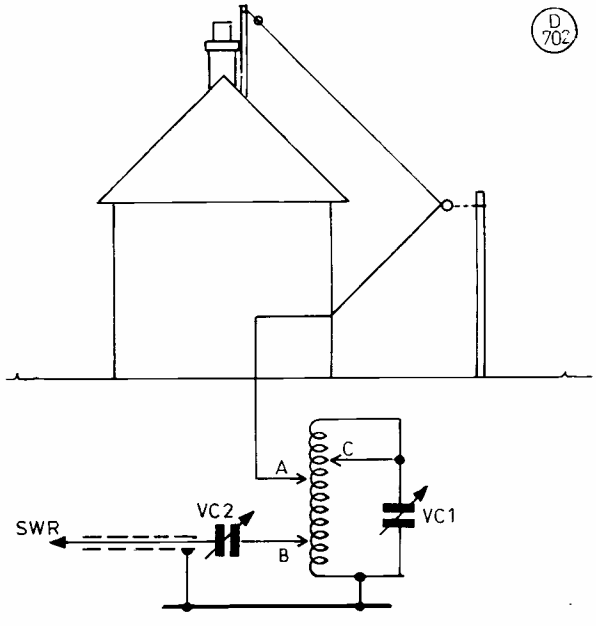


Fig. 1 COMPLETE 80–10m AERIAL SYSTEM

Matching Circuit

That shown has an aerial tapping clip A, a tuning capacitor clip C, and input or "auto-transformer" clip B. The essential is a wide range of adjustments, to meet diverse conditions.

The inductor was made by cutting four pieces of ⅛in. thick paxolin 8in. × 1¾in., and fitting them in slots sawn in a piece of wood 8in. × 1½in. diameter. The four strips were clamped together, and notches filed so that the winding would be at six turns per inch; a total of 40 turns were wound on, and stout bare wire (18 *swg* minimum) is most suitable. No details of the coil would be critical, but it needs to be reasonably large, efficient, and have spaced turns to allow clips to be attached. It is mounted vertically, with VC1 one side, and VC2 the other side. VC2 is a 2 × 500pF broadcast receiver type gang. VC1 is 200pF, wide spaced; a lower value is sufficient here, especially for the HF bands.

The SWR indicator is essential. The co-axial cable from Tx to SWR indicator, and indicator to matching unit, can be 50-ohm or 75-ohm as required.

The matching unit is best immediately inside the window to take the clip A; a good earth is essential. The SWR indicator used was standing on the transmitter, and the matching unit was about 2ft. to one side, at the aerial entry point. No RF feedback troubles were encountered.

Adjustments

A systematic approach, and logging settings for VC1, VC2, and taps, will help avoid the feeling that one needs three hands and should operate standing on the head!

Turns from B to earth may be regarded as a primary or coupling loop. Here, two or three were used for the HF bands, and up to seven for 80m. VC2 helps tune out reactance, to contribute to a low SWR or zero reflected power.

Clip C leaves a number of turns in circuit, to be tuned to resonance by VC1. (This even peaks up, but not usually at quite the same position, on receive.) Clip A allows aerial loading to be adjusted. In some cases A can be clipped to C.

A start can be made by guessing. Run at reduced power, and note that the PA pi-output capacitor is near its usual position for the band and 50 or 75-ohm load. Adjust VC1 and VC2 for a reduction in reflected power. If there is no dip in reflected power, try other positions for the clips. If there is a dip towards the required conditions, but they cannot be reached, try adjusting one clip only. Remember that this only needs doing once, for the middle of a band, if the capacitors have dials, and clip positions are noted. Afterwards, return to these positions for that band, and make such small adjustments as may be needed when working away from the centre or favoured frequency.

If the system is just to be set up for one band, it will of course be left adjusted, and if 80m. is not required, the coil need have only about one-half the total number of turns. With a short wire on the LF bands the end feed impedance may be so low that clip A has to be down at B, or under it. Those positions for clip C which allow VC1 to be near minimum capacitance are favoured.

SINGLE HOP PROPAGATION MAPS FOR EIGHTY METRES

R. W. MICKLEWRIGHT, G3MYM

THE following four maps show the likely coverage by means of single hop propagation, from a half-wave dipole, at low height on Fighty, for the years immediately following sunspot maximum.

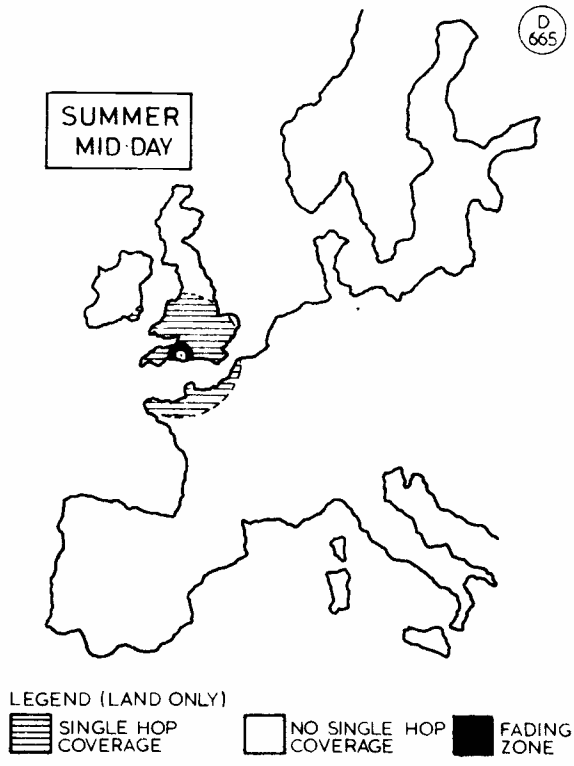
IONOSPHERIC DATA

	LAYER	WINTER		SUMMER	
		MID DAY	MIDNIGHT	MID DAY	MIDNIGHT
VIRTUAL HEIGHT		Km	Km	Km	Km
	F	-	300	-	300
	F1	200	-	200	-
	E	100	-	100	-
CRITICAL FREQUENCY		MHz	MHz	MHz	MHz
	F	-	3·3	-	6
	F1	3·7	-	4·9	-
	E	2·8	-	3·6	-

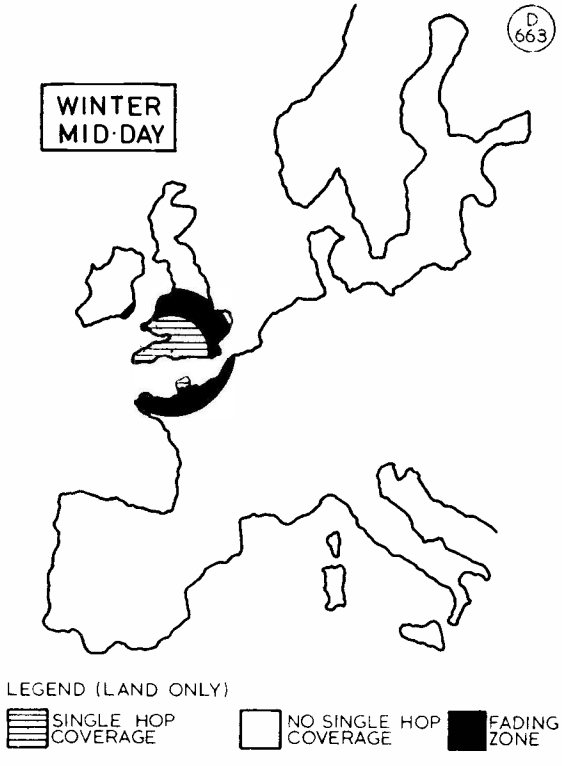
OTHER DATA

AERIAL RADIATION ANGLE	30° TO 150°
RADIUS OF EARTH	6366 Km
SIGNAL FREQUENCY	3·65 MHz

Fig 1 DATA USED IN CALCULATIONS (D 661)



The maps are based on the writer's calculations using the data shown in Fig. 1. Although the maps are centred on Yeovil, Somerset, the radii data shown in Fig. 2 will allow the boundary circles to be centred on other QTH's.



TIME OF YEAR	DISTANCE FROM TRANSMITTER		
	START OF COVERAGE	END OF COVERAGE	FADING ZONE
WINTER	MILES	MILES	MILES
MID-DAY	0	207	105–204
MIDNIGHT	178	580	–
SUMMER			
MID DAY	0	207	23–41
MIDNIGHT	0	580	–

Fig. 2 SIGNAL COVERAGE DATA (D 662)

It should be remembered that the calculations are based on averaged data, and include some simplifying assumptions: the data shown on the maps and in Fig. 2 are, therefore, only estimates of the true coverage. However, these estimates should provide a useful guide.

BASICS FOR THE S.W.L. AND R.A.E. CANDIDATE, PART II

SUGAR-COATED THEORY

Last time, we talked about electrons, and currents, and so forth. Now we must consider some other effects which will come into play in the real world. Firstly, imagine two bits of wire suspended one above the other, each one insulated from the rest of the world and the other wire. Let us now go through the routine we tried last time with the penny. Clearly electrons come racing out of one side of the battery, through the connection we have just made to one wire, and in the other wire lots of gleeful electrons shoot off down the wire and into the battery, *Ergo* — we have a current (Fig 1a).

Capacitance

Not for long, though — we have insulation instead of a penny, so electrons pile up on one side, and the positive holes to balance on the other. It doesn't take much genius to guess that if we increase the battery voltage, more electrons and holes will leave its terminals and head for the wire. If we have a useful piece of apparatus like a 100kV power supply, we can wind up the DC volts until, at some point, the wires will flash-over to each other with a loud crack, and at the instant that occurs we switch off and think a bit. Perhaps while we think we can idly connect up a battery across the wires (same way round as before), and then quickly remove the battery connectors from the wire. We are really rather lucky in our test gear — we have a perfect voltmeter, and a perfect current meter! With these, we can proceed to note our observations. First, the wires are insulated. Secondly, when we connect the battery, a current flows through the connections momentarily then stops. Thirdly, removing the battery leaves us with the voltage of the battery still sitting, apparently hanging between the two insulated wires. Fourthly, when we wind up the voltage between the wires high enough we have a flash-over — a visible spark and an audible crack.

What can we deduce from this chain of events? Firstly, by whipping off the connections to the wires, we leave one wire with a surplus of electrons, and t'other with a shortage of electrons which, as we have already said and agreed, must mean a surplus of positive holes. These, we suspected would like to cross the gap between our two wires, so we tried ever higher voltage and sure enough eventually there was a noise and electrons and holes jumped the gap. To make the noise and the visible spark when this happened, there must have been some *energy* about. This being the case, when we had our wires sitting at some lower voltage, there must have been strain between the two wires, and we can call this state of strain an "electric field". When the field was made intense enough, the insulation between the wires gave way, and the strain was neutralised by the current in the spark, and the visible and audible effects proving that there had been a release of energy. In fact we have been talking about a very elementary *capacitor*, and the property known as *capacitance*.

Applying this knowledge, plus the Law of Common Sense, and

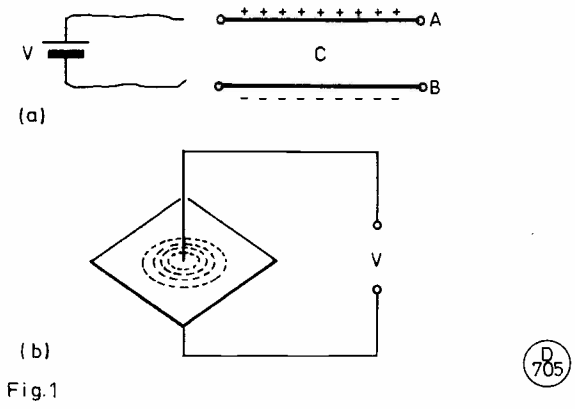


Fig. 1a. A voltage, V, has been applied between the upper wire, A, and the lower wire, B. If the voltage is raised enough, there will be a flashover through C (the dielectric). In Fig. 1b, the wire passes through a stout piece of paper sprinkled with iron filings, the current producing a magnetic field. *See* text.

we see that each wire could be flattened out to be a "plate", and the insulation put between the two plates. For a given voltage, which we may liken to pressure for the moment, we can imagine a given number of electrons on one plate and holes on the other; whence if we double the area of each plate, we would expect our given voltage to apply the same pressure on the electrons, so twice as many electrons would pile on to the bigger plate, and twice as many positive charges on the other side. For a given area of plate (assuming still that both plates are the same size) we would expect that reducing the spacing between the plates would cause more electrons to sit on one plate and holes on the other, for a given voltage. We deduce this because if we go back to our high-voltage. break-down test, we will find that for a given insulation (we've been talking about air up to now, of course) the voltage needed, to cause the flashover or "breakdown voltage" is reduced, proportionately as the plate spacing is cut down. Thus, we can say that for a given capacitor, the capacitance varies directly as the plate area and inversely as the plate spacing (greater spacing gives lower capacitance).

It would seem reasonable for us to assume that the amount of energy stored in a charged capacitor will depend on the voltage applied, directly; directly also on the plate area, and inversely with plate spacing. Now we'll try and put some numbers to all this, and make it look a bit like the book says. However, while we are at that, we can take in some bits of extra information *en route*. Firstly, a name for the insulation between the plates: *dielectric* is the name, implying a bit of something with a plate either side and an electric field trying to get through it. Interestingly enough, we will find that if we replace air as our dielectric by some other insulant — plastic film, paper, ceramic materials, glass, or whatever — the capacitance of the thing goes up by a measurable amount; and for a given material, the increase is constant. So, if we measure the capacitance using air dielectric, and then again with dielectric "A" and find that the capacitance increases by a factor of seven, we say that dielectric "A" has a *dielectric constant* of seven. It follows pretty obviously, that air is defined as having a dielectric constant of one.

We need a name for a quantity of electricity, somewhat as we visualise a bucketful of water. This unit is the *coulomb*; one coulomb is the amount of electricity moved when a current of one ampere flows for one second. How many electrons in our coulomb, you ask? 6.24×10^{18}. That's quite a lot of electrons. Someone might comment that since we talked about the coulomb last time, we're wasting space. Maybe, but it's a fact to hang on to; the textbooks on amateur radio just skim over it, but it is at the bottom of everything. It is no good knowing that twelve inches go to a foot, or 2.54cm to the inch, and less use still being able to do sums about them unless you can visualise what they are. When you can say that an inch is about the distance between the first and second joints of your index finger, a cm. is about the width of the nail of your little finger, the height of a door is about a couple of metres, six feet the dimension between finger-tip and finger-tip with both arms extended sideways and horizontal, the world is a simpler place. So with our electricity.

Now the unit of capacity: a capacitor has a capacitance of one *farad* if a potential difference of one volt appears when we inject one coulomb of electricity. We normally find use for much smaller units, the microfarad, or even the picofarad (a millionth and a million-millionth of a farad, respectively). Thus if we term charge Q in coulombs, C farads, and V volts, then we can say $Q = CV$.

Magnetism

We have looked at resistance and capacitance in a perfect world; now we must turn to the third party in the act. Take a piece of writing paper on a flat surface, and make a tiny hole through somewhere near the centre. Pass a wire vertically through the hole, have a battery to hand. Now, wait while we change the subject!

Everyone knows about a magnet; it is used to pick up ferrous material, it can magnetise another lump of suitable material. What is the proof of magnetism in a lump of material! Attraction? Hardly, because the other piece to which the lump is attracted may itself be a magnet. So, the test for a magnet is to bring the lump near to a known magnet, and test for the presence of *repulsion*. Like poles repel, unlike poles attract.

Now let's return to our experiment, Fig 1b. Shake some iron filings on to the paper and spread all round the wire. Connect the battery, so that current passes through the wire in one direction — it doesn't matter which for the moment so long as it is DC. While the current is on, take another look at our iron filings — ooh, they've all formed up in circles! Tap the paper and the filings jump, but they'll settle back into circles. Switch off the current, and tap the paper: the filings are knocked out their circular layout, and stay where they fall. Lets just add in one further fact; soft iron, such as the filings we have used, will take up magnetism, but can't hold it to any degree. Permanent magnets are of different material, and in general are harder to magnetise but hold much of the magnetism imparted to them.

So . . . when we passed the current through the wire, a magnetic influence of some sort appeared. Switch off the current and the magnetic effect disappeared. The wire was copper, and as we've never heard of copper being a magnet of itself, we must deduce that passing a current through that bit of wire set up the magnetic field, and that the field appears to be concentric around the wire. All the little bits of filings went nose-to-tail around the wire, which is why people talk loosely about "lines of force". Our only problem is that with the filings we know that current causes the lines of force, but we can't tell which way the current flows to make the north-seeking ends all look clockwise or the other way about. Go and get a magnet — a compass of the tiny Boy Scout type is fine. We will find that reversing the current in the wire makes the compass reverse direction. Now, the compass needle is a permanent magnet, so what it is saying to us is simply that the lines of force are incontrovertibly magnetic, and equally are controlled by the direction of current flow.

Now, we hope you have tried the experiments as we've gone along, and have agreed with our findings. You now want a simple rule which will tell you which way the current must flow for a given direction of the line of force. The poles of a permanent magnet are called *N* or *S* as they seek North or South poles of the earth's field, in a compass. The lines of force round a permanent (bar) magnet can be demonstrated to have a certain shape — a *field* which connects the poles of the magnet and fans out until it eventually "scents" the other end of the line when it closes in

continued on p. 320

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

THE SCREEN GRID SUPPLY UNIT

JOHN H. NELSON, G4FRX

HAVING discussed the first section of the system in *Parts I* and *II*, we may now turn our attention to what is in some ways the most important part of the machinery, the screen grid supply. Probably the most common ways of achieving the requisite voltage involve VR tubes or Zener diodes, and for the average amplifier these are fine; however, if one wishes to take advantage of the performance potentially available from such valves as the 4CX350FJ, a more subtle approach bears consideration.

On the face of it, of course, nothing could be simpler than generating a voltage of somewhere between 250 and 400, depending on the valve and its operating conditions, at a current of around 20 mA at most; the veriest novice could design such a circuit. In the heyday of the valve, screen supplies for tetrodes and pentodes would usually consist of nothing more than a resistor from the anode supply line, suitably decoupled to earth. A small-signal pentode such as the venerable EF80 would invariably use this technique; and if the larger tetrodes such as the KT66 or the 807 are considered, the only variations commonly encountered were the addition of a "clamp valve" (happy memories of that mainstay of the junk box, the 6V6) or, at audio frequencies, the "distributed load" technique whereby the screen grid was connected to a tapping on the audio output transformer. This was nothing to do with any requirement that the valve should be operated in such a manner, but was, in essence, a means of reducing distortion by negative feedback.

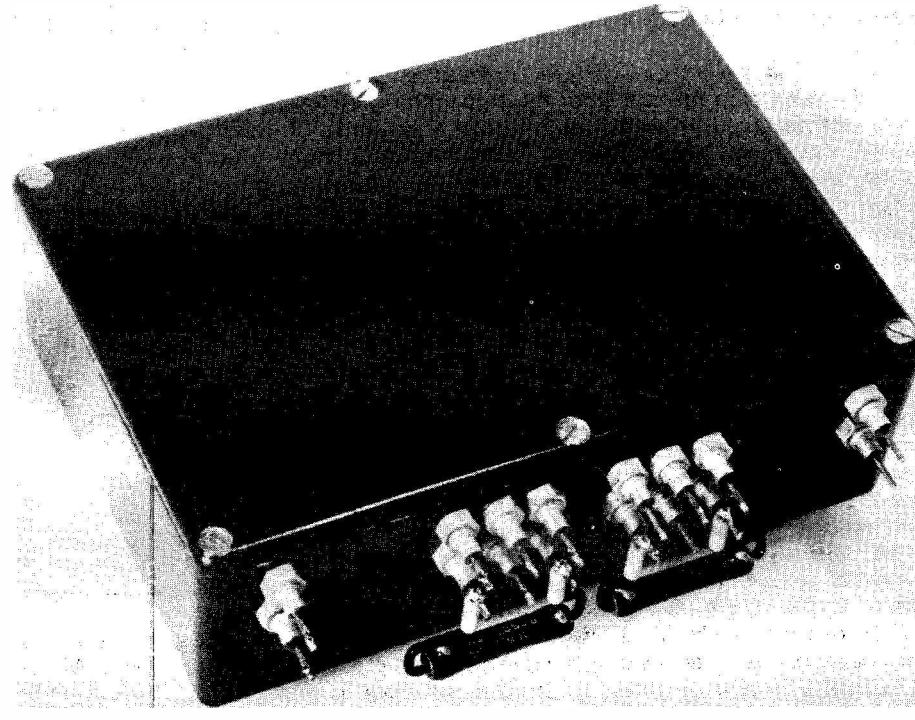
So even if RF linear amplifiers are considered, one does not find more or less elaborate power supply systems employed for the screen supplies of such valves as the 6146, QQVO6-40A or 6LQ6 – to quote some common ones at random. So why does the 4CX250 family require such special care and attention? And why should a whole article be devoted to a discussion of the power supply for just one electrode of a valve?

Design Principles and Requirements

Let us attempt to answer these questions by reverting to basic principles. It will be remembered that the simplest form of thermionic valve capable of providing amplification was the triode, and that in some ways its performance was limited by its inter-electrode capacitances. It was for this reason that a second grid, the screen grid, was introduced into the triode between the control grid and the anode: hence the tetrode. A modern triode might have a grid-to-anode capacitance of some 1.5 pF, whereas a tetrode such as the 4CX35OFJ has a C_{ag} of about 0.03 pF.

Now, without going into the fine detail, the idealised operation of a tetrode may be represented by the voltage/current curves of Fig. 1. But it *is* idealised because one very important effect is neglected — enter the pantomime demon, secondary emission!

In any valve, when the anode voltage is at its normal operating value, the electrons which arrive at the anode will have been accelerated and will have acquired enough energy to release secondary electrons on impact with the anode. Secondary emission, which is the name given to this phenomenon, does occur in the triode, but the secondary electrons are repelled by the negative bias on the control grid and return to the anode. In a tetrode, however, the positive voltage on the screen grid attracts the electrons and thus the screen current increases. The secondary emission also causes a



General view of screen supply. Note feedthrough capacitors for input and output voltages and, since this is a 350V version, connections to the BU208 transistors on heatsinks. The base feed resistors R1 and R2 are connected to the feedthroughs, avoiding excessive heat inside the box.

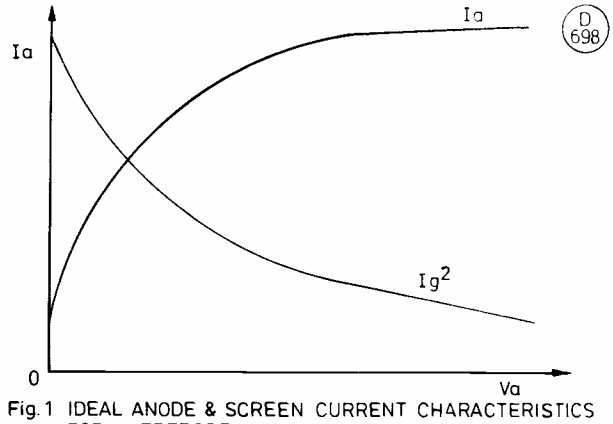


Fig. 1 IDEAL ANODE & SCREEN CURRENT CHARACTERISTICS FOR A TETRODE

fall in anode current; so, as the anode voltage increases from zero, initially there is an increase in anode current and a fall in screen current and then, when the anode voltage becomes sufficiently positive to accelerate the electrons enough to cause secondary emission to occur, the anode current starts to fall and the screen current will start to rise again. As the anode voltage is increased to the point where it is comparable with the screen voltage, the secondary electrons emitted will be attracted back to the anode rather than travel to the screen grid. Thus there will be a sharp increase in the anode current, and a corresponding sharp fall in the screen current.

Electrons striking the screen grid can also produce secondary emission. When the anode voltage is higher than the screen voltage, these secondary electrons will be attracted to the anode; so the anode current will increase further and the screen current will decrease further, to the point where it attains a net negative value (this is predominantly the mechanism inside the 4CX250 family, in fact). The resultant characteristics for a practical tetrode are shown in Fig. 2, and a little consideration of load lines and what happens to the anode voltage during the RF driving cycle will readily show why the screen current in a 4CX250B is such a sensitive indicator of how the anode tank circuit is loaded.

This "kink" in the characteristic of the basic tetrode is a nuisance, and early on in the history of the valve there were many attempts to remove it. Enter, stage left, the beam tetrode.

Now there is an energy difference between the primary electrons from the cathode and the secondary electrons produced from impact of these with the anode. If a "potential barrier" can be introduced between screen and anode, the primary electrons can pass through because of their higher energy, whereas the secondary electrons cannot and so must return to the anode. Such a barrier can be introduced by increasing the spacing between screen and anode and concentrating the electron flow from the cathode so that a space charge is formed; this is the function of the "beam-forming" plates in such devices as the KT66 (the KT, incidentally, standing for Kinkless Tetrode).

Practical characteristics are shown in Fig. 3, and one interesting point here is that when the anode current is low (*i.e.* the negative voltage on the control grid high) the effect of the space charge is small. If the anode voltage is low at the same time, the secondary electrons will still be attracted to the screen grid; there will therefore be a fall in anode current, as shown by the "kinks" in the characteristics for low anode current at low anode voltage. So the beam tetrode is inherently a high-current device since it must be operated outside this region, which is one reason why it was displaced by the pentode for small-signal use: but it does make an excellent valve for power amplification, and in particular for small transmitting uses. The 6146, 6LQ6, etc, mentioned earlier are valves of this type, as are those wonderful devices the 807 and 813.

Herein lies the answer to the earlier question of why elaborate supplies are not necessary for these valves. Secondary emission is not an issue in their use because they are *beam* tetrodes; thus the screen current neither fluctuates to anything like the extent that it does in the 4CX family and neither does it habitually swing very negative, unlike the screen current of the 4CX250B, which spends most of its time in the negative region!

At this point life can get rather confusing, since the 4CX family are known as "radial-beam" tetrodes and do, in fact, function in the same general manner as the beam tetrode just described. Which is where the rotten tomatoes start to fly again. "The 4CX250B has more secondary emission than any other valve in the known universe! Whaddya mean, it's a beam tetrode? You just told us they didn't have secondary emission! Booo – send 'im off!"

The problem is that valve design is a very complex art. Such factors as work functions of materials, space-charge distribution, transit time, cooling, intermodulation performance and so on all have to be balanced against each other, and indeed a whole article could be written about the way in which it is done. Again, without going into great detail (the interested reader is referred to the excellent little book "Care and Feeding of Power Grid Tubes" published by the makers, *Varian*) the trade-off for the performance of the 4CX250 family in terms of size, power handling, intermodulation performance and ease of getting power into and out of the device at high frequencies is a marked tendency to secondary emission effects of the kind described above, where the screen current will often be negative and in any event will be very variable according to loading and drive level. Since, of course, in Class AB1 use the drive level is continually changing, this means that the screen current will also change markedly over the RF driving cycle and between positive and negative values.

What does all this mean in practical terms? It suggests that any practical power supply must be able to handle both the "sourcing" and the "sinking" case – in other words, it must not object to having current flowing into it as well as being asked to supply it. Moreover, it is absolutely essential that whatever voltage is required *must* be very stable, because, particularly with the 4CX350FJ with its transconductance of about 22,000 μmhos, the gain of the valve is markedly affected by changes in the screen voltage. It follows that if the screen voltage is allowed to vary during the RF driving cycle, the transfer characteristics of the valve will change and thus linearity, metaphorically speaking, goes out of the window. It is found experimentally that as little as 3V variation on the 350V supply to a single 4CX350FJ causes a marked

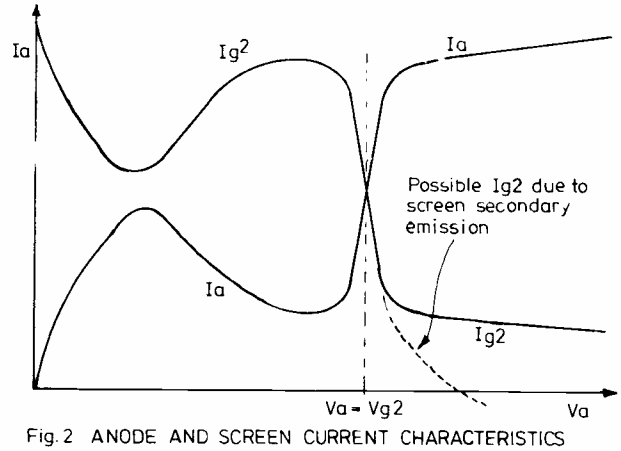
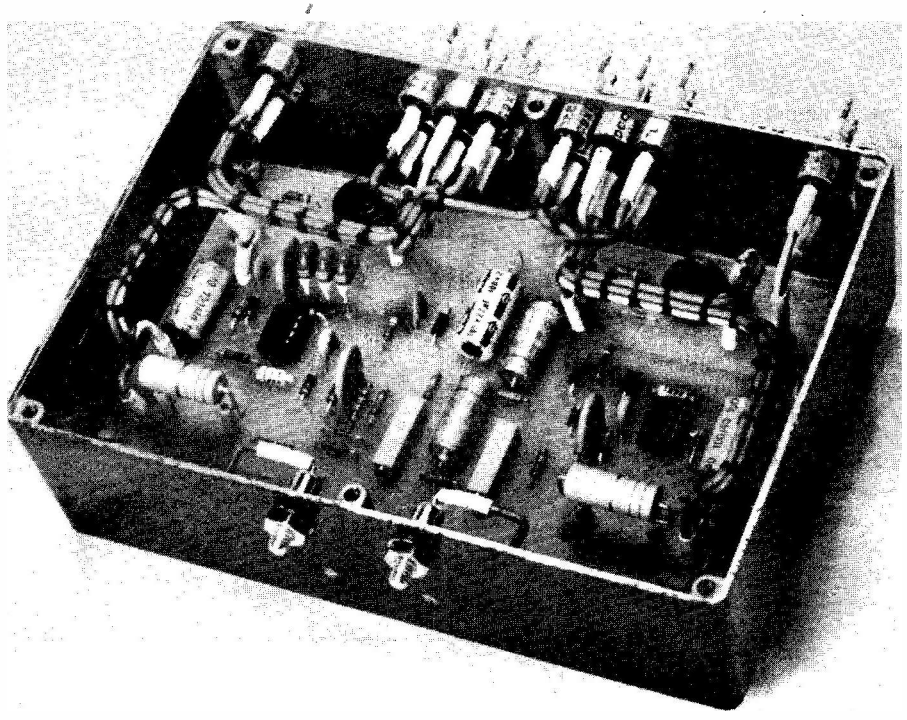


Fig. 2 ANODE AND SCREEN CURRENT CHARACTERISTICS FOR PRACTICAL TETRODE (Vg2 CONSTANT)



A general view inside the box. The BZY93C75R Zener diodes are bolted directly to the box, with holes for adjustment of the presets directly below them. The 62K/2W resistors are mounted on ceramic stand-offs above the board, and the VDR's across the output of one channel can be seen below the left-hand cableform.

deterioration in linearity, both in terms of harmonic and intermodulation performance, from the optimum results that the valve can provide; on the air, it is the difference between a signal 2.9 kHz wide between −50dB points and one almost 4 kHz wide between the same points. Not, one might think, a great difference in practice; but if one multiplies this by, say, twenty strong signals heard in one's receiver during an opening or a contest, it becomes more significant!

So we have already defined two important parameters for the screen supply; it must be extremely stable, and it must be able to source current as well as to sink it. To which we may add that, bearing in mind the very low screen dissipation permissible for the 4CX family (12W for the '250 and 8W for the '350) the power supply must not permit any current in excess of the maximum to flow for any great period of time, i.e. it must either "current-limit" or shut the complete amplifier down. It must also have a very low hum and noise content: this is often neglected. It is easy to forget that Zener diodes or VR tubes, as commonly used for screen supplies, make excellent noise sources . . .! Finally, it is desirable for standing-current balance purposes to arrange that one screen feed line can be slightly variable with respect to the other. It is often argued that this requirement is unnecessary and can easily be done by a slight variation of the grid bias of one valve with respect to the other, but the fact is that the two valves will not "track" over the RF cycle with anything like the same accuracy if their DC standing current is balanced in this way. Controlling balance via the screen grid is a much better way of ensuring proper load-sharing for two valves, which is in turn an important necessity that is often omitted. Hence the variable voltages in each channel of the present design and the "run/set" switches as used by G4AJW which are incorporated also (see the original article).

Delivering the Goods

We may now consider ways and means of fulfilling these requirements. The author apologises for what may seem to be a very roundabout way to build a screen supply, but all the above points are important and can make the difference between a mediocre, or at least ordinary amplifier, and a good or excellent one; and it will be obvious by now that it is the author's conviction that with band occupancy and signal strengths commonly found today, the pursuit of better methods of doing jobs that would previously have been regarded as easy or routine become less of a slightly self-indulgent pastime and much more of a practical necessity.

Feeding the screen *via* a resistor from the anode supply, which, as discussed earlier, is the standard method for a pentode or beam tetrode, is an absolute non-starter in this application. Its sole advantage would be that disappearance of the anode voltage for any reason would automatically imply removal of the screen voltage which, for this family of valves at least, is a necessity – as explained in the earlier article. However, regulation would be atrocious and the capacity of the system to handle negative screen current nil.

The two ways commonly used are either a chain of Zener diodes or VR tubes such as the OA2 or OB2 connected in series or series-parallel with equalising resistors. Provided that, as mentioned before, a resistor is connected from screen to earth whose value is arranged so as to pass approximately 15 mA per connected screen – this will deal with the negative screen current case – either system may be used, but they both have quirks which must be understood.

The VR tube is simple to use, and many published power supply designs use them. They do, however, have two disadvantages; it is impossible to provide any fine adjustment for one screen feed line with respect to the other for balancing purposes (as discussed above), and they can be extremely prolific sources of noise under certain conditions. The higher the current that they are asked to pass, the higher the noise level that they tend to produce, sometimes with a bandwidth of several hundreds of megahertz. The older octal-based types such as the VR150/30 are worse in this respect than the more modern OA2 or 15OC2, and special quality versions of the newer types (*i.e.* the OA2WA or M8224) are well worth having if available. Vast amounts of decoupling are really required with most VR tubes, and noise can still be found to be an intractable problem in some cases: and a noisy screen supply can cause all sorts of subtle problems. Noise modulation of the signal is responsible for the fact that some 4CX250 amplifiers, especially when used in Class C for CW are observed to produce quite large amounts of white noise along with the

signal when keyed. (This has even been confused with actual instability in some cases known to the author, and indeed one professional distributed amplifier using some twenty 4CX250BM valves suffered about fifty hours down-time before this problem was traced to one poor innocent OB2 which had, for reasons best known to itself, gone noisy!)

On SSB, the usual effect is of somewhat "phasey" speech quality, which is especially noticeable if the exciter on its own is alternated with the exciter-plus-amplifier; it sometimes feels to the author that the signal cannot be tuned on the receiver so as to sound natural, no matter what adjustments are made to the pass-band or whatever. The signal is usually fairly narrow except at the extreme edges, where some rather noisy and "mushy" effects may be heard at low level; examination with a spectrum analyser will sometimes show some low-power products associated with the initial transient "attack" or certain syllables and extending some 10-15 kHz away from the main body of the signal. These effects are usually traceable to noise in the screen supply if the amplifier is otherwise correctly set-up, although it must be said that in the majority of amplifiers they will be masked by more glaring faults!

Turning now to Zener diodes, these are in some ways better than the VR tube but they, too, have drawbacks. There is, of course, no problem in arranging for slightly different voltages to be supplied to each screen, although this brings its own problem insofar as in all probability a great deal of time will have to be spent adding and subtracting devices here and there to get the required result. More fundamental, however, is the fact that, as noted in *Part I* of this series, a Zener diode is *not* a precision device in any sense of the word. This type of device does not perform in the way that the textbook says it should, insofar as since the Zener diode, possesses neither a sharp knee nor an absolutely vertical slope above its breakdown voltage, the Zener voltage is not absolutely constant for changes in current through the device; hence the concept (which usually appears in the small print of the device's data sheet) of "slope resistance".

Now, granted that any mention of resistance implies Ohm's Law somewhere and that Ohm's Law and semiconductors are sometimes not the best of bedfellow, much can be learned from this. Let us assume, for example, that a 300V supply is required and that this is to be obtained by using four 75V Zener diodes in series: we may further assume that in the interests of reliability 20W devices are to be used. Typical data sheet values for such a device would be a slope resistance of 140 ohms and a temperature coefficient of +54 mW/°C (the significance of this latter point will be seen shortly). Since the devices are in series, these components will both be additive and hence the total slope resistance for our "300V" Zener will be some 560 ohms and its temperature coefficient of the order

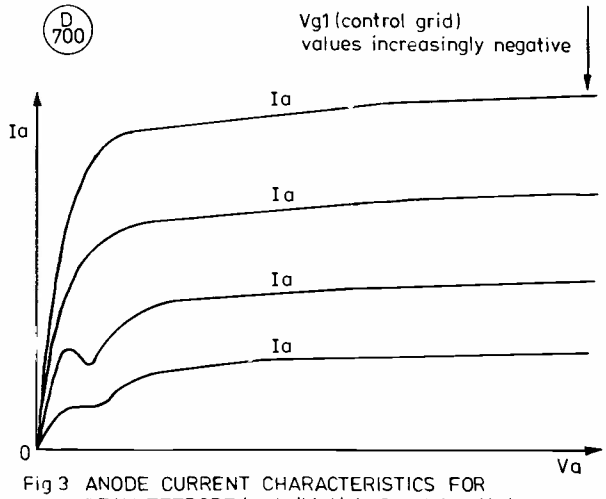
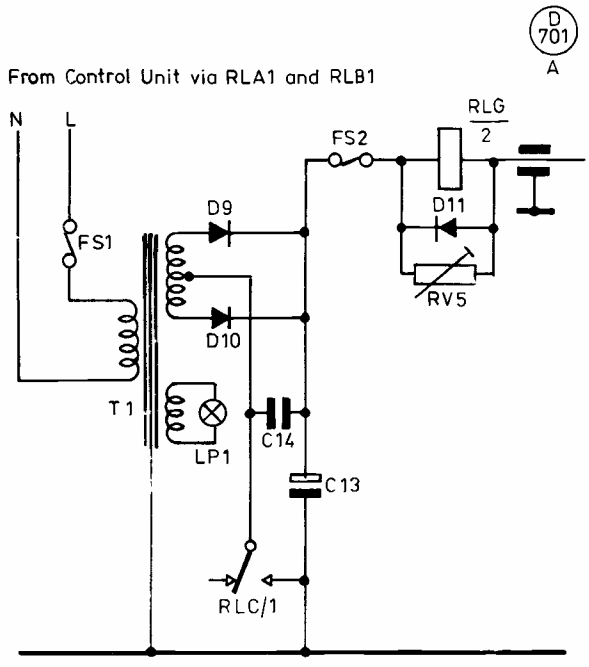


Fig 3 ANODE CURRENT CHARACTERISTICS FOR BEAM TETRODE. (Note 'kink' in Ia at low Va)



of 216 mV/°C. This means that a 10°C change in temperature will alter the Zener voltage by 2.16V, which by itself would not matter much if the effect were, for instance, confined to long-term warm-up. Unfortunately, the junction in even quite large Zener diodes has little thermal inertia because of its small size, which implies that different currents through the device (for example, the varying negative screen current from a 4CX250B) will vary the temperature, which in turn will vary the Zener voltage. The effect is, admittedly, small, but it is compounded by the effect of the slope resistance, which, as we have seen, implies that a change of current through the device implies a change in Zener voltage. For any Zener diode with a value of greater than about 5V (*i.e.* one where the temperature coefficient is positive) the effects act in the same direction, and it is always the higher-voltage devices that show both a large temperature coefficient and a high slope resistance.

Bearing in mind what was said earlier about Ohm's Law and semiconductors, the author has evolved a small rule-of-thumb for using Zener diodes in this kind of application. It seems after a good deal of experimentation that the slope resistance of the device, or combination of devices, multiplied by the range of current that the power supply must handle, will give a good approximation to the amount of voltage variation which will be present on a supposedly stabilised screen supply line. For instance, if we assume that the screen current of the valve varies between −6 and +2 mA, which is not an unreasonable assumption for a 4CX250B in amateur service, this implies a net swing of 8 mA. Multiplying this by two (for two valves) gives 16mA. Multiplying this value by the slope resistance of the devices mentioned above in series − 560 ohms − gives a value of almost 9V, and in fact when an amplifier using devices of this specification was measured recently, the screen voltage was found to be fluctuating by about 8.5V on a 300V rail. This put its performance so far as the author was concerned into the mediocre class, and indeed it sounded that way − it wasn't bad but equally it was by no means getting the best out of the valves.

One could, of course, use separate Zener chains for each valve, but they would have to be mounted in such a way that their thermal tracking was good and that one chain did not end up producing 10V more than the other after the power supply had warmed up! One other point here is that mixing Zener devices can lead to a minor pitfall if their temperature coefficients are not taken note of; it probably will not matter

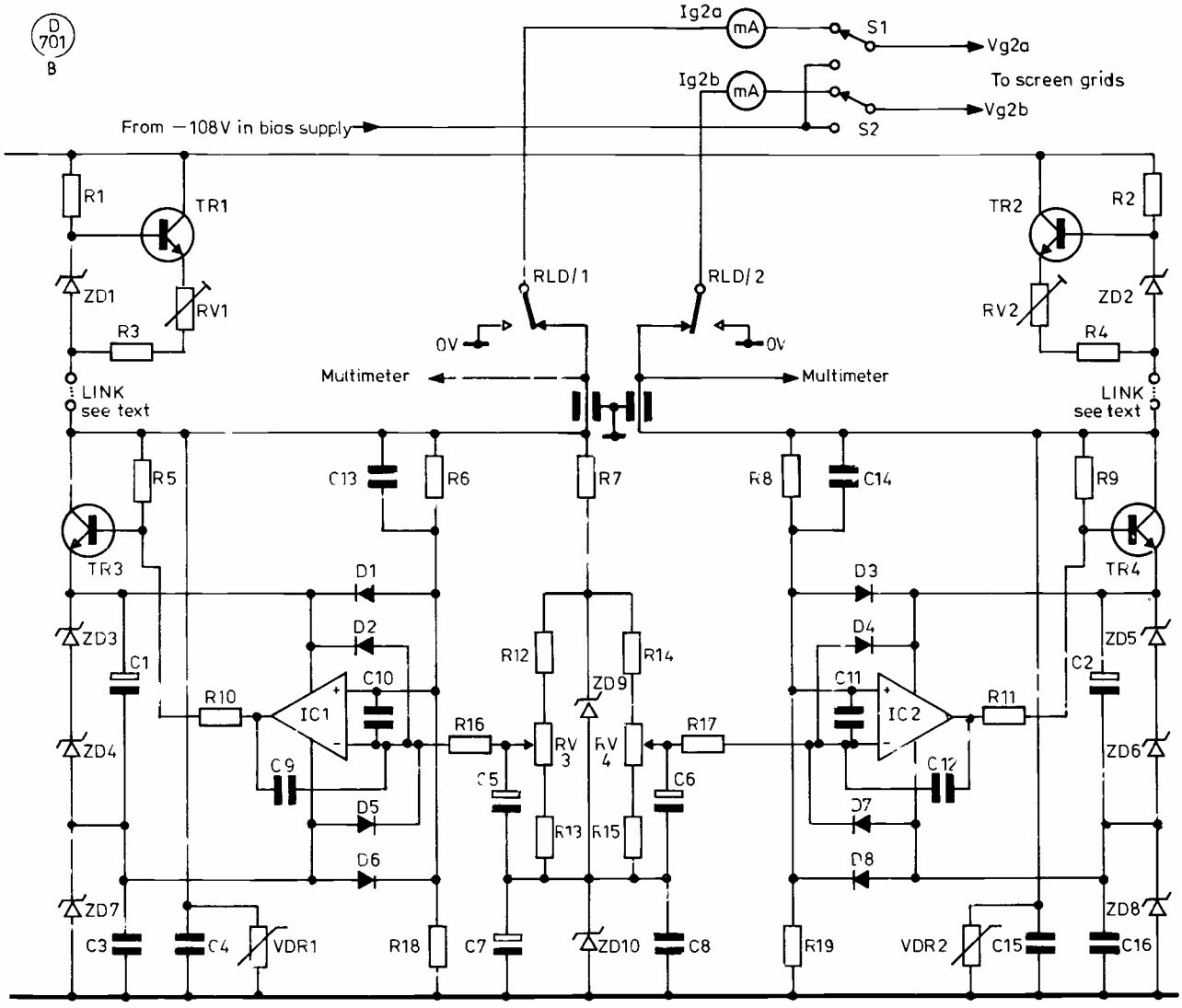


Fig 4 SCREEN VOLTAGE SUPPLY UNIT FOR HIGH PERFORMANCE POWER SUPPLY AND CONTROL UNIT

for a screen supply, with its relatively high voltage requirement, but low-voltage Zeners usually have a negative temperature coefficient.

And also, Zener diodes are open to the same objection as the VR tube insofar as they can produce vast amounts of noise. Different devices by different manufacturers seem to vary very much in this respect, and no hard-and-fast rules can be laid down except that, once again, you can't use too much decoupling!

In some ways the Zener diode is an attractive proposition for the job – in particular, it is tolerant of the occasional flashover – but it must be used with caution. It should be remembered that although the textbooks tend to show the Zener diode as having a nice sharp knee and a vertical line on the current/voltage axis, semi-conductor junctions – particularly those used in high-voltage and high-power Zeners – cannot read and neither can they interpret diagrams!

So, having been somewhat rude about the usual systems, what is left? One answer is a supply along the lines of the G4AJW design mentioned in the first two parts, using a 741 op.amp. driving an EL84 shunt stabiliser. This approach does permit good regulation (typically around ±1V in examples known to the author) and also the ability to vary the voltage on one channel slightly for balancing purposes. This type of supply also copes well with negative screen current. However, some comments regarding the anode voltage of the EL84 were made in the previous article (*S.W.M.*, March 1981) – it is specified at 250V – and also the author thought that it would be possible to produce a better design using transistors; which brings us to the present design.

The Circuit

As presented here, Fig. 4, it represents somewhere about Mk 6B! It started life as a straight transistorised version of the G4AJW design which never did perform very well; and it is at this point that the author must introduce his colleague Melvyn Noakes, G4JZQ. It is he who has sat muttering to himself over pieces of paper in the canteen, laboured over several variants of the printed circuit board, tied up most of the works QTH's test gear in lunch breaks such that his bench resembled an operating theatre during open-heart surgery, and blown more fuses in a long-suffering bay power supply than anyone had ever seen before! It is a wondrous sight to see one small die-cast box surrounded by two Avos, two expensive DVMs, two sophisticated oscilloscopes, a main power supply and a lash-up for testing the "sinking" capability of the supply and enough wires and connectors to re-cable completely the entire London telephone area! Melvyn still thinks that the system can be improved and still has one running on his bench with assorted bits and pieces hanging from it, regardless of the author's feeble protests that one *has* to stop somewhere!

to be continued

CLUBS ROUNDUP

By "Club Secretary"

The Mail

Acton, Brentford & Chiswick are top of the pile; they are still at the Chiswick Town Hall, where they have the large committee room on the third Thursday of the month. As we have no note of their plans for August, it would perhaps be a sound move to contact the Hon. Sec. – *see* Panel.

A.R.M.S. looks after the mobile operating interest largely by way of net operations, and of course the excellent "Mobile News" – details from the Hon. Sec. at the address in the Panel.

At **Ashford** – the Kentish one – the group have their Hq in a place they built for themselves, back in 1969, on private property at the top of Hart Hill, which lies near Charing, some ten miles from Ashford town. They foregather on Tuesdays, and the word is that if you want to look them up, it's best to contact the Hon. Sec. for directions or talk-in, as may be appropriate. Naturally, his name is in the Panel.

New!

That's the word in **Aylesbury Vale,** where the gang get together at Elmhurst Youth Centre, Fairfax Crescent, Aylesbury, every four weeks; which means August 11 for a natter session and junk sale. There is coffee to be had at meetings, and there is a pub some 200 yards away at which some of the members conclude their evening. Details from the Hon. Sec. – *see* Panel.

Barking are open for business on four evenings each week, as follows: Mondays constructional, Tuesdays Morse, Wednesdays operating, and Thursdays are a social evening. Programme details can be obtained from the Hon. Sec. – *see* Panel. A unique thing about Barking, is its newsletter: two YLs writing it, and an OM typing-up the script!

On we go to **Bishops Stortford,** at the British Legion Club, Windhill, where they are booked in on the third Monday in each month; but there is *no meeting* in August.

The **Bournemouth** gang seem to have settled in to the new venue, in the Conference Room, Coach House Motel, Tricketts Cross, Ferndown, on the first and third Fridays.

Next we head for **Braintree,** and August 17 for the annual surplus equipment sale. They meet at Braintree Community Centre, Victoria Street, next to the bus station. In addition, we note they have a trip to Whipsnade Zoo fixed up for August 15 – an all-day affair for members and families, with the fee covering transport to and from plus the Zoo entrance fee.

B.A.R.T.G. caters for the RTTY mode of operating, at SWL or transmitter level; apart from the odd contest, they have a very good newsletter and of course they can help with the sort of supplies needed by the RTTY operator.

Now we turn to **Brighton;** on August 12 they have what they term an "SWL and Shack" night, and on 26th an "RTTY and Data" night – both will be at the Hq at 47 Cromwell Road, Brighton.

Bromsgrove next, and here we see two venues; the main one is Avoncroft Arts Centre, where on August 14 they will be listening to G3RJV – George will of course be giving a talk on his pet theme of QRP operating. The other place is the Parkgate Inn, off the A448, for an informal on August 25.

Every Tuesday evening the **Bury** group are at the Mosses Community Centre, Cecil Street – but the main one is the second Tuesday, which is the one reserved for organised activities. This time, August 11 sees them out on a Fox Hunt.

Coleridge Community College, Radegund Road, **Cambridge** lies off Coleridge Road, to the south of the city. It is, during term-time, home to the local club, either in the Visual Aids Room for lectures, or the Tower Room where they have the club station. Obviously, you will be reading this out of term-time, so a contact seems indicated to the Hon. Sec. – *see* Panel for his address.

Silent Key

A double blow for **Cheltenham,** where Edgar Janes, G2FWA, died recently, after many years in which he put more into his hobby than he took out, both at local and national levels – he leaves a gap that will indeed be hard to fill. In addition, they mourn Bill Taylor, G2AGX, who, although a member, had been unable to attend meetings though ill-health. Our sympathies to the families of both.

Turning back to the club, they will be listening to a talk on E-M-E tests by G4ERP and G8PZD on August 6, and on August 21 it will be a natter evening, both these meetings having been scheduled for the Old Bakery, Chester Walk, Clarence Street. Incidentally, this E-M-E activity in Cheltenham was noted to the local paper, and the club managed front page headlines on two successive days – the right place to have your publicity!

At **Chesham,** sad to say, the club scribe had a late change of details which would have altered some of last month's entry had there been time for us to use the information. Never mind, at least he can say he tried. The group have their place in Chesham Whitehill Centre, every Wednesday evening, with the second one being *slightly* more formal!

Deadlines for "Clubs" for the next three months –

September issue – July 31st
October issue – August 28th
November issue – September 25th
December issue – October 30th

Please be sure to note these dates!

Now to **Cheshunt;** August 5 takes them out /P on Broxbourne Common, 12th and 26th are natter nights, and on August 19 they will be operating the HF rig from the Club Hq, which is the Church Room, Church Lane, Wormley.

We seem to have run out of programme details from **Chichester,** but we can tell you they turn up at the Lancastrian Wing, Chichester High School for Boys, Basin Road, Chichester, on the first Tuesday and third Thursday of each month.

A letter to hand from the Hon. Sec. at **Chiltern** says he had some difficulty in getting his speakers until the last moment – he obviously doesn't twist arms hard enough! However, they always seem to have something set up for the last Wednesday in each month at the canteen of the John Hawkins furniture factory in Victoria Street, off the A40 Oxford Road.

The scribe at **Clifton** says they seem to have taken root in the New Cross Inn on Fridays, and that there has been a slight improvement in membership.

It's been quite a while since last we heard from **Conwy Valley** – we had it on file as "Conway Valley" which was a bit confusing! – but they seem to have survived and thrived. They now have a booking at the Green Lawns Hotel, Bay View Road, Colwyn Bay, at 7.45 on the second Thursday of each month; but they hope to increase the number of meetings each month this autumn.

Right down west now, to **Cornish** and their long-time base at the SWEB Club Room, Pool, Camborne. They are always

to be found there on the first Thursday in the month.

August for **Crawley** covers an informal at G8ECR on 12th, and a VHF Pub Hunt slated for August 26 – all the details from the Hon. Sec., *see* Panel.

G8UVD will be talking about and demonstrating Dopplescant two-metre FM mobile D/F equipment to the **Cray Valley** gang on August 6, while on August 20 there will be a short talk by G8LDV about Cray Valley library, followed by a natter; both these are at Christchurch Centre, High Street, Eltham.

It's the third Saturday in each month for **Crystal Palace,** at Emmanuel Church Hall, Barry Road, SE22. However, for the rest of the data we must refer you to the Hon. Sec. – *see* Panel.

Next we come to **Dartford Heath D/F** – for details of their activities, on membership, and D/F hunts, and so forth, we have to refer you to the Hon. Sec. (*see* Panel).

Morse in Derby?

Derby Head Post Office is, and has been for a long time, listed as an official centre for taking the Morse test, necessary for a Class-A licence, given there are enough applicants. The minimum number before a test (held in September) will be arranged is ten applicants. The next alternative is to go to Humber Radio nearly 100 miles away. So – the **Derby** gang want to know if there are any people who would be interested in taking their test there this September. If so, please contact G3VGW (QTHR), or the Hon. Sec. at the address in the Panel as *soon as possible.* Of course if you are a member you can trot up to 119 Green Lane, Derby and talk about it any Wednesday, save that on August 5 they will be at Lower Bemrose School, Littleover, Derby, getting ready for the Mobile Rally on 9th. August 12 sees a Film Show, there is a night-on-the-air on 19th, and on 26th G5RV will be talking about "From Oscillator to Aerial".

East Antrim close down for the summer, but they will re-appear on September 8 at Carntall Hall, Mossley, for the AGM, and we understand we will be hearing about the programme as soon as it is sorted-out.

Next we head for **Edgware,** where the gang foregather at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, on the second and fourth Thursdays of every month. However, they make the point that there is a break with routine in August – *no* meeting on August 13.

The **Ex-G Club** is for those who were born in UK but are now living abroad. Details of the group from the UK Hon. Sec. – *see* Panel for his address. Apart from the newsletter, they have their various national and international nets through which to keep in touch with each other and with UK.

Over to **Farnborough** – a long time since we last heard from them. They are still to be found at the Railway Enthusiasts Club, Hawley Lane, on the second and fourth Wednesday. On August 12 they will be receiving an insight into RTTY by G3RRA, and on 26th Ron Broadbent, G3AAJ, will be giving his talk on AMSAT-UK.

Up to Scotland, and **Glenrothes** – they want everyone to know about their regional Convention, named 'SCOTAM 81' between 1100 and 1700 on September 12. It is at the Lomond Centre, just off the Kirkaldy-Tay Bridge road. Details on the Convention from K. Horne, GM3YBQ, who is QTHR (tel: 0592-65789), while tickets for the dinner-dance to be held in the "Ship and Stern", Main Street, Thornton in the evening are to be obtained from K. Riddoch, GM3ZSP, 181 Kinghorn Road, Burntisland, Fife. His telephone number is 0592-872727. As for the Glenrothes club itself . . . The Hon. Sec. hasn't given us the details, so we must refer you to him, at the address in the Panel.

It is many moons since we heard a buzz about a club to be formed in **Gloucester.** Now, we hear they are going well, on Thursdays at the Chequers Bridge Centre, Painswick Road. August is completely scrubbed as the centre is closed, but the activity restarts on the first Thursday in September. Details from the Hon. Sec. – *see* Panel.

Some members of Coventry Technical College A.R.S. in their new shack, which was opened recently by two DJ's from Mercia Sound (the local independent radio station); one of the DJ's is himself licensed as G4AEH. Left to right in the picture are Derek G8UGM (seated), Jim G8ISJ, Adrian G6ADC (seated), Dave G4APS, Malcolm G8UBC, Roger G3ZFR, and Glen G8MWR. The club meets every Monday at 7 p.m. in the Winfray Annexe of the College, and visitors are most welcome.

We now turn to the **G-QRP Club,** which must be the largest club in the UK outside RSGB, with over 1000 on the books. Anyone who is interested in the low-power aspects of operating or listening, or home-brewing, with simple equipment really can't afford not to be a member.

Now to **Guildford** where we hear that on August 14 there is to be a Quiz Night, and on 28th a natter; the club room is at the Guildford Model Engineering Society Hq, Stoke Park, Guildford.

Now we come to **Harwell,** a club we haven't heard of for many a long year; they now have the third Tuesday of every month at the A.E.R.E. Social Club, with membership open to all who are interested in amateur radio. For the August meeting, G3RZP, Peter Chadwick will be making it all sound so simple!

Havering are to be found on Wednesdays at Fairkytes Arts Centre, Billet Lane, Hornchurch; more details from the Hon. Sec. – *see* Panel.

Hereford are based at the ominous-sounding County Control, Civil Defence Hq, Gaol Street, Hereford, where they are down for August 7 and 21. More details from the Hon. Sec. – Panel again!

It was a bit of a surprise to find a picture of Brighton on the front cover of the **IRTS** newsletter; but of course the connection is with the IARU Region 1 meeting at which the EIs were represented. If you want to know about amateur radio activities in EI-land, contact the Hon. Sec. – *see* Panel – who will have details on the various clubs around the country.

Now to **Jersey** where the gang are QRT in August due to the Hq being closed, but they resume in September – second Wednesday in each month, at the Communicare Centre, St. Brelade.

At **Kilmarnock & Loudon,** they will be at the Buchanan Centre, Riccarton, Kilmarnock on August 18. Looking forward to September, they are hoping to start RAE classes.

Brush Sports & Social Club, 18 Fennel Street, is Hq of the **Loughborough** group, every Friday evening.

Nice to hear again from **Loughor,** who seem to have been slightly in the wars; but now all is rosy again, and they are

Names and Addresses of club secretaries reporting in this issue:

AYLESBURY VALE: M. J. Marsden, Hunters Moon, Buckingham Road, Hardwick, Aylesbury, Bucks. *(0296-64783)*
BISHOPS STORTFORD: B. J. Salt, G4ITL, 135 Kingsland, Harlow, Essex. *(0279-20478)*
CHESHUNT: J. Sleight, G3OJI, 18 Coltsfoot Road, Ware, Herts. SG12 7NW.*(0920-4316)*
EAST ANTRIM: J. Welch, GI4JXM, 20 Bryantang Brae, Roagh, Ballyclare, Co. Antrim BT39 0RJ. *(Ballyclare 40384)*
EX-G: F. W. Fletcher, G2FUX, 53 St. Ives Park, Ringwood, Hants BH24 2JX. *(Ringwood 3561)*
FARNBOROUGH: I. Ireland, G4BJQ, 118 Mychett Road, Mychett, Camberley, Surrey. *(Farnborough 43036)*
GLENROTHES: I. Robertson, GM4HBG, 123 Altyre Avenue, Glenrothes, Fife.
GLOUCESTER: E. A. Perkins, G3MA, 40 Calton Road, Gloucester GL1 5DY.
HARWELL: Mrs. A. E. Stevens, G8NVI, 78 Whitehorns Way, Drayton, Abingdon, Oxon. OX14 4LJ. *(Drayton 430)*
JERSEY: S. Smith, GJ8EZA, 19 Parade Road, St. Helier, Jersey, C.I. *(Jersey 23249)*
KILMARNOCK & LOUDOUN: W. Strachan, GM3ZRT, 38 Loudoun Avenue, Galston, Ayshire. *(Kilmarnock 820052)*
LOUGHBOROUGH: J. S. Smith, G4DZL, 91 Anson Road, Shepshed, Loughborough, Leics. LE12 9PT.
LOUGHOR: T. Griffin-Thomas, GW8TYS, 'Riverside Manor', 77 Castle Street, Loughor, Nr. Swansea, W. Glamorgan. *(Swansea 893392)*
MEXBOROUGH: I. Abel, G3ZHI, 9 Grove Terrace, Maltby, Rotherham, Yorks. *(0709-814911)*
MID-SUSSEX: J. Brooker, G3JMB, 20 Farnham Avenue, Hassocks, Sussex.
NORTH BRISTOL: W. E. Bidmead, 4 Pine Grove, Northville, Bristol BS7 0SL. *(Bristol 691685)*
R.A.O.T.A.: Miss May Gadsden, 19 Drummond House, Font Hills, Long Lane East, Finchley, London N2.
R.A.T.E.C.: R. Marsh, G8TYH, 43 Jenny Lane, Woodford, Cheshire SK7 1PE.
REIGATE: C. S. Barnes, 25 Hartswood Avenue, Woodhatch, Reigate, Surrey RH2 8ET.
SILVERTHORN: C. J. Hoare, G4AJA, 41 Lynton Road, South Chingford, London E4 9EA. *(01-529 2282)*
SUTTON COLDFIELD: A. D. Turner, G8TUR, 10 Jervis Crescent, Sutton Coldfield, W. Midlands B74 4PW. *(021-353 2061)*
THAMES VALLEY: M. C. Bell, G8RLB, 6 Park Road, Hampton Hill, Middx. TW12 8HD. *(01-977 6122)*
THORNTON CLEVELEYS: F. Hill, G3YWH, 45 Preston Old Road, Blackpool, FY3 9PR.
TORBAY: H. Davies, G4DZH, 18 Bowland Close, Paignton, Devon TQ4 7RT. *(Paignton 523036)*
WHITE ROSE: D. R. Comber, G8UYZ, P.O. Box 73, Leeds LS1 5AR.

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

recruiting actively – the venue now is the Loughor Scouts Hall, on alternate Tuesday evenings, with planning going ahead for the detailed programme.

Over to **Louth;** on August 25 they are going out – the visit is to the Royal Observer Corps Hq, Fiskerton, near Lincoln.

Maidenhead operate from the Red Cross Hall, The Crescent, Maidenhead on August 6 they have a visit to the shack of a member, while on the 18th, G3VCT will be talking about noise.

No meeting as such in August for **Meirion;** but they will be operational at Dolgellau Sports and Hobbies Exhibition to make up for it.

Mexborough have missed the deadline with their update but we know they are to be found every Friday evening at Harrop Hall, Dolcliffe Road, Mexborough – for the rest we must refer you to the Hon. Sec.

Another missing update is **Mid-Lanark,** who are also Friday-night merchants, with their Hq at Wrangholm Hall Community Centre, Jerviston Street, New Stevenson, Motherwell. For the rest – the Hon. Sec., as per Panel.

Over now to **Mid-Sussex,** still based on Marle Place Further Education Centre, Leylands Road, Burgess Hill. During August, they are setting-up a series of informals at each others' homes, so for details we have here also to refer you to the Hon. Sec.

Norfolk have August 5 for an equipment demonstration by G4CTT, with informals on 12th and 26th. On 19th there is a visit, which is fully booked. Otherwise, it is Crome Community Centre, Telegraph Lane East, Norwich.

A brief note from **North Bristol** covers the ground: venue S.H.E.7, Braemar Crescent, Northville, Bristol 7, every Friday evening, with all sorts of things to do. New members welcome. More data? Try the Hon. Sec. at the address in the Panel.

Northern Heights foregather every Wednesday evening with alternate ones devoted to nattering, at the Bradshaw Tavern, Bradshaw, Halifax.

We have a note from the Hon. Sec. of **Pembroke** referring to the "Bucket and Spade Party" on September 13 at the Regency Hall, Saundersfoot, Dyfed, with talk-in arranged on FM, channels S22, R7, RB4, and RB6. He could also tell you about the club itself, if you contact him at the address in the Panel.

Pressing on we come now to **Pontefract** where it seems we omitted a mention of their Foxhunt, for which they are quite cross. Please, sir, won't do it again! However, we see that in August they have a junk sale on 6th, and a discussion evening on 20th, both at the Carleton Community Centre, where they have rooms on the top floor. On a different tack, they want to know if we would like a photograph of the club in some activity or whatever. Yes, as always, but they must be sharp black-and-white prints, have plenty of contrast and be on glossy paper.

We mustn't forget to mention **R.A.I.B.C.** in this Year of the Disabled. If you know of anyone, blind or invalid, who is interested in amateur radio as listener or operator, they should be in RAIBC. Supporters and representatives are also needed – they keep things ticking over in all sorts of ways.

And, of course **R.A.O.T.A.** is another one we mustn't forget; they now regard an old-timer as someone who has been at it for 25 years proven, whether licensed amateur or SWL. Membership forms from Miss May Gadsden, 19 Drummond House, Font Hills, Long Lane, East Finchley, London N2. Tnx G2UV for the details.

A new group has to be mentioned now: the full name is Radio Amateur Technical Engineering Club or **RATEC** for short; the object of the club is to promote the technical aspects of the hobby, and while the founders seem to be in South Manchester area, we hear, independently, noises that suggest they may well grow (as did the QRP Club) on the promotion of home-brew. Details from the Hon. Sec.

Reading are based on the "White Horse" in Emmer Green, which is off the B481 Reading-Nettlebed road, where they have booked the club room for August 4 and August 18. On the former date, G3RZP of Plessey will be talking about SWR, while on the latter date they will be having discussions about SSB Field Day and their two-metre trophy.

August 18 at **Reigate** is a Members Evening, at the Upstairs Meeting Room, the Conservative and Constitutional Club, Warwick Road, Redhill.

We don't have the very latest details on **Silverthorn,** but suffice it to say they are based on Friday Hill House, Simmons Lane, Chingford, London E4, where they get together on Friday evenings.

Next we go to **South Birmingham,** where the Hq is at Hampstead House, Fairfax Road, West Heath. The main session each month is on the first Wednesday in each month; but they are there every Wednesday evening, every Thursday evening, and every Friday evening. What more can we say?

Now we turn to **Southdown** who foregather on the first Monday of every month at the Chaseley Home for Disabled Ex-Servicemen, Southcliff, Eastbourne; the August talk will be by G2MI on the amateur radio of the past, or, "When it Really Was Steam Radio".

The August meeting for **Southgate** will be, as usual, on the second Thursday, but the activity will be a mite different – a new QTH house-warming party. The new place is St. Thomas Church Hall, Prince George Avenue, Oakwood, London N14.

Pressing on, we come to **Stevenage,** based on the senior staff canteen, British Aerospace Plant B, where they are to be found on August 6 for a natter, and August 20 which is down for a Beginners Night.

Sutton Coldfield foregather on the second and fourth Mondays – *except during August* – at the public library in Sutton Coldfield, and they say they usually have a talk or discussion organised, and visitors are welcomed.

Now to **Thames Valley**; they have gone to the use of a standard form for their publicity, which indicates their next meeting to be on September 1, for a talk on the Territorial Army radio operating procedures by G8MOB. This is at Dittons Library Meeting Room, Watts Road, Thames Ditton, Surrey.

G6VS comments that when he joined **Thornton Cleveleys** and mentioned he was ex-VU2EU, someone remembered him contributing some news from the East to *Short Wave Magazine* before W.W.II, which promptly qualified him for election as Press Officer! Since last we heard from them, the club have both grown and moved, to Thornton-Cleveleys Leisure Centre, Victoria Road East, every Monday evening. August 3 sees a review of the HF and VHF Field Days, and on 10th there is a talk on Operating Procedures. G8KBH is selected on August 17, his topic being Electronic Controls for Heating and Ventilating; on August 24, G4APP gives a computer demonstration, and on 31st – the Bank Holiday – there is a natter night.

At **Torbay** we hear of a very successful Field Day, both as to weather and contacts. They meet every Friday and the last Saturday of each month, at their Hq in Bath Lane, rear of 94 Belgrave Road, Torquay.

The **UK Horizontal FM Group** are looking for members all over the country, and SWLs who are interested; details from the Hon. Sec. – *see Panel.*

University College of North Wales, Bangor will be out contesting in August, and any locals who are not members will be welcome – contact the Hon. Sec. He also indicates they are having a drive for students to their electronics courses – drop him a line for details.

August 25 is the **Verulam** bring-and-buy, at the Charles Morris Memorial Hall, Tyttenhanger Green, Tyttenhanger, near St. Albans. They may also be found on the second Tuesday of the month at the R.A.F.A. Hq, Victoria Street, St. Albans.

At **Wakefield** the gang meet in Room 2, Holmfield House, Denby Dale Road, Wakefield, on alternate Tuesdays. More details from the Hon. Sec. – *see* Panel.

We move on now to **West Kent,** where they seem to alternate Tuesdays between the formals at the Adult Education Centre, Monson Road, and informals at the Drill Hall in Victoria Road, both venues in Tunbridge Wells. More details from the Hon. Sec. – *see* Panel.

White Rose are located these days at the Moortown Rugby Club, Far Moss, Alwoodley, Leeds 17, every Wednesday evening, where they have a full programme organised and a well-equipped shack, not to mention 150 members. Details from the Hon. Sec.

At **Wirral** they have a place in the Sports Centre, Grange Road West, Birkenhead, on the first and third Wednesdays of each month. Details from the Hon. Sec. as to the programme – *see* Panel again.

The normal **Worcester** meetings are at the Old Pheasant in New Street, Worcester on the first Monday of each month. They have, if past experience is anything to go by, usually got something of interest fixed up.

Now to **Yeovil,** and Building 101, Houndstone Camp, near Yeovil. August 6 is a briefing for the club 144 MHz cross-country race, and on 13th, there is a talk on the mechanism of ionospheric propagation. August 20 is a session on 'skin effect', and on August 27 they have a natter evening while the committee are in a huddle in one corner.

At **York** the venue is the United Services Club, 61 Micklegate, York, where they are to be found on Friday evenings except the third one in each month.

Finale

That's it for another month – no matter how hard we prune the list, it grows by the month, which must mean amateur radio is healthy! Next time's deadline will be found in the 'box' in the body of the piece, and your news should be addressed to "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts AL6 9EQ.

More Mobile Rallies

September 13, Telford Mobile Rally, Telford New Town Centre, Malls, Telford, Shropshire, 11 a.m. start, earlier admission (10.45 a.m.) and reserved parking for the disabled, talk-in by GB4TRG on 2m. FM (S22) or 70cm. (SU20/SU8), family attractions, full catering and licensed premises on site, unlimited free parking and no entrance charge. Further details from G8DIR (Shrewsbury 64273), G8UGL (Telford 584173), or G3UKV (Telford 55416); all QTHR. **September 20,** Bromsgrove Mobile Picnic, Avoncroft College, Bromsgrove, off the A38 with easy access from the M5, talk-in on 2m, SSB (S22) and 70cm. FM, a true picnic with no trade stands and plenty for the family to do, refreshments available. Full details from Mr. E. Cotton, 0905-773181. **September 20,** annual Isle of Wight "get-together" at the National Wireless Museum, Arreton Manor, Newport, 2.30 p.m. onwards, talk-in by GB3WM on S22 and GB3IW on RB4, situated on the A3056 Newport-Sandown road, visitors most welcome. Full details from G3KPO, Ryde 62513, **September 27,** Harlow and District A.R.S. Mobile Rally, Harlow Sportcentre, 10 a.m. to 5 p.m., food and bar available, Further details from T. White, G8LXB, QTHR.

Special Event Station

August 15, Yeovil A.R.C. will be operating GB2MSS at the Mid-Somerset Show, Sheptón Mallet. Details from G3NOF, QTHR (0935-24956).

Forthcoming Events

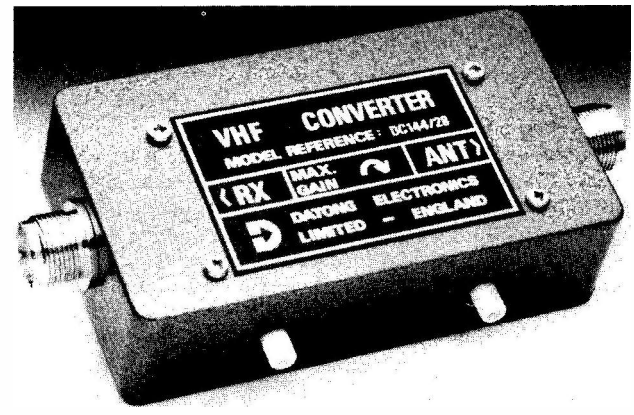
October 23, 24, 25, Amateur Radio Exhibition, Granby Halls, Leicester, full range of all the well-known equipment, with a number of exhibitors who have not been seen before at this particular venue, **October 29, 30, 31,** the ARRA's Tenth Anniversary Exhibition, Castle Donington (adjacent to East Midlands Airport).

"QTI"

This is the name of a recently introduced tape magazine for visually handicapped licensed amateurs and SWL's. It provides, each month, recorded news and technical items from many sources both past and current. *QTI* may be obtained by sending two C90 cassettes (Maxel UD preferred) in an "Articles for the blind" postal pouch to J. F. Feeley, G8VFK, 79 Narrow Lane, North Anston, Sheffield S31 7BJ. There is no charge, and each edition is posted on the first Tuesday of the month.

EQUIPMENT REVIEW

DATONG DC144/28 TWO-METRE CONVERTER



THERE are two methods of achieving reception of two metre signals. One is to use a receiver or transceiver dedicated to the band, the other to put a converter ahead of an HF reciever using its 10m. band as a tunable IF.

On the HF bands, there is little point in aiming for extremely low noise figures due to the high levels of natural and man-made noise, but at VHF, especially away from big city noise, it does become practical to use a very sensitive, low noise RF stage. With a gainy aerial array fed with high quality, low loss cable, it is possible to detect very weak signals. However, such aerial systems, when fed with several hundred watts of RD, can produce e.r.p's in excess of 20 kilowatts, far greater than anything possible on the HF and LF bands. Therefore, a really good VHF receiving system has to cope with a huge range in signal level giving rise to the somewhat conflicting requirements of low noise and high sensitivity, and large dynamic range.

The Datong DC144/28 Converter

A number of "bomb-proof" converter designs have been published in recent years. A recipe for success can be summed up by: –

(*i*) keep the overall gain relatively low. *i.e.* 20dB or less,
(*ii*) use a low noise, optimum matched MOSFET RF stage,
(*iii*) use a low loss, Schottky diode balanced mixer with high local oscillator drive level,
(*iv*) use a power type, low noise amplifier after the mixer.

The *Datong DC144/28 Converter* adopts this approach.

The RF amplifier is the popular ion-implanted, dual-gate MOSFET type 3SK88 with a *device* noise figure of around 1dB. It is preceded by a simple parallel-tuned input stage and followed by a bandpass pair of tuned circuits feeding the mixer. The local oscillator uses a fifth overtone, 116 MHz crystal in a completely balanced circuit with screened tuned stages thus reducing the amount of internally radiated 116 MHz RF energy to a very low level. It provides about +7dBm. drive to the mixer which uses a pair of Schottky diodes and a bifilar wound transformer on a ferrite bead. The single balanced configuration used here has a lower insertion loss than the double balanced type enabling a lower RF gain to be used for a given noise figure, thus improving the dynamic range.

The 28-30 MHz output signal is routed through a diplexer to a Siliconix J310 grounded gate amplifier, in the drain circuit of which is a *pi*-network to provide a 50 ohms output impedance. The power requirement is 10-14 volts, unregulated DC at 100 mA., fed to a 3.5mm jack socket. The converter incorporates an 8 volt regulator and a convenient power source is the Datong MPU Mains Power Unit as used in this review.

Gain Setting

To achieve optimum performance from this class of converter, it is essential to get the overall system stage gains right. Many amateur band receivers and transceivers-including some of the more modern ones – do not perform well on 10m. Their sensitivity and dynamic range can be rather mediocre. When preceded by a VHF converter with, perhaps, 25-30dB gain and with a further 10-15dB of aerial gain, strange things happen!

All converters are broadband devices. If the user lives in an area where high power stations – including repeaters – are operating, the total output power from a good, linear converter can be considerable and enough to degrade the performance of the first mixer in the tunable IF strip. Datong have thoughtfully provided an output gain control to cope with this eventuality. A further gain control has been provided across the input socket to cater for extremely local signals which could overload the RF stage. This latter comprises a 1nF capacitor in series with a potentiometer and, with the pot. at minimum setting, the approximate one ohm reactance of the capacitor very effectively attenuates the signal tranferred to the 3SK88 without tinkering with its gate voltages.

Tests

The converter was used ahead of a Hallicrafters SX-146 receiver, the aerial being a 10-element long Yagi. Careful tuning across the 2m. band did not reveal any of the "birdies" noticed on other converters using a 38.667 MHz. In the "wee small hours," when man-made noise was minimum, this converter proved to be very quiet, even with both controls at the maximum setting. It was usually possible to detect the GB3ANG beacon, 614 kms. away, under flat conditions.

One of the strongest signals locally is the notorious GB3SL repeater. The aerial-plus-converter gain was sufficient to cause slight non-linearity when the SX-146 was operated with its RF gain at maximum, as required for "correct" S-meter readings. Use of the converter's output gain control completely overcame this problem and the maximum attention was about 15dB. Under all normal conditions it was never necessary to use the input gain control. However, its efficacy was tested by running a 20 watts carrier on 144.150 MHz into crossed dipoles in the loft with the receiver tuned to GB3VHF on 144.925 MHz and the 10-ele. Yagi pointed to Wrotham. The distance between the aerials was about ten feet in places and the receiving system was blocked initially. But by using the input gain control – maximum attenuation about 12dB – satisfactory reception was [illegible]. Linear law pots. are used for these two gain controls which result in little effect until the last few degrees of rotation. Logarithmic law pots. would seem to offer a better choice.

Conclusions

Datong suggest a typical noise figure of about 2dB for their converter but the reviewer does not possess professional equipment capable of verifying this. No quantitative claim for dynamic range is stated. However, comparison with three other converters in the "Kilowatt Alley" on the North Downs showed it to be superior to all and pretty well "bomb proof." There is no hesitation in recommending the DC144/28 to anyone seeking a really good 2/10m. converter. It is available complete in a diecase box, with SO-239 connectors for £31. Alternatively the built and tested module, less box and connectors, can be supplied at £25, both prices excluding the dreaded VAT payable by UK purchasers.

N.A.S.F.

"A Word in Edgeways"

Letters to the Editor

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

Dear Sir — As one who has advocated that some form of controlled VHF CB service should be introduced into this country, it is with great concern and a sense of urgency that I write this letter which raises two important and interrelated matters.

The British authorities have been slow to deal with the problem of the phenomenal growth of CB in this country over the past year and has, in the main, preferred to cast a "blind eye" in the face of public opinion and the increasingly successful lobby by various sections of the community. During a period of discussion and consultation, the government showed little serious attempt to halt the flood of Japanese and American equipment entering the British market, or to discourage the general public from using such equipment. As a result we now have in this country a firmly-rooted CB service which, although loosely organised within its own ranks, is non-disciplined and non-controlled.

Any and all modes (even CW) are used, and have evolved in such a way that the government will never regain the initiative it held until only a few years ago. So, too, the operators have developed and increasingly strive to work the countries that they hear on their equipment; no amount of future legislation will stop the naturally-evolved DX-er who has progressed from working "cross-town" to the appreciation that SSB (whatever that may mean), an "after-burner" and a beam antenna will increase his potential to work international DX. Make no mistake, 11-metre DX-ing is a fact, and a rapidly increasing facet of CB which no government wished to encourage when providing the service within its own country. No amount of bating with offers of higher frequencies will ever lure the DX-ers away from 11-metres. There is now so much QRM on these frequencies that stations are increasing power in an attempt to overcome it, and thereby accentuating the problem. The natural progression is to QSY to those areas where interference is least, and this invariably means into the 10-metre amateur band.

Of even greater concern are the increasing number of CB operators who are obtaining the facility of high-power tunable transceivers originally intended for the amateur market. I was recently shown an FT-101ZD acquired privately by an SWL colleague that was fully crystalled for the 11-metre CB band. CB is really big business, and a number of radio retailers are quite rightly and legitimately looking toward this expanding market which is only too keen to part with its money in order to participate in the materialistic electronic miracle, One only has to observe the proliferation of CB magazines in local newsagents to realise the extent of the competition.

Now, to the crux of the matter. If the government had been prepared to halt the initial upsurge of 27 MHz CB (which had a snowballing effect on public interest) and had been quick to offer a viable alternative, then it would have been able to legislate when, where and how this service was to operate. During this period of uncertainty, the law of the masses predominated, resulting in a late change of policy by the government and the pandamonium which is only too keen to part with its money in order to participate in the materialistic electronic miracle. One only has to observe the staffed department as to the cause of the biggest headache. It is tragic that our government has contributed to the international problem by its lack of control over the UK situation.

Let us be quite clear about the problem. It is not the task of the equipment supplier to ensure that the equipment he supplies is used exclusively by licensed amateurs. Indeed, one retailer I contacted commented that a policy of selling only to licensed amateurs decreased his sales to such an extent that he could not offer the same discounts as other suppliers, Needless to say, the amateur clientéle was in no way interested in moral arguments, and took their business to the most competitive supplier.

As an amateur who concentrates most of his HF activities on 10 metres, I have been alarmed and angered by the encroachment of these intruders into our frequencies. When I tune the CW segment, I am frequently interrupted by CB stations, and even when operating phone above 28.5 MHz I have been called on several occasions by European and Latin-American CB operators. Familiarity breeds complacency, and unless amateurs are prepared to force these operators back to 27 MHz, then a foothold will be gained and strengthened by the growing numbers of operators who are obtaining the facility to QSY from the 11-metre QRM. Legislation is lengthy, and requires international co-operation by governments and equipment manufacturers; even then, at best, the problem will only be reduced.

There appears to be two viable procedures which we, as radio amateurs, can implement in order to conserve our valuable frequencies. One deals with the symptom, and the other attempts to reduce the cause.

(a) Any amateur finding illicit operators within the band should call CQ directly on frequency, or test the match of his antenna (making due note in the logbook). Remember, you have the right to be there, and unless the QRM is created, then more operators will establish themselves in these "fresh green pastures".

(b) The programme adopted by many clubs and societies to educate the local CB fraternity in the discipline of licensed and controlled radio-communication should be expanded. This in no way condones CB, or recognises the present 27 MHz, situation; it merely informs them of a more efficient and potentially rewarding alternative — the licence requirements of which are not so much an obstacle, but a necessary qualification for anyone wanting to effectively communicate *via* the air waves. We are not plying for membership, and certainly the greater majority will show little sign of wanting to become involved immediately. However, your case and presence has been made known, together with the amateurs exclusive right to operate on 10 metres.

We live in a fierce and competitive world. Unless we make a reasonable, but positive attempt to conserve that which is ours from intruders, many of whom are ignorant of what they use and how to use it, then portions of 10 metres will become an extension of the CB service, lost to amateurs, never to be reclaimed.

David Johnson, BA, ATC, G4DHF

Dear Sir — With reference to your June editorial, the use of cordless telephones, whether causing interference or not, contravenes the Wireless Telegraphy Act, 1949. Such devices are not permitted in this country as yet; no spectrum is available for their legal use and they do not comply with British Telecom's requirements for connection to the telephone network. Unless readily convertible to any frequency band which may be authorised, those now being touted will fail to meet the future requirements for certification as telephone attachments which will come into force in the autumn when the British Telecommunications Bill has become law.

British Telecom's radio interference service, which acts on behalf of the Home Office, will always follow up reports of interference, regardless of its source. It can be contacted through the general manager's office for the telephone area concerned; its address and phone number is given in the local directory.

Although cordless phones are on sale in some amateur radio shops, amateurs would do well to keep clear of them. As a licensed amateur myself — as are many interference investigators — I would be unhappy to see an amateur in trouble from using one of these devices.

Andrew Emmerson,
Technical Press Officer, British Telecom.

BOOK REVIEW

"AMATEUR RADIO"

by Gordon Stokes and Peter Bubb

AMATEUR RADIO for the title of a book could mean anything. In this instance it is that of a manual for those wishing to study for the Radio Amateurs' Examination. It comprises an Introduction, nineteen chapters and an Index and covers the basic, technical material the would-be candidate needs to assimilate to sit the R.A.E. with some degree of confidence.

As is to be expected from a professional writer, Gordon Stokes, G4HWD, this is a well written book, copiously illustrated with simple diagrams and some excellent plates. In his Foreword, Mr. Stokes writes that it is the work of Peter Bubb, another licensed amateur but whose callsign is not stated, a lecturer and the fellow who coached Mr. Stokes through his R.A.E.

In a rather expensive book of this type, one would have expected to find the Amateur Licence reproduced and a sample of a typical R.A.E. paper included so that the student could gauge the format and type of questions he, or she, will be likely to have to answer. However, in the Introduction, mention is made of the Home Office's booklet, "How to become a Radio Amateur."

This new, Lutterworth Press hardback publication is one of their "Practical Handbook Series" and runs to 192 pages in 220 by 145mm. format. It is obtainable from *Short Wave Magazine* Publications Dept., but at £9.60, including postage and packing, it does seem to be rather expensive when compared with other, similar publications.

N.A.S.F.

"QRZ THE UNICYCLE, PLEASE"

Jeremy Boot, G6AFP

Those readers who have worked the odd motorcyclist and thought him a good catch, or have perhaps heard an occasional /P in a dinghy at Clacton or Margate masquerading as a Maritime Mobile, should note that such minor feats fade into insignificance compared with recent QSOs heard on 2-metres FM when G8YRF (Rory Foxley) and G8XHY (Mark Bracey) conducted their QSO from a unicycle — one at a time of course.

Mark and Rory, aged 18 and 17 respectively, have been active on 2m. since passing the RAE in May last year. They both live in the Dunkirk area of Nottingham (ZM square, not BL!) and are well known among the local amateurs, notably on the S23 nets which have a character all their own. When he heard the two working from a unicycle, a local station commented, "Some people will do anything for a contact"!

Since a unicycle needs no hands to operate it, unlike a motor car, perhaps the case should be made for this to be the only recommended mobile for amateur radio purposes.

Indeed, in the light of recent legislation on CB, nothing would now come as a surprise. No mobile working except from a unicycle (slow-scan TV transmissions and moonbounce allowed); tricks involving lions of facetious or circus nature strictly forbidden, and third-party traffic under supervision, limited to passengers only. . . . The possibilities are endless.

Two evenings ago, I thought I heard the same two stations working from pogo sticks — but then, there was a lift on.

continued from p. 308.

again. If we say the lines of force go from the north pole of the magnet to the south pole, and if we regard the current in our vertical wire as going from positive downwards through the paper to the negative terminal of the battery, then we can say that the lines of force around the wire which we saw with the iron filings appear to go clockwise round the wire; and our compass confirms that deduction.

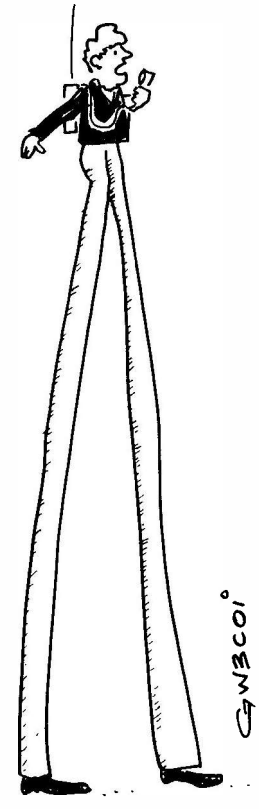
This is where most books or articles go on to talk about coils of wire (solenoids) and then go on to talk about various funny effects which can be shown to happen when alternating currents are applied. Not us.

No, sir, we have a totally different thought to bring to your notice. We have used a piece of wire and shown it to have resistance, capacitance, and *inductance,* which is the complicated name for what we've just been demonstrating with the iron filings and the compass. In other words there's just no such thing as a perfect resistor, or a perfect capacitor, or a perfect inductance, or even a perfect piece of connecting wire! As for the proof, any home-brew project that has a good circuit, and is wired correct to circuit diagram, but acts up like crazy when you switch it on, does so because we have disregarded the absence of perfection; or, if we have thought about it and got our layout as good as possible, then some component is not behaving like its label says it should. Nothing is perfect, but some things are more imperfect than others, and some become more imperfect with age.

to be continued.

Blush

In *Part I* we said that a molecule of water comprises two atoms of oxygen and one atom of hydrogen. Any schoolchild knows it's the other way round. . . . . .



". . . and tomorrow I shall be shot from a cannon while working CW".

VHF BANDS

NORMAN FITCH, G3FPK

4X4 and EA9 on Two Metres

IN last month's *stop press* item, the first G/4X4 2m. QSO was mentioned. This has now been confirmed and your scribe has received a photocopy of the QSL card. For the record, Mike Lee, G3VYF, (AL33j) worked Abe Nagel, 4X4IX, (RS65g) at 1605 GMT on June 11, 1981 on SSB *via Sporadic E* propagation. Abe's station was an *Icom* IC-211, 200 watts amplifier and single 11-ele. beam. This was a notable "first", the distance being 3,515 kms.

Mike sent along a tape recording of the event, unedited, and 4X4IX was very strong at times and was heard working ON stations, too. There is clear evidence from this tape of considerable tropospheric propagation from the English end. DK8SG (EI13j) can be heard calling 4X4IX, Helmut being 646 kms. from Mike. Surprisingly, after G3VYF completed the contact, no other G stations called Abe, suggesting a very selective and fortuitous duct into Vange, Essex!

What are believed to be the first 2m. contacts with the Spanish, North African enclave of Ceuta (XV14?) were made around 1615 GMT on July 10. G3FPK and several others got through the pile-up. His QTH is; José Carretero de Miguel, Falange Espanola 51, Ceuta, North Africa.

Satellite News

No sooner was it stated in last month's piece that *Oscar 7* was functioning satisfactorily, than news was received from AMSAT-UK that the poor thing was very sick and possibly on its proverbial "last knockings". When last heard, it was uncommandable and the telemetry was incomprehensible. For a long time, *0-7* has been working off its solar cells directly, rather than from its now defunct battery. This is alright when the spacecraft is in near perpetual sunlight but recently, this has not been the case. It has been suggested that, if it is to be heard any more, it could be from about July 12. If it has not been heard by the time this is published, it is likely that the faithful satellite will have finally died. If any reader should hear anything at all from *0-7* please inform G3AAJ. (*QTHR*).

The *UOSAT* experimental satellite will not be launched before Sept. 4 at the earliest, with a greater probability of the original date of Sept. 15. The time would be 1141 UT on either day.

Midlands VHF Convention

Peter Burden, G3UBX, has sent details of the Midlands VHF Convention to be held at the Wolverhampton Polytechnic on Saturday, Oct. 10. The venue is about five minutes walk from the main railway station. The event will follow the lines of the London one with a trade show and series of lectures, plus an evening buffet meal. Professional equipment will be on hand to measure the noise figures of VHF and UHF pre-amplifiers, converters and receivers, also a high accuracy standard frequency source for checking frequency meters. Attendance is restricted, so immediate application is essential. All inquiries to: J.P.H. Burden, 28 Coalway Road, Wolverhampton, WV3 7LX. The Convention-only tickets are £1.00 and the Buffet-only ones, £3.00, with cheques payable to "Midlands VHF Convention".

Contest News

Results: The Single-op. part of the BARTG Spring VHF/UHF Contest, held over the Easter weekend, was won by G8SFM, with G8LWY second, both stations operating on 2m. and 70cm, G3EMU/A was third. In the Multi-op. section, the Melton Mowbray ARS, G4FOX, were just 0.1 percentage point ahead of G3NNG, with G8DVR/P quite close on their heels in third place.

Coming events: On Aug. 2, there is the 144 MHz QRP Contest for which no rules have been published. Therefore, it must be assumed they are as last year; one watt p.e.p. or CW, 0900-1700 GMT. The RSGB European Meteor Scatter Contest runs for 24 hours from 1700 GMT on Aug. 11. All British Isles entrants must be RSGB members. (Does that apply to EI, GJ folk?) Scoring at one point *per* kilometre with a multiplier of 2 for each new square worked. Prior skeds. can be arranged. On 432 MHz, an additional multiplier (total) of 15 will apply, the final score being the sum of scores on each band. Standard MS reports/calls must be exchanged *plus* square — e.g. ZL. Full rules were on page 60 of *DUBUS Informationen,* issue 1/1981.

Aug. 16, 0900-1700 GMT sees the 70 MHz Trophy and SWL event. This is a two section affair; Fixed and All Others, with normal radial ring scoring. Also on the 16th is the fifth leg of the 10 GHz *Cumulatives* and likewise the Microwave Contest, the latter being a 24 GHz section.

The Harlow and District ARS is promoting a 144 MHz, all-mode, 25 watts maximum output contest over two days, Aug. 29 and 30, in two, four hour sessions, 1200-1600 GMT. RS(T), serial number and *geographic* county to be exchanged. Only countries outside the U.K. count; *e.g.* France, Belgium, etc., count as a county. Logs for the two sessions to be kept separate and stations may only be worked once. Entries, by Sept. 30, to G4LDY, 9 Little Grove Field, Harlow, Essex, CM19 4BS. The scoring is one point *per* contact, but G6UT is worth 4 points, and G6BUT, 6. Total score is number of points times total of counties and countries worked.

Sept. 5/6, 1600-1600 GMT is the period for the 144 MHz Trophy and SWL event which coincides with the 2m. section of the IARU Region 1 VHF Contest. No need to give the QTH this time, just QTH Locator. Radial ring scoring for the RSGB affair, one pt./km. for the IARU event. The RSGB contest is a four section one: Single-op. fixed, Single-op. -/A or -/P, Multi-op. fixed or Multi-op. -/A or -/P, while the IARU one is either Single-op. or All other.

The only comment on the "staking-a-claim-to-a-frequency" practice mentioned last month came from the Brakespears, G8RZO and 'RZP, who suggest it makes sense for high power stations to put out a few test calls about fifteen minutes before the start of a contest so that they do not cause interference to each other once the event gets going.

Beacon News

F6EOQ told Roger Thorn, G3CHN, that EA3VHF (BB26h) is a new 2m. beacon on 144.149 MHz running 25 watts to a 16-ele. beam. The keeper points the aerial in the "DX" direction. The "private" beacon, EA3XS, is on 144.152 MHz and runs 5w. to a "Big Wheel" aerial.

DX Notes

Marc De Munck, ON5FF, with ON5EX, plan to operate from Portugal from Aug. 4 to 12, signing their own calls -/CT. Squares to be activated are VA, VZ, WA and WZ. The CW frequency for MS work will be 144.011 MHz and they will adopt 2½ minute periods at 800 *letters-per-minute*, starting off first. No prior skeds are being made to avoid wasting time with unreliable stations. (This happened last year when ON5FF, ON6UG and G8RNM operated from UN in the Irish Republic.) So the 20m. VHF net frequency should be used for sked arranging when they are there. The SSB QRG for possible tropo. work will be 144.295 MHz.

Martin Adams, G4IYA, will be in Ireland by the time this appears, operating as EI2VFZ/P until Aug. 9. CW and SSB

QRGs will be 144.040 and 144.240 MHz respectively. He will be on the 20m. VHF net for skeds. and also on 80m. for more local QSOs.

Chris Tran, GM3WOJ, will be operating portable on 70.225 MHz from XS square on Aug. 10-12 and from YS square on 14-16 with 80m. talk back on 3,725 kHz from 1700-1715 GMT daily. SE England 80m. net control will be handled by G8VR in Kent. Stations interested in arranging MS QSOs should write to Chris at 21 Richmond Avenue, Dumfries.

Pirates

Your scribe recently heard a character on 2m. SSB using the call sign G8RSL. It did not ring true so a call was made by telephone to the real G8RSL, in Iver, Bucks., who was very annoyed when the bootlegger's actual transmission was relayed live down the twisted pair. When subsequently challenged, the phoney said he'd have to find another call and was later heard using G8RYZ! The real owner of that lives in Perth. Another "wrong-'un" is G8PIK who says his name is Bart at the NW side of Heathrow Airport. The real 'PIK is also a GM but is now a GM4 anyway. Again, when asked to explain his call, said "Bart" replied, "Oh, I'll have to follow that up!"

Surprisingly, quite a few licensed amateurs seem to work these pirates even though it is a breach of licence conditions to communicate with anyone other than a properly licensed amateur station operator.

Repeater News

Microwave repeaters seem to be the latest fashion and licences have been received for the following relays: GB3AA, Alveston-on-Avon on RM0; GB3CP, Crawley, W. Sussex on RM3; GB3MC, Bolton, Lancs. on RM0; GB3RU, Upper Basildon, Berks., on RM9; GB3WX, Brighton, E. Sussex on RM9. UHF repeater GB3OS at Stourbridge, Worcs., is now QRV on RB2 and licences have been received for GB3SW in the Swindon area and GB3TH at Tamworth, Staffs.

Four & Six Metres

John Baker, GW3MHW, (Dyfed) mentions the unkeyed carrier 2 kHz below ZB2VHF on June 29 and 30 on 6m. Seems to have been heard over a wide area and to have been vertically polarized. ZB2VHF came back on July 3 and G2AOK reports reception of ZS6PW the same day. ZB2VHF on 6m. was very strong on June 20 so GW3MHW telephoned ZB2BL and a 10/6m. crossband QSO resulted. After 1640, they made a 6/4m. crossband contact with Jimmy using a 4m. transverter loaned by GM3WOJ. This was a first GW/ZB2 4/6m QSO, for the record. On June 22, John worked EI6AS on 4m. and at 2230, Albert went on 6m. and they made the first GW/EI 4/6m. crossband QSO. Since July 1, the EIs no longer have 6m. permits. John is surprised how much SSB traffic can be passed with GM3WOJ *via* a tropo. and MS mode mixture. He says that the OZs have to obtain a permit to *listen* on 4m.! Three Danes are listening on the band as is 15CTE using a converter loaned by G4BPY. The Italians no longer have 6m. permits. Another keen 4m. listener is SM6PU who can often hear GW3MHW's automatic transmission, "Test DX de GW3MHW." Olof reports strong *E's* reception of GB3SX on June 11.

Frank Howe, G3FIJ, (Essex) was on in VHF NFD and added a useful number of counties for his 4m. table entry, but Dave Sellars, G3PBV, (Devon) was not as he loaned his rig to the Exeter club who made 40 contacts for about 300 points. In the June 7 contest, Dave worked two countries with 200 *milliwatts* to a 2-ele. beam. George Haylock, G2DHV, (Sidcup, Kent) is back on 4m. with 10w. of CW and a 3-ele. *Yagi* at 12ft. fixed east! From Cornwall, Martin Blythe, G4HFO, now has 10w. of SSB to a 4-ele. beam and is willing to arrange skeds. from XK56b. (*QTHR*)

David Thorpe, G4FKI, (Essex) has five countries this year now, the two recent additions being GJ3YHU/A and GU3HFN/P. Although the University year has finished, G5YC, the station of the Imperial College ARS in London, will be on the air in the summer. They will be looking for contacts every Thursday at 1200 GMT on 70.20 and 70.26 MHz. Mick Bull, who passed this information, is now G4MIK (ex-G8WXJ) and promises to be QRV on 4m., listening for FM contacts on weekday evenings.

May 31 was a red letter day for Arthur Breese, GD2HDZ. A landline call from G3KMS enabled him to make his first ever contact with ZB2BL on 4m. The June 7 contest provided 30 QSOs worth 298 points in not-very-good conditions. Mike Allmark, (Leeds) in a letter dated June 16, reports lots of Band 1 TV DX *via E's*, particularly on June 2 and 7. Paul Turner, G4IJE, (Essex) is now on 4m. with 8-9w. of SSB and Peter Hallam, GI4GVS, is also QRV from C. Antrim,

Two Metres

Mike Allmark (Leeds) copied stations in FX, HG, KU, LL and MQ squares in the May *Aquarids* meteor shower. In the June *Arietids/Perseids*, he heard LA1K (FX), YU3ES (GF) and OE6WIG (HG) on CW and YU3ES and F1JG (CD) on SSB. G3PBV had an 0400 sked with EA3LL on June 6 on SSB which came off. New ones for Mike Lee, G3VYF were SM6EAN (FR) on June 9; Y25JE/P (HN) on the 10th; SP2LU (JN) on the 14th and UQ2OW (MQ) on June 28.

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3POI	—	—	327	327
SP2DX	—	—	280	280
G3IMV	—	—	276	276
DK3UZ	—	—	264	264
I4EAT	—	25	238	263
G3VYF	—	89	229	318
G3CHN	—	—	202	202
G4ERG	—	16	199	215
GJ4ICD	1	94	196	291
EA3LL	—	15	194	209
G4IJE	—	—	192	192
G3SEK	—	—	182	182
G4IGO	—	8	180	188
9H1CD	—	13	178	191
G3BW	4	30	176	210
G3FPK	—	—	173	173
GM4COK	—	12	172	184
G3KEQ	—	—	166	166
G4DEZ	—	—	166	166
9H1BT	—	11	163	174
G4CMV	14	59	157	230
G8HVY	22	83	141	246
G4BWG	—	38	136	174
G3NAQ	—	58	128	186
G8IXG	—	—	126	126
G8LGL	—	25	121	146
G3XDY	30	83	120	233
GJ8KNV	2	54	119	175
G3COJ	24	74	116	214
G8VR	—	3	115	118
G8MFJ	—	23	114	137
G8ATK	6	56	113	175
G8HHI	6	47	113	166
G4AWU	—	22	113	135
G8OPR	1	38	111	150
G4MCU	—	26	111	137
G3JXN	41	82	110	233
G3PBV	12	60	109	181
G8JJR	—	38	108	146
G8TFI	—	55	105	160
G4FBK	—	5	105	110
G8LEF	22	62	101	185
G8KGF	—	28	99	127
G2AXI	4	54	96	154
G8CXQ	—	—	96	96
G4ERX	5	45	92	142
G4JZF	—	—	92	92
G8GXE	13	57	89	159
G6UW	—	1	89	90
G4GHA	—	—	88	88
G8KPL	—	7	87	94
G8TGM	—	—	84	84
GD2HDZ	12	41	83	136
G8IFT	15	34	81	130
G8VLQ	—	34	79	113
G8JAG	—	7	79	86
G8KAX	9	41	78	128
G3FIJ	—	27	76	103
G8RMA	—	12	76	88
GJ3RAX	1	27	74	102
G4HFO	—	50	69	119
GI8EWM	—	25	67	92
GW3CBY	3	14	65	82
G8RWG	—	—	64	64
G8FMK	15	53	62	130
G8JGK	—	—	62	62
G4IRX	—	—	60	60
G8SVG	—	—	58	58
G8TIN	—	3	56	59
G8SKG	—	5	53	58
G4GSA	—	6	51	57
G8VFV	—	—	51	51
G4GXL	—	1	48	49
G4LDY	—	2	39	41
G8WUU	—	11	37	48
G8LXY	—	18	32	50
G8WRD	—	21	30	51

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

Dave Hawkes, G4FOR, (Luton) is all computerized and keen to investigate data transmission *via* MS. He would like to hear from anyone willing to try some 3,000 sections of *Western Electronics* "Alumast" and 19-ele. *Cushcraft* "Boomer" aerial up, both donated by the manufacturers, fed with 35m. of half-inch diameter, foam dielectric coax. He asks we should again clarify that, as the station is in United Nations territory, 4U1ITU is

erroneous. He runs only 60w. and has only completed a couple of QSOs. Paul successfully "tail-ended" a sked on July 13 and worked F6CTW/FC in ED square in Corsica for no. 192.

Ken Osborne, G4IGO, (Bristol) lists CW MS successes with LA1K on 5/5; OH0JN (KU) on 23/5; OK1KKH (HJ) on 31/5; SK7NM/PI (JQ) on 4/6; OH2BBF (LT) on 6/6; Y21PL (GL) on 7/6; LA6HL (CS) on 8/6 and OK2BFH (JJ) on 9/6.

Nick Button, G4IRX, (Beds.) has built the memory keyer recently described in the *Magazine*, but with a CMOS 6508 memory in place of the 2102. A *muTek* 3SK88 preamp. has been added to the *Icom* IC-202S, plus a 2N6082 PA, this set-up enabling him to complete his first MS QSO on Apr. 22 with SM5CHK (HS). A 100w. "black box" was bought at Alexandra Palace and, on June 16, a contact with SM4IVE (HT) was over in 30 mins. From Pete Bowyer's, G8VPN, QTH on June 27 and 28, skeds. were completed with SM6CMU (FR); HG8CE (KG); LA1K; I3TJQ (GF) and OZ1EYX (GQ). The gear comprised a *Yaesu* FT-225RD with *muTek* board, a 4CX250B amplifier, a 13-ele. *Yagi*, Nick's keyer and a *Philips* tape recorder.

Ken Willis, G8VR, wrote before leaving on one of his period trips to the U.S.A. listing MS CW QSOs with I1JTQ (DF); SP2DX (JO); I5MZY (FD); CT1WW (WB) and UR2GZ (MS) for the first Russian at the third attempt. Eddi Ramm, DK3UZ, has sent the *DUBUS* MS Address List compiled in March, 1981. This runs to 10½ pages but the British information is not very up to date.

Next to the tropo. scene and to a very comprehensive report from Jesus Suarez, EA1QJ, (VD59h) who worked EA8XS on June 7. On the 11th., the propagation was to western and central France, best DX being F6CJG (BF21j). The 13th and 14th, brought much DX to the north and northeast including PA0FTF (CK10e) on CW and ON6TN/P (CK52a) on SSB. In England, best DX was G3VYF (AL33j) along with G5KW (WJ09e) in the Scilly Isles, GJ and GW stations.

Geoff Grayer, G3NAQ, operated 4U1ITU in Geneva on June 13 and between 1825 and 2136 worked G8SGG (ZL); G3BDQ (AK); G3VYF (AL); GJ4ICD (YJ); G5KW (WJ); G8ATK (ZL); GJ8YVL (YJ); G6AYY (XK) and GJ8SBT (YJ). The station now comprises a *Trio* TS-700. a *Polar* PA and preamp. with a QQV07-50 donated to the IARC, and a *Tempo* 6N2 and 16-ele. *Tonna* aerial loaned by G3NAQ. By the time this is read, Geoff hopes to have two 6m. *1 p.m.* experiments before returning to university at the end of September. (*QTHR*). Paul Turner, G4IJE, had a 20m. QSO with CT1WW and asked Tiago about CT4KQ with whom there has been little success. It transpired that '4KQ has a *Trio* TS-770 the digital readout of which is

ANNUAL VHF/UHF TABLE
January to December 1981

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
G8FMK	—	—	63	13	47	8	23	2	156
G3BW	29	5	60	25	23	6	*5*	*4*	148
G2AXI	32	4	51	10	40	7	*5*	*1*	144
G8TFI	—	—	65	17	45	11	—	—	138
G8GXE	—	—	52	11	44	9	17	5	138
GD2HDZ	25	4	53	11	32	9	*2*	*3*	134
G8VLQ	—	—	64	16	38	8	—	—	126
G3PBV	*2*	*2*	54	15	39	7	5	1	121
G8HHI	—	—	39	10	41	9	13	2	114
G3FIJ	26	2	45	10	27	4	—	—	114
GW3CBY	10	3	50	14	17	6	*3*	*2*	100
G8VR	30	3	35	17	6	1	—	—	92
G8WUU	—	—	53	13	23	3	—	—	92
G3CO	14	3	39	8	22	5	—	—	91
G6ADC	—	—	55	9	25	2	—	—	91
G3FPK	—	—	70	20	—	—	—	—	90
G4FKI	37	5	20	5	16	4	—	—	87
G8KAX	—	—	40	10	20	3	10	3	86
G8RZP	—	—	43	9	29	4	—	—	85
G4ARI	18	2	54	10	—	—	—	—	84
G4DEZ	—	—	57	21	—	—	—	—	78
G4JZF	—	—	65	13	—	—	—	—	78
G8RZO	—	—	44	9	20	3	—	—	76
G8VFV	—	—	60	14	—	—	—	—	74
G4GXL	—	—	51	15	1	1	—	—	68
G8WRD	—	—	34	9	17	7	—	—	67
G8TIN	—	—	40	7	12	3	—	—	62
GW8TVX	—	—	46	14	—	—	—	—	60
G4HAO	—	—	48	10	—	—	—	—	58
GM3MHW	48	8	—	—	—	—	—	—	56
G8RWG	—	—	48	7	—	—	—	—	55
G8LXY	—	—	25	5	18	5	—	—	53
G8SKG	—	—	39	10	2	1	—	—	52
G8TRW	—	—	43	9	—	—	—	—	52
G8XTJ	—	—	44	8	—	—	—	—	52
G8RMA	—	—	29	11	5	4	—	—	49
G3LDY	—	—	32	9	2	1	—	—	44
G6ABB	—	—	32	6	—	—	—	—	38
GM4COK	—	—	21	12	—	—	—	—	33
GM4ELV	—	—	10	3	—	—	—	—	13

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

recognized as a separate country and not counted as just another Swiss station.

G2DHV is back on 2m. with 25w. of CW to a 5-ele. *Yagi* at 20ft. We also welcome another new correspondent, Adrian Chamberlain, G6ADC, from Coventry, who was licensed on Feb. 9 last and whose station consists of a *Yaesu* FT-225RD, 100w. *SOTA* amplifier, the aerials being a 7-ele. *Cushcraft* and *GPV-5* vertical. He enters the annual table with a very respectable score. In spite of a 200ft hill only 200 yards away, G3PBV writes that he has never heard F1DYD and F1JG so strongly as during the June 13/14 lift. Dave's contacts included F3VG/P (DF); EA1XH (YD); EA1TH (YC); EB1AK (VD) and OE9GWI/9 and 'PMJ/9 (EH). On June 6 some ONs and PAs and DC6TY in Cologne were heard and EI3VDE in VL42a (Co. Cork) worked. The following evening, during the monthly, Danish contest on 2m., OZ5DD/LX/P (DK) was a welcome QSO. Just before reading the *GB2RS* news bulletin on the 21st., Dave at last worked EI9Q.

EI3VDE figures in the lists of G4GHA, G4IRX, G4MCU, G8HHI, G8RZO and G8RZP, and no doubt many others. G4FHO worked EA1QJ on June 13 and EA2SW (YD60c) on FM on the 14th. EA1TA (VD58b) was worked on 150 mW. SSB from an *Icom* IC2-E and 10-ele. crossed *Yagi* the same day, on FM. G4IGO worked French folk in BD, BF, CE, CF and CH, an HB in DH and an EA in YD on the 13th., with lots more heard. G4IRX went out portable on the 13/14th. and got DF1CF (FH23j) on CW, F6GLJ/P (BD43c) and F6FHP/P (AE21g) plus loads of ONs in their Field Day.

Graham Taylor, G4JZF, (Staffs.) also worked stations in lots of French Squares on June 13/14, and heard HB9 and 4U1ITU. EA1XH was called for 1½ hours without success. Jon Stow has swopped G8LFJ for G4MCU, having passed the Morse test at the beginning of June. In addition to several Fs in the June 13 lift, he worked LA6HL (CS) on the 21st. John and Jackie Brakespear, G8RZP and RZO, are now in their new Isle of Sheppey QTH (AL45f) and have been beavering away to get well into the annual table again. The new location is proving very fine for continental DX, it seems.

Kevin Piper, G8TGM, has done very well from Bognor Regis with EA, F, HB9 and OE Stations worked in the June 13/14 period, in 25 squares, including six new ones. Terry Hackwill, G8WRD, (Reading) did not have too much time to work a lot of DX, but has upped the power from 40 to 100 watts. New tropo. squares for Geoff Brown, GJ4ICD, were ED1EDC (WC13d) on June 11, and HB9POM (EGO8b) on the 14th., bringing the tally to 196. The first GJ/4U1 QSO was made on June 13. Mike Allmark reckons the southern stations were favoured in the

June13/14 affair though he did hear some very DX French and Swiss stations but not 4U1ITU and EA1XH.

Undoubtedly, *Sporadic E* propagation has provided the most spectacular activity on 2m. recently. Many reports have been gratefully received on the June 7 affair. 4U1ITU worked UR2AO (MT54h) at 1749 and UA3LBO (QO21h) at 1714. G3PBV called SP8AOV on CW for 20 mins. without success, then worked him at S9 on SSB with ease. UC2AAB was a colossal signal in Newton Abbot at 1915. Dave mentions low frequency *Doppler* shift on G stations likely due to back scatter.

G4IGO heard snatches from an LZ2 on CW at 1335, DF7RG (GI) at 1422, an OK in HK square at 1646 and, at 1727, UO5OGF (OG) for 20 secs. The band was open between 1737 and 1800 with UC2s AAB and ABT worked in NN18 and SPs heard, then again at odd times till 1915. G4IRX's successes were LZ2XU (MD44e) at 1402 and UB5BAE (MJ38a) at 1758. John Pilags, G8HHI, (Hants.) heard RB5EHT, UT5FT, SP8AOV and SP5EPT (KM) in this affair. G8TGM also heard SP8AOV around 1940 on SSB. Neil Clarke, G8VFV, (W. Yorks.) just got on in time to work SP9BGS (JK56e) at 1908 and G8VR worked his first Russians — UC2AAB and 'ACT, plus SP8AOV, but found QRM from strong locals pretty overpowering. GJ4ICD mentions SP7CNL (JL27e) for a new square on the 7th.

Ted Morton, G4CDC, (Humberside) worked YO6AFP (MG); SP9s in JK; RO5OAA (OH); UB5SBI (MI); UT5DL (LI); UO5LP (OG) and RB5JAX (QE38j) at 2,648 kms. Clive Penna, G3POI, (Kent) worked 20 stations, including AU3LBM in QP71f and his best DX was 2,462 kms. Roger Thorn, G3CHN, (Devon) also got the UA3, a couple of UC2s, YO7VJ at 1350; SP8AOV and UT5DL. The Nottingham University station, G3UNU, worked two LZs, six SPs and five Russians and between 1915 and 1925. Right at the end of the affair, G3IMV added RB5WLS (MJ): YO6AFP, UB5SBI and HG0DG (KH).

From Leeds, Mike Allmark was listening for MS signals on 144.2 MHz but tuning down to .190 heard OK3KVP in GI square at about 0930. At 1337 there was a pile-up on 144.3 MHz of PAs, underneath which was SV2JT (LA26c) at 2,347 kms. Best DX heard later was RB5JAX at 2,711 kms. RO5OAA " . . . was like a beacon throughout at 2,253 kms." At 1847, a check on Band III TV channel R7 — 183.25 MHz — revealed a Polish or Russian station!

There were more *E's* openings on June 9, 10 and 11. Jim Rabbitts, G8LFB, (London) worked YU2RGT (HF20c) at 1425, followed by YU4VYL (JE34j). Sheldon Hands, GW8ELR, (Dyfed) starting at 1420, worked 14 YUs and two OEs in HG, HH, IG, JF, KE and KF, squares, with more YUs at 1900. On the 11th, he contacted YU1OHK at 1825 and YU2CDF (JF) at 1901. G4GHA worked OE6IWG (HH47j) for a new square on the 9th. The day he worked 4X4IX, G3VYF also got UO5OGX (OH) on CW at 1622. At 1648 on June 9, G4IRX copied two calls from ZB2VHF on 144.145 MHz.

G4IGO caught a 20 min. opening on June 9 at 1412 during which Ken got 10 YUs and OE6TGD in KE, JE, JF, IF, IG and HH square. On the 10th. at 1553, an I7 was heard for 15 secs. and the following day, another four YUs were worked in IG, JE and KE between 1818 and 1824. A couple more YUs were heard that evening at 1901. G8TGM caught YU1AWW (KE13j) at 1903 on June 11 which pleased his wife who comes from YU1.

GJ4ICD on June 9 worked 16 HGs, 13 OEs and 11 OKs in a hectic 25 mins. from 1408, followed by 8 9H's, 4 IT9s and IS0 between 1628 and 1716. On the 11th., OK8BAA (JJ13b) and UB5DAA (LI22f) gave another two squares for Geoff. Mike Allmark heard YU2RYX, 14PWL (FE60f) and YU3TTL (HG74f) at 1430 on the 9th.

Too late for written reports came the wonderful opening to CT and EA and North Africa on July 10. There was a brief event to HG and OK at 1316 but the main affair from about 1530 brought scores of EA and CT stations, the like of which has never been heard before. The FM part of the band was awash with EAs and Bryn Llewellyn, G4DEZ, worked over two dozen on this mode. "Star turns" were EA9HW, ZB2BL in Gibraltar and CN8BA in Casablanca, with EA8XS in the third phase at around 1945. Salvador was S9 at your scribe's QTH and went on to work G3XDY (Ipswich) and G8VLL in Norwich, a QRB of 3,062 kms. His locator is SO73d and QTH is P.O. Box 860 in Las Palmas, Canary Islands. EA3TR was coming in *via E's* at the same time so this looks like a double hop phenomenon. He was on the calling frequency on SSB and there was bedlam on the band. If only operators would spread out a little more. . . .

Seventy Centimetres

EA1QJ contacted G8ORP at 0806 and GJ4ICD at 0816 on June 14 using 10w. to a 21-ele. *Yagi*. G8ORP is Julian Blythe, the son of G4HFO, who worked Jesus the previous day at 0830. G4HFO also worked F0DZP/P (G8FRB on holiday) in AJ12b; F1SA (CI15c); EA1XH (YD41b) and HB9MIN/P (DH66c) who was only using 2w. of SSB. EA1TA (VD58b) was contacted on FM.

G3PBV has been trying out a 23-ele. *Yagi* to the DL6WU design, from *muTek* and finds it has plenty of gain and a clean polar diagram. On June 13, Dave worked F1AGO (AG); F6CWO (AF) and F1CXR/P (CF). During VHF NFD, he concentrated on 70cm. but found conditions poor with lots of QRM and splatter. NFD yielded new squares YK and YO for G4MCU. G6ADC is on the band with an *FT-225RD, Microwave Modules* transverter, 45w. *Ampere* amplifier and 48-ele. *Multibeam*.

Ray Cox, G8FMK, (Oxon.) worked G8PWX (Tyne & Wear) on June 21, and GU8FBO and GW4LXO (S. Glam.) on the 23rd. G8RZO and 'RZP have 300w. of SSB on the band from Sheppey and are looking for contacts. Telephone no. is Minster 872277. GJ4ICD is claiming the first Italian contact from Jersey made with IW1AHH (DF15c) on June 13. Geoff is now up to 94 squares on the band. He reports that CT1WW (WB63b) has worked EA8 on the band.

Gigahertz Bands

Angus McKenzie, G3OSS, (London) spent much time on 23cm. in VHF NFD and reckons some 125-150 stations were on. He found conditions good east/west and to the southwest on the night of the 4th. of July, and fairly good to very good to the north without ducting. He worked about 52 stations including G3SPJ/P (Durham); G8SFI (N. Yorks.); G8PUB/P (Devon); GW4CBW/P (Clwyd); GW3NZS/P (Powys) etc. There were some very bad signals with funny audio and "bubbling noises". Angus is now up to 40 counties on the band.

G3PBV has had a frustrating time getting parts for an SSB transverter but has, at long last, got an *SSB Electronics* kit from *Piper Communications* so Dave should be on 23cm. with at least 3w. by the time this appears. Richard Hope, GW8TVX, from Swansea is a new correspondent and friend of Roy Webb, GW3CBY. He too has just obtained all the "bits and pieces" for a 23cm. system and plans to install a *Microwave Modules* transverter atop his 60ft. *Versatower* and four 23-ele. *Tonna* aerials.

Little news of bands above 23cm. is ever received so it is good to hear from John Tye, G4BYV, (Norfolk). He made the first G to OK QSO on 13cm. with OK1KIR/P at a QRB of 866kms., just 3kms. less than his contact with SM6ESG. John now has 14 QTH squares on 2,304 MHz. and would like to hear from any Gs on the band. Simon Freeman, G3LQR, had a "first" with SM6ESG on 13cm., a QRB of 880 kms. He has 15 squares on the band, and five on 9cms. John reports that I3CLZ/3 has 13 squares on 10 GHz!

Deadlines

Quite an eventful month, once more. The deadline for next month is August 5 and for the following piece, Sept. 2 — very early. As usual, everything to: "VHF Bands", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK*.

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READERS

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For Sale: trio R-1000 communications receiver, little used, very good condition, £195. — Ring Daws, Farnborough 52928 (Kent).

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