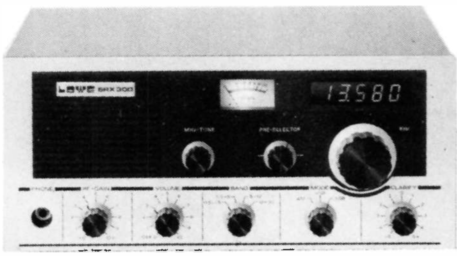
The SHORT WAVE Magazine

60p

VOL. XL FEBRUARY 1983 NUMBER 12

ok, it was always a good receiver, but now with FM the **SRX 30D**, todays rig, yesterdays price.



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

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

SRX 30D NOW WITH FM STILL £215.00, carr. £5.00

From Daiwa yet another aid to operating. In addition to the notch, SSB and CW filters, the AF606K is equipped with a PLL tone decoder; when the tone frequency of the CW signal and the free running frequency of the PLL tone decoder are the same a locked signal is generated. This locked signal keys an audio oscillator which then reproduces the received CW signal. However, there is a tremendous difference between the produced signal and the received one — no noise and, of course, no fading. **ANOTHER PIECE OF EQUIPMENT TO ENHANCE YOUR LISTENING.**

AF606K £56.50 inc. VAT, carr. £5.00

we now stock the **vibroplex** range of morse keys

THE VIBROPLEX IAMBIC — PRESENTATION £92.50 — DELUXE £62.18 — STANDARD £49.20, THE BRASS RACER EKI £99.00 THE BRASS RACER IAMBIC £66.50, THE PRESENTATION £99.50, THE ORIGINAL — DELUXE £66.50 — STANDARD £53.20, THE VIBRO-KEYER-DELUXE £62.18 — STANDARD £49.20 ALL INC. VAT CAR. £5.00

FOR THE ENTHUSIAST THESE PRODUCTS REQUIRE NO MORE DISCUSSION
FOR THE NOVICE "VIBROPLEX" IS NOT A MARITAL AID

Now from Daiwa, a new 2 metre monitor receiver. Using PLL synthesized circuitry, the SR1000E covers the entire amateur band in 5 KHz steps. It provides for today's amateur a small convenient means of monitoring activity on the busy 2 metre band. Compact and supplied with earphone, mounting bracket, the SR1000 provides for you mobile or fixed your contact with the 2 metre band.

SR 1000 E £72.50 inc. VAT, carr. £2.25

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

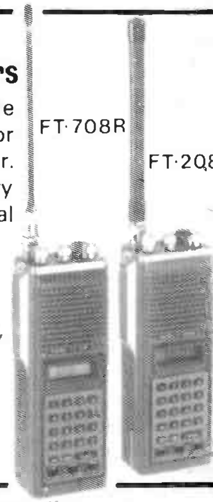
FT-290R 0.5 low/2.5 high watts out

FT-790R 0.2 low/1.0 high watts out (incorporates speech compressor).

FT-708R and FT-208R Synthesized UHF/VHF transceivers

The FT-708R and FT-208R provide new dimensions in operating flexibility for the discerning 70cm and 2m operator. LCD display, 10 memories, memory and bandscan, priority function, internal battery back-up. RF output FT-708R, 200mW low, 1 watt high, FT-208R, 300mW low, 2·5 watts high.

NC8 Charger DC PSU



FT·708R

FT·208R

FT-230R/730R 2m & 70cm FM mobiles

- Two independent VFO's
- 10 memories
- Priority function
- Memory and band scan
- 12.5/25KHz steps (25/100KHz FT-730R)
- Large LCD readout.

FRG-7700 High performance communications receiver

YAESU's top of the range receiver. All-mode capability, USB, LSB, CW, AM *and* FM 12 memory channels with back-up. Digital quartz clock feature with timer. Pictured here with matching FRT-7700 Antenna tuner and FRV-7700 VHF converter.

FT-480R/ 780R 2m & 70cm mobiles

The most advanced 2 metre and 70 cm mobiles available today — USB, LSB, FM, CW full scanning with priority channel, 4 memory channel, dual synthesized VFO system.

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East Anglia - Amateur Electronics UK, East Anglia, Dr. T. Thirst (TIM) G4CTT, Norwich 0603 667189

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The FT726R is a revolutionary combination of a full feature VHF/UHF transceiver with the deluxe facilities (which you have always wondered why were only available on HF transceivers) such as IF shift and variable bandwidth for SSB and CW operations incorporated, plus a full duplex option for the ultimate cross band and satellite transceiver!

The transceiver main frame accepts 3 modules, 2 metres (standard), 430-440MHz and six metres (options). Modes catered for are SSB-CW-FM with optimum provisions made for each: 20Hz steps for SSB/CW, selectable steps for FM (also preset and programmable repeater splits), plus a A & B VFO system with no less than 10 memory channels.

Surely the development of the decade in VHF/UHF transceiver technology.

FT726R(2)	Transceiver incorporating 145MHz	£649.00
SAT 726	Full duplex cross band unit	£82.80
430T726	430-440MHz Module	£208.90
50T726	Six metre module	£157.15

12 MEMORY RECEIVER:— FRG7700M; £399 inc. VAT @ 15% & SECURICOR

- ★ 30MHz down to 150kHz (and below).
- ★ 12 Channel memory option with fine tune.
- ★ SSB (LSB/USB), CW, AM, FM.
- ★ 2.7kHz, 6kHz, 12kHz, 15kHz, @ — 6dB.
- ★ 3 Selectivities on AM, squelch on FM.
- ★ Up conversion, 48MHz first IF.
- ★ 1kHz digital, plus analogue, display.
- ★ Inbuilt quartz clock/timer.
- ★ No preselector, auto selected LPF's.
- ★ Advanced noise blanker fitted.
- ★ Antenna 500Ω to 1.5MHz, 50Ω to 30MHz.
- ★ 20dB pad plus continuous attenuator.
- ★ Switchable A.G.C. Variable tone.

'7700 THE ONE WITH FM!
Non memory version £335

- ★ 110 and 240V ac, 12Vdc option.
- ★ Signal meter calibrated in "S" and SIMPO
- ★ Acc; Tuners, Converters, LPF, Memory.

FRT7700; 150kHz-30MHz, Switch, etc.
FRV7700A; 118-130, 130-140, 140-150MHz.
FRV7700B; 118-130, 140-150, 50-59MHz.
FRV7700C; 140-150, 150-160, 160-170MHz.
FRV7700D; 118-130, 140-150, 70-80MHz.
FRV7700E 118-130, 140-150, 150-160MHz.
FRV7700F 118-130, 150-160, 170-180MHz.
FF5; 500kHz (for improved VLF reception).
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FRA7700; Active Antenna.

FT707 £509 inc. VAT @ 15% & SECURICOR

SMC FM VERSION AVAILABLE

- ★ 80-10 metres (including 10, 18 and 24MHz bands).
- ★ USB-LSB-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*
- ★ AGC; slow-fast switchable VOX built-in.
- ★ Semi-break in with side tone for excellent CW.
- ★ Digital (100Hz) plus analogue frequency display.
- ★ LED Level meter reads: S, PO and ALC.
- ★ Indicators for: calibrator, fix, int/ext VFO.
- ★ Receiver offset tuning (RIT-clarifier) control.
- ★ Advanced noise blanker with local loop AGC. *Option

KDK 2030 £199 inc. VAT @ 15% & SECURICOR

- ★ 2M. 12 VDC compact 2 3/16" x 6 3/8" x 7 3/16".
- ★ 25W (+ adjustable low power), 12½kHz steps.
- ★ 10 "year long" memories for "crystal control".
- ★ Display reads to 100's of Hz *or* channel number.
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- ★ Single knob frequency selection. 20 steps rev.
- ★ Rapid QSY button, end to end in a single turn.
- ★ Digital RIT 1kHz steps, adjusted from main tuning.
- ★ 2, 5 slot memories, simplex, cross or 600kHz split.
- ★ Memories entered by pushing main tuning knob.
- ★ + 600kHz split. Instant repeater input monitor.
- ★ Band scan between front panel selectable, limits.
- ★ Scan stop requires squelch open *and* centre zero.
- ★ Scanning and up/down tuning on the microphones.
- ★ Reprogrammable; steps, tone, splits, and coverage.
- ★ C/W mic. "Easy out" mobile mount and handbook.

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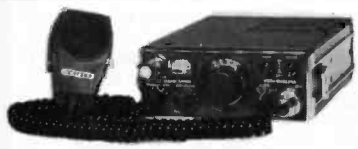
TR7730 the new compact 2m Transceiver £268.87



TR2300

TR2300 2m Synthesised Portable Transceiver. We have lost count of the number of this model we have sold over the last 12 months. Hikers, campers, climbers, you can hear them all over the country and reliability which is the essence of TRIO equipment. £144.44

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C8/70cm. Colinear	£62.10
D15/1296 23cm. Antenna	£
8 element 2m quad	£44.85

J.R.C. NRD515D

General coverage receiver 100 KHz to 30 MHz fully synthesised. Digital readout PLL synthesiser with rotary type encoder pass band tuning — modular construction. £985.00

NEW 24 CHANNEL MEMORY UNIT.

NSD515 TRANSMITTER + NBD515 power supply

100 Watts output. USB/LSB-CW-RTTY. Mic impedence 600 ohm — Antenna impedence 50 ohm.
From the same Company, Japan Radio Company, comes the new JST-100 Digitally-synthesised HF Transceiver. All amateur Bands 160 through to 10M. 100 watts output AM-USB/LSB-CW-RTTY. Three phase locked loop circuits including BFO circuit are phase locked with stable 10MHz standard crystal oscillator, ensuring superior frequency stability and accuracy.

J.R.C. JST100

New digitally-synthesised, microcomputer-based transceiver. 11 channel memory — two digital VFO's. 100 watt PEP. CW — SSB — AM — RTTY — passband tuning — notch filter.

The TS930S latest transceiver from Trio **Price: £1154.00 inc. VAT.**

TRIO

TS830S HF Transceiver	£678.00
AT230 All band Antenna Tuner/SWR	£129.00
SP230 Speaker	£39.00
DFC230 Digital remote control	£170.86
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TS130V Solid State HF Transceiver	£433.32
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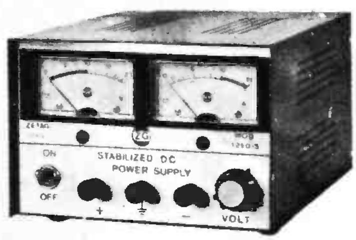

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FDK 750E Transceiver	£299.00
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DL600 Dummy Load	£29.50
SR1000 2m Receiver	£72.50

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TR5 Transceiver & AC PSU	£740.00
MN75 200 Watt ATU	£189.00

TS830S HF SSB TRANSCEIVER £678.00

The new TS830S, the latest from TRIO. A high performance, very affordable HF SSB/CW transceiver with every conceivable operating feature built in for 160 through 10 metres (including the new three bands). The TS830S combines a high dynamic range with variable bandwidth tuning (VBT), IF shift and an IF notch filter, as well as very sharp filters in the 455 KHz second IF. Together with the optional VFO230 (remote digital display VFO) which provides split frequency operation and 5 memories for frequency hold, the amateur has available today's advanced technology linked to the proven reliability and exceptional linearity of a valve PA.

- ★ **VBT variable bandwidth tuning**
- ★ **IF notch filter**
- ★ **IF Shift**
- ★ **Various filter options**
- ★ **Built in digital display**
- ★ **6146B final with RF negative feed-back**
- ★ **Optional Digital VFO for increased flexibility**
- ★ **Innovative PLL system of frequency generation**
- ★ **RF speech processor**
- ★ **Adjustable noise blanker level**
- ★ **Adjustable audio tone**
- ★ **RF attenuator**
- ★ **RIT/XIT**
- ★ **SSB monitor circuit**
- ★ **Expanded frequency coverage**

SHORT WAVE MAGAZINE

(GB3SWM)

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Editor: **PAUL ESSERY, G3KFE/G3SWM**
Advertising: **Charles Forsyth**

Published at 34 High Street, Welwyn, Herts. AL6 9EQ, on the last Friday of the month, dated the month following. *Telephone: 04-3871 5206 & 5207*

Annual Subscription: *Home: £9.00, 12 issues, post paid*
Overseas: £9.00 (£17.00 U.S.), post paid surface mail

Editorial Address: **Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ, England.**

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- ★ TWO VIDEO INPUTS
- ★ AERIAL CHANGEOVER FOR RX CONVERTER
- ★ TWO CHANNEL USING PLUG-IN CRYSTALS

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Full transmit/receive switching is included together with an internal wave form test generator. The unit is housed in a highly durable black diecast case and all circuitry is constructed on high quality glass-fibre printed circuit board. The two stage linear amplifier is housed in a separate internal compartment, thus ensuring excellent stability.

£149 inc. VAT (p&p £2.50)

MM4001KB

RTTY TRANSCEIVER Supplied with RCA keyboard

FEATURES:
- ★ COMPLETE TRANSCEIVE DATA COMMUNICATION SYSTEM USING THE LATEST STATE OF THE ART MICROPROCESSOR
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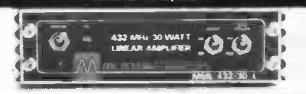

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- ★ Large 20A current meter
- ★ 15A output terminals
- ★ LED shut down indicator
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- ★ 13.8V, 25A continuous output
- ★ 30A maximum output current
- ★ Large 30A current meter
- ★ 30A output terminals
- ★ LED shut down indicator
- ★ fully protected

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- ★ 13.8V, 40A continuous output
- ★ 50A maximum output current
- ★ Large 50A current meter
- ★ Large output voltmeter
- ★ LED shut down indicator
- ★ LED out of regulation indicator
- ★ Output sensing terminals
- ★ fully protected

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PT. No.	TYPE	PRICE
	Plugs	
BU 01	PL259 for O 0.4" cable (UR67)	0.47
BU 01A	Reducer for O 0.2" cable	0.12
BU 01B	Reducer for O 0.25" cable	0.12
BU 02	as BU 01 but with metric thread	0.56
BU 03	PL259 for O 0.2" cable	0.56
BU 04	PL259 push on connector	0.81
BU 05	PL259 elbow plug for O 0.2" cable	0.78
	Sockets	
BU 11	SO259 square flange	0.40
BU 12	SO259 single hole, inside nut	0.47
BU 13	SO259 single hole, outside nut	0.47
	Couplers	
BU 21	back to back female	0.57
BU 22	back to back male	0.79
BU 23	male to female elbow	1.13
BU 24	1 male, 2 female 'T'	1.35
BU 25	3 female 'T'	1.46
BU 26	female to female lightning arrestor	1.22
	Adaptors	
BU 31	UHF plug to BNC plug	1.75
BU 32	UHF plug to BNC socket	1.15
BU 33	UHF socket to BNC plug	1.49
BU 34	UHF socket to BNC socket	1.64
BU 36	UHF plug to N socket	2.90
BU 37	UHF socket to N plug	2.90
BU 39	UHF socket to phono/car aerial socket	0.52
	DUMMY LOAD	
BL 01	PL259 connector, 50 ohm impedance 30W max, 15W continuous rating, DC-150 MHz, VSWR less than 1.2:1	6.78

PREAMP TRANSISTORS

3SK88	145MHz, 26dB gain, 1.1dB NF	£1.05
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BFR91	432MHz, 18dB gain, 1.9dB NF	£1.50

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

Licensing

Good news from the Home Office is that the issue and conversion of licences is now, at last, completely up to date. We hope that the situation which pertained recently of some people having to wait months for their licence to be issued can be avoided in the future.

While we realise, naturally, that the flood of new licence applications must have presented considerable problems to the Licensing Branch — only organised to cope with the average number of applications of previous years — it does appear that Home Office reaction time to the problem was very slow indeed.

Still with licensing, the Home Office has announced amended application requirements. Essentially it is a streamlining (and, with luck, a speeding-up) of the system; for example, instead of having to produce a birth certificate you will only be required to state your age on the application form. A more important change, perhaps, is the abolition of Class-C and D licences (*i.e.* reciprocal, G5 + 3 calls): overseas applicants will be issued with their own G4 or G6 callsigns, included in the normal Class-A or B licence streams. In other words, the British nationality requirement is being dropped — which is a very good idea. Not having to produce birth certificates or passports at the 'consumer end' will certainly save trouble, if nothing else.

Don't forget that the closing date for entries for the May R.A.E. is 15th February. Late entries can be arranged (though not necessarily in all cases), but at an increased fee. Better check with your local examination centre now.

Thanks to all those who wrote in response to "Your Assistance, Please" (this page, November 1982 issue). Some of the pearls will be appearing in print shortly!

Austin Forsyth
G3KFE.

VHF BANDS

NORMAN FITCH, G3FPK

The 1982 Tables

EACH year, the regular participants in the Annual Table seem to do even better. This is probably due to improved equipment as much as to better conditions, and perhaps better awareness of the possibilities of periods of anomalous propagation. Another important factor is the undoubted increase in overall activity, particularly on 70cm.

In the Four Band Table, the first three places are the same as last year, 1981. Syd Harden, G2AXI, with 231 points, was followed by Bill Hodgson, G3BW, with 206, just three ahead of Arthur Breese, GD2HDZ. Dave Sellars, G3PBV, who was tenth in 1981, was fourth in 1982, due to more 4m. success and it was by far his best effort.

G2AXI's 63 points gained Syd top spot on 4m. with GD2HDZ just two points behind. G3BW, with 51 pts., was third. On 2m. eight readers made the magic "ton", compared with only three in 1981. Bryn Llewellyn's, G4DEZ, performance was quite outstanding and his total of 120 pts. is a real challenge; to work 41 countries in one year on VHF is a fine achievement. Walt Davidson, GW3NYY, was second with 108 pts. and it is nice to see Mick Cuckoo, G6ECM, in third spot with 105 pts. In 1982, 21 readers worked 20 or more countries compared with 13 in the previous year.

On 70cm., Chris Easton, G8TFI, was the comfortable leader with 84 pts. and 21 countries in the year. Graham Taylor, G4JZF, was second with 75 pts. and third spot went to G2AXI with 71 pts. Of the 32 entrants, 14 got to double figures in the countries column compared with 9 the previous year. On 23cm. top honour goes to Pam Rose, G8VRJ, whose 25 points beat G3PBV by five. Russ Clarke, GWRCCF, was third with 17 pts.

The first 1983 listings will start next issue, retaining the four band format. The countries are the 78 *administrative* ones in G, GD, GI, GJ, GM, GU and GW, plus the 26 in the Irish Republic. The countries are the *DXCC* ones plus IT9 (Sicily) and GM (Shetlands). There is no requirement that detailed lists of counties and countries worked have to be submitted. As with the Squares Table, QSOs *via* repeaters and artificial satellites are not recognised, but *E-M-E* contacts can be counted for points.

VHF Convention

The venue for the *RSGB's* 1983 VHF Convention is Sandown Park Racecourse, in Esher, Surrey, as in the past two years. The date is March 26 and doors will open at 1030. Generally the format will follow the successful pattern of previous years comprising a large trade show all day and three lecture streams in the afternoon, rounding off with an informal Social Evening in the *Cavalry Room*. The Society has taken up the suggestion made in this feature last May that an equipment test facility be provided and more details will be published next month.

The three lecture streams are:— "A" — The GB3SS SSB repeater, RF radiation hazards, and the VHF Committee forum. "B" — Field Aligned Scatter Propagation (F8SH), Phase 3B satellite, and Computers for the VHF amateur. The "C" stream is the microwave one and will cover Introduction to Microwaves, the new microwave bands and "back yard" microwave *E-M-E*.

Tickets in advance can be obtained from Mr. B. Rider, G4FLQ, of the *RSGB* Membership Services Section at Alma Houses, Cranborne Road, Potters Bar, Herts., EN6 3JN. Convention and Exhibition only is £1.00 (75p for under-18s), for the whole affair including buffet supper the cost is £8.50 and for the evening only, it is £8.00. All enquiries about the exhibition should be addressed to Norman Miller, G3MVV, at Avon, Gardiners Lane, Crays Hill, Billericay, Essex.

Awards Notes

Dave Sellars, G3PBV, from Newton Abbot in Devon, was the recipient of VHF Century Club Certificate No. 33 for 70cm., issued on December 20, 1982. He first came on the band from Northampton in Sept. 1965 and, ". . . ended up using a 3CX100A5 tripler driven by a QQV06-40A — a fearsome beast producing a good 10 watts of NBFM or CW. The antenna was a 14-ele. *Jaybeam*". Dave returned to the band from the present QTH in Nov. 1970 with 3w. of NBFM and CW and 10-ele. *Jaybeam* and made some reasonable contacts. Best DX heard was OE2OML in GH square. SSB operation started in Aug. 1979 with a *Microwave Modules* transverter into two 10-ele. *Jaybeams*. Later the power was increased to 50w. and in June, 1981, a 23-ele. *H.A.G.* aerial was erected.

The site is 620ft. *a.s.l.* but poor to the west and extreme north. One GM in XO has been heard, one EI worked, but neither GD nor GI heard. Country tally is 14 worked plus LX and OE heard and Dave's best DX is OK2BFH/P (JJ) at 1,572 kms. Future plans include increasing the power to the legal limit and improving the receiving performance.

Beacon News

The Anglesey 6m. beacon GB3SIX, has been on continous 24-hour service since Dec. 28 last and reception reports should go to John Wilson, G3UUT (*QTHR*). On 70cm. French beacon FX3UHF (ZH53a) is reported by G3PBV and G8TFI on 432.950 MHz. On 23cm., G3PBV copied the Belgian beacon ON5SHF (BK39j) on New Year's Eve. Dave did not mention the frequency which should be 1,296.880 MHz.

Contests

The 432 MHz Fixed Contest is scheduled for Feb. 6 from 1000 to 1500 and is a two section event for either single or multi-operator stations, The weekend of Mar. 5/6 sees the 144/432 MHz affair starting at 1400 and lasting 24 hours. This one is a two class event, either fixed station or all other.

The Satellite Scene

The Soviet satellite *ISKRA 3* "died" well before the January issue of the *Magazine* appeared. It was switched to transponder mode for a few short periods before Christmas but indications are that it burned up on re-entry on Dec. 22. According to Pat Gowen, G3IOR, the

TWO METRES ANNUAL TABLE

Final Placings at December 31, 1982

Station	Counties	Countries	Total
G4DEZ	79	41	120
GW3NYY	81	27	108
G6ECM	80	25	105
G4JZF	82	22	104
G8RZO	77	25	102
G8RZP	77	25	102
G3FPK	76	25	101
G8VR	62	38	100
GM8OEG	74	25	99
G8TFI	79	20	99
G2AXI	73	24	97
G4ARI	73	24	97
G3BW	75	22	97
G8LFB	72	24	96
G3PBV	67	23	90
G6DER	72	18	90
G6ADH	65	21	86
G8HHI	67	19	86
G6FSH	71	15	86
G8VFV	66	18	84
GD2HDZ	68	16	84
G4MEJ	59	24	83
G8ULU	61	22	83
G6ADE	65	16	81
G4ROA	67	14	81
GW3CCF	62	12	74
G4MUT	53	20	73
GM4CXP	51	21	72
G3FIJ	54	18	72
G4KLX	53	18	71
G8RWG	54	12	66
G6CGY	51	14	65
G8XTJ	52	11	63
G6AJA	49	13	62
G8VRJ	46	15	61
G8KAX	49	12	61
GW3CBY	44	15	59
G8WUU	41	15	56
G4NBS	44	9	53
G4NRG	37	15	52
GW8TVX	39	11	50
GM4COK	28	20	48
G6HDD	40	7	47
G8ZYL	35	8	43
G8XHL	30	9	39
G8LXY	30	7	37
G4FKI	23	10	33
GW4HBK	14	5	19

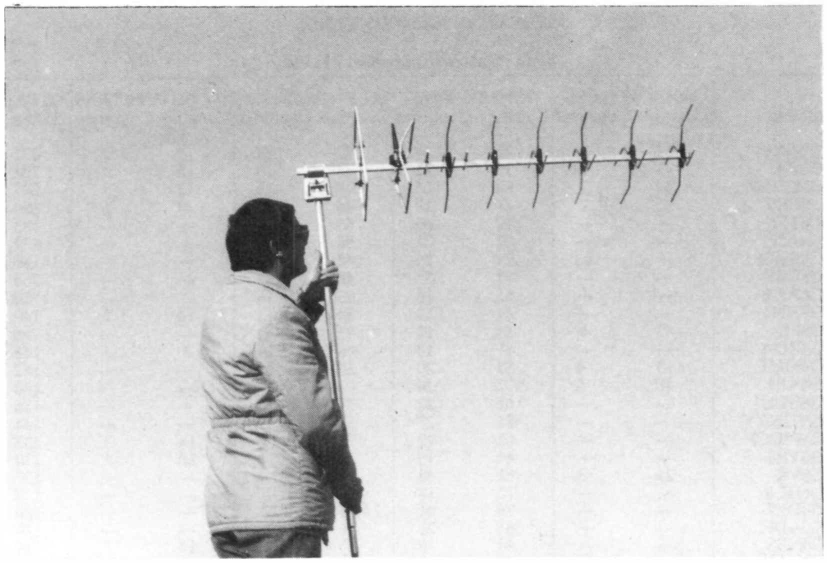
somewhat unsuccessful *RS-1* and *RS-2* satellites which were launched on Oct. 26, 1978, may still be heard occasionally. Telemetry from either has been copied and some transponding has been heard.

A Soviet vessel has been sent to the Antarctic to exchange personnel at the several Russian bases. The new people include several radio amateurs and Leonid Labutin, UA3CR, went with them to oversee the setting up of equipment suitable for operating through the present *RS* satellites. It seems that *RS-5* is being used to accept messages from the various 4K1 base stations, these messages then being retrieved when *RS-5* is over the U.S.S.R. A request has been made that *RS-5* not be used generally for the time being. A number of satellite buffs have reported difficulty in accessing *RS-6* lately, but there are no problems with *RS-7* and *RS-8*. It is worth repeating that 100 watts effective radiated power from the aerial is quite sufficient for *any* presently orbiting satellite, *i.e.* 100w. to an omni-directional radiator or 10w. to a 10 dB. gain aerial. At close range, particularly when activity is low, far less power is necessary. Mondays are QRP days. — 10w. *e.r.p.* maximum — and Wednesdays are "no go" days unless you are participating in prior-booked experiments.

The January 5 recorded status report on *UOSAT* from The University of Surrey mentioned boom deployment "shortly". No later information is to hand and anyone interested can telephone Guildford. (0483) 61202 for the latest information including current orbital predictions.

Concerning the *Phase 3B* satellite, a letter from Jan King, W3GEY, has now been received containing the long-awaited information about the *L-transponder*. The power output at 436 MHz is now 40-50w. *p.e.p.* at 30% efficiency with third order intermodulation products some 35 dB down. The 1,269 MHz receiving aerial is a four-turn *helix* with a gain of approximately 11 dBi. There is an omni-directional, crossed turnstile emergency aerial with a "gain" of zero to —10 dBi, depending upon direction. The 436 MHz Tx — and Rx — aerial is a three-dipole array giving a gain of 9.5 dBi and there is also a sleeved dipole, 0 dBi, with a very uniform pattern. *AMSAT* is suggesting the 24cm. uplink requires 28.8 dBW *e.i.r.p.* and, with a 70cm. aerial of 13 dBi or more gain, the user signal-to-noise ratio should be 17 dB. The *noise figure* of the 24-cm. Rx is 3dB or better in an assumed bandwidth of 2.4 kHz.

The *U-transponder* should require an uplink capability of 21.5 dBW on 70cm. The satellite's Rx *n.f.* is 5 dB. or better and, with a station 2m. aerial of 10 dBi. gain, a 20 dB. S/N user ratio is suggested. All user aerials must be of right-hand circular polarisation by *I.E.E.E.* definition. Jan describes the 2m. Tx aerial as, "a funny 3-way *Yagi* arrangement", developed by experiment and which has a gain of 7.0 dBi. There is also a quarter-wave, linear monopole. The high gain 2m. aerial can be expected to introduce as much as 6dB of spin modulation on the downlink at times.



This picture, received recently from *Jaybeam Ltd.*, shows their back-mounted Type MBM28 antenna for the 70cm. band orientated horizontally for operation in the lower, or "DX", end where its total of 28 elements is claimed to give considerable signal enhancement. For the FM simplex and repeater segment of Seventy above 433 MHz the unit should be vertically orientated; in this plane the back-mounted design is especially valuable by reducing the effect of local obstacles, which in man-made environments are predominantly vertical in character.

The —105 dBm AGC threshold represents the composite signal level input to the transponder at which the AGC activates. Above this level, the gain of the satellite's Rx is reduced to eliminate distortion due to power amplifier overload. With no signals present, the system noise output is 13 dB below full output.

To translate some of the above into practical terms, your 1,269 MHz transmitting set-up could be a 20w RF signal into a 12-turn *helix* made from 3 to 5mm. rod with an overall diameter of 7½cm. and a winding pitch of 5.2cm. The reflector diameter would be 18.9cm. so it would make a compact system. Brief information on *helical* aerials can be found in the RSGB's *VHF-UHF Manual*.

AMSAT-UK's Annual General Meeting is on April 9 at London House, Mecklenburgh Square, off Guildford Street, London, W.C.1 at 1300. Lunch can be bought in London House from midday at a sensible cost.

Moonbounce

As operators improve their station equipment, many more folk are getting interested in *E-M-E* communication. To make such contacts on 2m. is a formidable challenge since, although path losses are less than they are on higher frequencies, the physical size of the aerial system required can be somewhat daunting. Of course, you can let the "big gun" at the other end do much of the work for you. The philosophy of Dave Olean, K1WHS, is to run very high power into a huge aerial array so that stations running about 300w. to a single, long *Yagi* may be able to work him on 2m.

Fortunately the Moon's orbit is not circular, its *perigee* being 362,000 kms. and its *apogee*, 406,400 kms. and this equates to a difference of 2 dB in the path loss, a considerable amount when dealing with marginal reception. The weekend of Jan. 1/2 was a *perigee* period and

70 CENTIMETRES ANNUAL TABLE

Final Placings at December 31, 1982

Station	Counties	Countries	Total
G8TFI	63	21	84
G4JZF	58	17	75
G2AXI	52	19	71
G6ADE	53	16	69
G8RZO	48	16	64
G8RZP	48	16	64
G4ROA	46	14	60
G3PBV	44	14	58
GD2HDZ	45	13	58
G3BW	48	10	58
G8ULU	37	16	53
G4NBS	45	8	53
G4MUT	38	12	50
G8HHI	34	13	47
G8VRJ	33	11	44
GW3CCF	35	7	42
G4BVY	29	11	40
G8KAX	28	9	37
G6ADH	26	7	33
G6DER	26	6	32
G3FIJ	25	3	28
GW3NYY	19	7	26
G8WUU	18	6	24
G4NRG	12	6	18
G8LXY	16	2	18
GW3CBY	13	2	15
G8XHL	11	3	14
GM4COK	5	6	11
G4FKI	9	1	10
GM4CXP	6	3	9
G6CGY	4	2	6
G4KLX	3	1	4

ANNUAL VHF/UHF TABLE

Final Placings at December 31, 1982

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	23 CENTIMETRES Counties	23 CENTIMETRES Countries	TOTAL Points
G2AXI	56	7	73	24	52	19	*13*	*2*	231
G3BW	45	6	75	22	48	10	*6*	*4*	206
GD2HDZ	54	7	68	16	45	13	*3*	*3*	203
G3PBV	35	7	67	23	44	14	*14*	*6*	190
G8TFI	—	—	79	20	63	21	—	—	183
G4JZF	—	—	82	22	58	17	—	—	179
G8RZO	—	—	77	25	48	16	—	—	166
G8RZP	—	—	77	25	48	16	—	—	166
G6ADE	—	—	65	16	53	16	—	—	150
G8HHI	—	—	67	19	34	13	14	2	149
G3FIJ	42	4	54	18	25	3	—	—	146
G4ROA	—	—	67	14	46	14	3	1	145
G4MUT	15	4	53	20	38	12	—	—	142
G4ARI	40	5	73	24	—	—	—	—	142
G8ULU	—	—	61	22	37	16	—	—	136
GW3NYY	—	—	81	27	19	7	—	—	134
GW3CCF	—	—	62	12	35	7	14	3	133
G8VRJ	—	—	46	15	33	11	20	5	130
G8VR	24	3	62	38	—	—	—	—	127
G6DER	—	—	72	18	26	6	—	—	122
G4DEZ	—	—	79	41	—	—	—	—	120
G6ADH	—	—	65	21	26	7	—	—	119
G4NBS	—	—	44	9	45	8	11	1	118
G8KAX	—	—	49	12	28	9	11	4	113
G6ECM	—	—	80	25	—	—	—	—	105
G3FPK	—	—	76	25	—	—	—	—	101
GM8OEG	—	—	74	25	—	—	—	—	99
G8LFB	—	—	72	24	—	—	—	—	96
GM4CXP	8	3	51	21	6	3	—	—	92
GW3CBY	12	4	44	15	13	2	*4*	*3*	90
G6FSH	—	—	71	15	—	—	—	—	86
G8VFV	—	—	66	18	—	—	—	—	84
G4MEJ	—	—	59	24	—	—	—	—	83
G8WUU	—	—	41	15	18	6	—	—	80
G4KLX	—	—	53	18	3	1	—	—	75
G4NRG	1	1	37	15	12	6	—	—	72
G6CGY	—	—	51	14	4	2	—	—	71
G4FKI	21	2	23	10	9	1	—	—	66
G8RWG	—	—	54	12	—	—	—	—	66
G8XTJ	—	—	52	11	—	—	—	—	63
G6AJA	—	—	49	13	—	—	—	—	62
GW4HBK	35	7	14	5	—	—	—	—	61
GM4COK	—	—	28	20	5	6	—	—	59
GW8TVX	—	—	39	11	—	—	6	3	59
G8LXY	—	—	30	7	16	2	—	—	55
G8XHL	—	—	30	9	11	3	—	—	53
G4BVY	9	2	—	—	29	11	—	—	51
G6HDD	—	—	40	7	—	—	—	—	47
G8ZYL	—	—	35	8	—	—	—	—	43

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

encouraged a lot of activity. For example, on the morning of the 2nd, Clive Penna, G3POI, worked WA2GSX, SM4GVF, WA8ZHE, WA3USC, W7IUV and KY4Z. At 2200 on the 2nd , Clive had a sked with RA3YCR but heard nothing from the Russian, even though he was receiving his own echoes well. G3POI has received a QSL card from KG6DX in Guam who received Clive's signals between 2200 and 2230 at RST 519. The KG6 uses four *Cushcraft* "Junior Boomer" aerials and a masthead preamplifier and appears to be active on *E-M-E*. G3POI is the second English station to complete a *Worked All Continents* on 2m., thanks to a QSO with YV5ZZ on Dec. 26. This brought Clive's country total to 59!

On Dec. 29, OZ4VV heard G3POI calling "CQ" at 3 dB above the noise. He called Clive using just 300w. and two 9-ele. *Tonna Yagis*, and was just about detectable. It is now relatively easy to install a masthead preamp. with a *noise figure* below 1 dB. A couple of correctly made *NBS* 12-ele. *Yagis* with 15ft. booms could give 15 dB of aerial gain over a dipole and such a system would enable many of the bigger *E-M-E* stations to be heard.

In the U.K., we are at some disadvantage with the normal power limit of a trivial 100w. at the aerial in A1A mode. Of course, higher power permits have been granted to a few amateurs specifically for *E-M-E* research, but it has been a tedious and lengthy process. Naturally there is the real risk of more potential interference to radio and TV receivers, so those who have to sort out these problems are understandably not over-enthusiastic about scores more people running a kilowatt. However, it has to be recognised that, licensed to do so or not, quite a few VHF/UHF operators are using far more power than 100w. The interference problem has been overdone, in your scribe's opinion, since usually one would elevate the aerial system for serious *E-M-E* work so that much less RF would be fired at surroundings TVs, etc., than by tropo. operators running 400w. *p.e.p.* of SSB. No doubt this topic will be aired at the forthcoming VHF Convention, during the *RSGB* VHF Committee forum.

José Mª Gené, EA3LL, sent a colour print of his *E-M-E* aerial array which comprises four, 21-ele. home made *Yagis*. He uses a *D432* preamp. with 0.6 dB *n.f.* and on the Tx side, runs a pair of 4CX250R valves at one kilowatt. The following stations have been worked:— On Oct. 10, 1982, WA8ONQ and WA1JXN/7; on Nov. 6, KB8RQ, K1WHS, SM7BAE, KR5F, WA1JXN/7 and W5UN, and on Nov. 7, DK4XI, YU3USB, F6BSJ, I2ODI, HB9SV, UA1ZCL and K1MNS.

As readers will know, the station 4U1ITU at the *I.T.U. Headquarters* in Geneva, has separate *DXCC* country status. Geoff Grayer, G3NAQ, operates this station quite often and writes that they now have four 19-ele. *Cushcraft* "Boomers" on 2m. Moonbounce QSOs have been made with SM7BAE, WA1JXN, W5UN, VE7BQH and KI7D, and signals have been identified from I2ODI and WA9KRT. Geoff would be glad to make *E-M-E* skeds for *perigee* weekends preferably in the "quiet" hours, say 2300 to 0800 GMT, when city noise is lowest, and when the Moon is at an elevation of 20° or more. The QTH is:— Dr. G. H. Grayer G3NAQ, c/o I.A.R.C., P.O. Box 9, CH-1211 Geneva 20, Switzerland. An *s.a.e.* with a U.K. first class stamp would be appreciated with the first letter.

Meteor Scatter

Staying with 4U1ITU, the station was active in the December *Geminids* shower with G3NAQ and Pierre Pasteur, HB9QQ, at the controls. They operated throughout the night of Dec. 13/14 and again on the evening of the 14th. They had problems, such as the aerial connector catching fire and a tape recorder malfunction. From 2100 on the 13th through 0800 on the 14th they completed QSOs with DK6AS, DL7YS, YU2EZA, HG1YA, SM5CMU and OZ1ASL. Skeds with OZ4VV, UK3AAC, ON6UG, were unsuccessful and no final R's were received from LZ1AB. On the 14th, from 1700 to 2400, G4IJE, UC2ACA and SM7BAE were worked. Nothing was heard from LA9BM, DF5HC and SM6EOC and only a few pings from G8OPR. 4U1ITU plans to be QRV in future major showers and skeds are sought. Two minute periods are preferred and CW speed should not exceed 700 *l.p.m.* with the present equipment.

John Hunter, G3IMV, added FC square *via* an SSB QSO with IW5AVM in the *Quadrantids*, to bring his 2m. total to 324. G3POI was on during the *Geminids* and completed with ZB2BL (XW) for country no. 58. Other completed skeds were LA6QBA (GV); LA1K (FW); OH1ZAA (KV) and OH7UE (OW), a new square. Because of the gales, Clive was not on for the *Quadrantids*.

Mark Turner, G4PCS, operated G3UNU, The University of Nottingham Radio Society's club station, during the *Geminids* and thinks the successful sked. on FM mode with F1JG (CD) could be a G-to-F "first"? In the period Dec. 11 to 14, he completed with OK3CPY (JI) and OH3MF (MU) on CW, while SSB yielded

I4MKN (GE); IW5ACZ (FD); I4YNO (FE) OH3TR (LV) and OK1FM (GJ). A test on SSB at 0150 on Dec. 14 with G8WPD over a 58 km. back scatter path went through in 12 mins. with the Derbyshire hills eliminating tropo. signals. Both aerials were pointing northeast for this test. Mark asks if this is the *shortest* ever MS contact?

Random operations saw nine QSOs for G3UNU with YU3ZV (HG?); YU7AJH (JF); YU7AR (KF) in 10 secs; I1ANP (EE); I4XCC (GD); YU3ES (GF); F1KFN (CF) and OE3OKS in 10 secs., all SSB. CW mode brought I1KTC (EF). Mark suggests this shower peaked between 0300 and 0800 on the 14th but that activity was down on some previous years.

Paul Turner, G4IJE, (Essex) got his 50th country — 4U1ITU — on Dec. 14 and also made on SSB QSO with EA7AG (YW18b). He reckons the shower to have been "par for the courses", but better than in 1981. His three *Quadrantids* skeds failed but he did complete one random contact with OH3MF. There was a lot of random SSB operation with some folk using 144.400 MHz instead of the old '200 frequency, and Paul thought the operating was "exemplary". Martin Adams, G4IYA, (Kent) worked 4U1ITU in the *Quadrantids* by "tail ending" G8VR. He heard UQ2GLO and several YUs on the random frequencies.

Two Metres

The mail bag was not so large this month and it seems that the Post Office took a long while to deliver the January issue of the *Magazine*, many readers not getting their copies until after our deadline.

G3PBV reckons 1982 to have been a good year for propagation with good *Auroras*, and *Sporadic E* and tropo. openings in unusual directions. Dave remarks that the year ended, and 1983 began, with some good tropo. even though activity was low. The lift started on Dec. 29 towards Spain with many stations working into VD square. The next day it was the turn of central France and by the 31st, the ONs and PAs were there. Signals into Newton Abbot were strong up to about 800 kms. but not much further. The HB9HB beacon was copied. Dave heard weak *Ar's* on Dec. 21 and 23.

23 CENTIMETRES ANNUAL TABLE

Final Placings at December 31, 1982

Station	Counties	Countries	Total
G8VRJ	20	5	25
G3PBV	14	6	20
GW3CCF	14	3	17
G8HHI	14	2	16
G8KAX	11	4	15
G2AXI	13	2	15
G4NBS	11	1	12
G3BW	6	4	10
GW8TVX	6	3	9
GW3CBY	4	3	7
GD2HDZ	3	3	6
G4ROA	3	1	4

FOUR METRES ANNUAL TABLE

Final Placings at December 31, 1982

Station	Counties	Countries	Total
G2AXI	56	7	63
GD2HDZ	54	7	61
G3BW	45	6	51
G3FIJ	42	4	46
G4ARI	40	5	45
G3PBV	35	7	42
GW4HBK	35	7	42
G8VR	24	3	27
G4FKI	21	2	23
G4MUT	15	4	19
GW3CBY	12	4	16
GM4CXP	8	3	11
G4BVY	9	2	11
G4NRG	1	1	2

G4PCS's report on G3UNU activity mentions tropo. into OZ and SM on Dec. 1, to GP, HP and IQ squares. In the Dec. 7 *Ar* the weak event lasted from 1634 to 2010 and GMs were worked, along with LAs in CU and FT and SM5 in HT. The QTFs for GM were 15-27°, for the CU and HT sq., 15° and for FT sq., 35°. Between 1940 and 1950, very strong signals were heard at 60° from EN sq. On Dec. 8, another weak event occurred and the first QSO was with RQ2GAG (MQ) at 1814, QTF 35°. At 1901, SM6CMU (FR) was heard at 347°. SM4 and SM5 stations were worked in GT and HT. Another weak *Ar* on the 10th. produced on SM5 (HS) at 2024 (QTF 0°), and GI and GM stations with QTFs 30-45°.

Mick Cuckoo, G6ECM, (Kent) was quite busy on the band in December. In a brief tropo. opening on the 1st, the GB3ANG beacon was 20 dB over S9 for half an hour, but only GM8BDX (YP19e) was worked. In the contest on the 5th, Mick made 191 QSOs, best DX being DF8AE and DL3YBP, both in EM. He caught the *Ar* on the 10th and worked GI6DRK (WO34a); GI8YDZ (WP67b); GM4JCM (YQ45b) and GM8GFF (YP04d). On Dec. 30, F1BUU (ZE08a) was a new sq. and F1EAN (AG22f); F1GYA/P (BF16g) and F1YJ (BH12c) were also contacted. The next morning, the good tropo. conditions had rotated to the east, bringing QSOs with DB5OE (FL22h); DF4DC (EL22j); DF8AE again and DK5OZ (EM60c). A further 42 stations in DJ, DK and DL were worked.

John Pilags, G8HHI, (Hants.) added a few more for the Annual Table in the Dec. 10 *Ar* with GM4JCM (Fife); GI6DRK (Tyrone) and GM8GFF (Lothian) between 1925 and 1958. GI8YDZ (Antrim) was also contacted. John wished HB9AEN/P (DG13b) "Season's Greetings" at 0152 on Jan. 1, but nothing else of much interest was worked in the opening. Chris Easton, G8TFI, (Gloucs.) reckons the only "real DX" worked at the year end was EA1ED (VD). French stations in BJ, CH, DH, ZE and ZF were heard on the 30th with propagation moving eastwards the following day, before fading out. Chris, with G4NBS and G4NWT, put G4NXO on the air for the Dec. 5 Contest, as mentioned last month. They made 410 QSOs worth 3,700 poins, with many GMs and 98 continentals worked.

At G3FPK, the Dec. 8 *Ar* was discovered at 1720 but was generally a weak event, and the one on the 10th was discovered around 1900. A big *Ar* was reported on the 17th in Sweden at 1310 and heard in London at 1415. Another one was found on the 23rd, from 1650 to at least 1730 with QTFs 350-360°.

Seventy Centimetres

G3PBV was hearing beacons on Dec. 31 from distant parts, but activity was nil. The previous day, F1EZQ (CH) was worked.

In Geneva, 4U1ITU is active on 70cm. When G3NAQ erected the four 2m. *Yagis,* he also put up a 19-ele. *Tonna Yagi* underneath. The station comprises a *Yaesu* FT-101 transceiver, driving a *Microwave Modules* transverter and Geoff's PA which gives about 50w. output. A K2RIW-type amplifier should soon be available and it is hoped to work towards *E-M-E* capability on this band if the necessary aerials are forthcoming. A sub-frame of the 2m. aerial support has the correct spacing for mounting four 70cm. *Yagis.*

Twenty-Three Centimetres

It seems that the end-of-1982 tropo. failed to create any significant activity on the band, even though distant beacon reception was reported. Congratulations to Adrian Chamberlain (Coventry) who is now G4ROA (ex-G6ADC). He is the only correspondent to report any activity. His best DX up to Jan. 2 is G3TDG in Kent, worked on Dec. 24.

Six Metres

As this is being compiled, the situation concerning the 6m. permits is that the *RSGB's* VHF Committee has selected the forty licensees from the near two hundred applicants and that the list has been agreed with the Home Office. It has been sent to the B.B.C. with a request that a prompt comment be made in days, rather than weeks. It was a matter of protocol to inform the B.B.C. as prime users of this band at present. It is inconceivable that any grave objections could be raised by the Corporation at this stage since there is no question of interference as the permits will be for operation outside TV broadcasting hours.

Finale

That's about it for this month. The Squares Table will be back next time along with the 23cm. All-time one, so please update your scores for that. All your news, claims etc. by **Feb. 2,** and for the April issue by Mar. 2 — *both very early dates* — to:— "VHF Bands", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK.*

A MICROPROCESSOR CONTROLLED MORSE DECODER PART III

Peter Lumb, G3IRM

Table 3

1	PA3	14	PC0	22	PB4
2	PA2	15	PC1	23	PB5
3	PA1	16	PC2	24	PB6
4	PA0	17	PC3	25	PB7
10	PC7	18	PB0	37	PA7
11	PC6	19	PB1	38	PA6
12	PC5	20	PB2	39	PA5
13	PC4	21	PB3	40	PA4

All PA pins are for connections to input/output port A and the remainder are the corresponding pins for ports B and C. The connection to pin 17 has been shown in the circuit diagram.

The Processor Unit

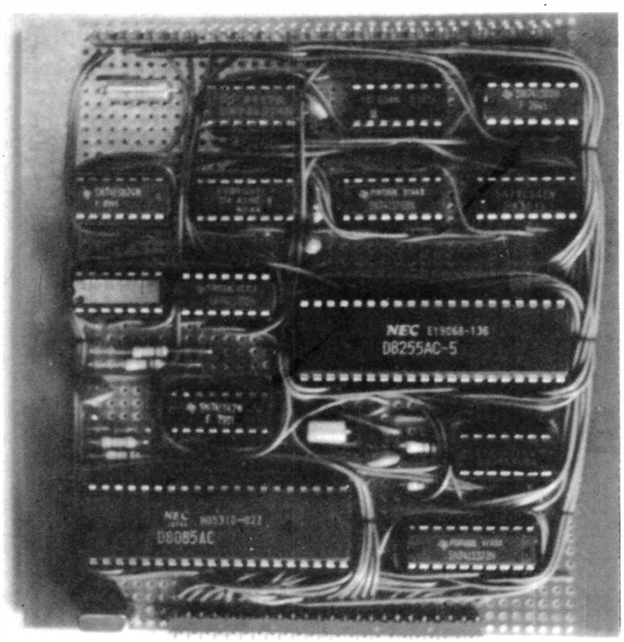
THIS unit consists of six integrated circuits. It accepts the Morse timing clock referred to in the first part of this series, together with Morse code at TTL levels. The Morse clock is keyed by the code input so that the pulses can be stored in the microprocessor and converted into special code (the Morse holding code) which again is stored in the processor; this code is then converted into ASCII which is output to the display unit. The processor also measures the length of spaces, ignores marks of less than five pulses and transfers the dot count to an output port which is used to control the automatic speed control circuits. It also generates pulses to control the display such as inserting spaces when required.

The 8085A used is a revised version of the earlier 8080A. The latter required an external clock generator (an 8224) and a system controller (an 8228) to make it work. All three IC's are now combined in the 8085A but at the expense of a small complication due to the fact that the 8085A still has only 40 pins. The low addresses and data lines are multiplexed on the same pins and have to be split again into separate lines and the control signals have to be generated by a separate small IC. A 74LS373 can be used to demultiplex the address/data lines and a 74LS42 can be used to generate the four control signals required. These signals are $\overline{\text{MW}}$ (memory write), $\overline{\text{MR}}$ (memory read), $\overline{\text{I/OW}}$ (input/output write) and $\overline{\text{I/OR}}$ (input/output read). The bars over the symbols indicate that the control is active low, meaning that, for example, to write into memory the signal must go low; at all other times it must be high.

Although not essential in this case, it is usual to use all address lines to determine the addresses to be applied to the memory and this can be done quite simply by a 74LS05. The cost of including this extra device is so small that it is well worth the coppers it costs. The inputs of five of the inverters are taken to the five highest address lines so that the OR'ed output connected to pin 10 of the 74LS132 gates only goes high when all five high addresses are low, an essential for correct access to the memory. Decoding circuits on address lines controlling memories can be quite complicated but owing to the simple nature of the whole circuit, and the fact that only one memory is used, some liberties can be taken. The remainder of the decoder consists of two NAND gates forming part of a 74LS132. Provided that the output of the OR'ed inverters is high, gate 1 is enabled when either $\overline{\text{MR}}$ or $\overline{\text{MW}}$ is low and the output of gate 2 is high. The output of gate 1 is then low, enabling the memory from which it can be concluded that the memory can be accessed when either $\overline{\text{MR}}$ or $\overline{\text{MW}}$ is low. The microprocessor will not allow both to be low at the same time. $\overline{\text{MR}}$ is connected to $\overline{\text{OE}}$ (output enable), on the memory *via* IC5 to allow data to pass from the memory on to the data lines and $\overline{\text{MW}}$ is connected to $\overline{\text{WE}}$ (write enable), again *via* IC5 to allow data to be written into the memory.

The remaining device is a programmable peripheral interface (PPI) which has three ports, any one of which can be made to act as either an input or an output. One of the ports can even be split into two ports four bits wide, and each bit in this port can be set and reset separately. There is no need to go into details as to what this rather clever device can do: suffice it to say that for the purpose of the Morse decoder port A is made to act as an input, port B as an output and port C is split so that the lower half acts as four separate outputs and the upper half acts as an input. No wiring alterations are required to change use, everything being controlled by the program written into the memory. In a similar way to that used to decode the address lines to the memory, the addresses are also decoded to control the PPI. In order to read or write information through the ports, address line A7 must be high; this is inverted by the remaining inverter in the 74LS05 and applied to pin 6 of the PPI. To tell the PPI which port is to be used address lines A0 and A1 are also used. The codes required are therefore 10000000 to 10000011 inclusive. In octal these are 200 to 203 and a look at Table 2 will show that three of these are used at addresses 003, 005 and 007.

To avoid making the circuit diagram in Fig. 4 confusing all the address and data lines have been omitted. The circuit can be assembled on a piece of *Veroboard* measuring 120mm. square by first making all the connections shown and then laying the address and data lines on top of the existing wiring. All A0 points should be joined together as should all other corresponding address and data lines. In addition the lines must be joined to a 24-way pin strip to correspond to the leads on the memory board. The unconnected pins on the 8255A are listed in Table 3 and will be wired at a later date. The $\overline{\text{MW}}$, $\overline{\text{MR}}$, $\overline{\text{I/OW}}$, $\overline{\text{I/OR}}$ and $\overline{\text{CE}}$ must also be connected and, with the exception of $\overline{\text{MW}}$, must be



The Processor Board

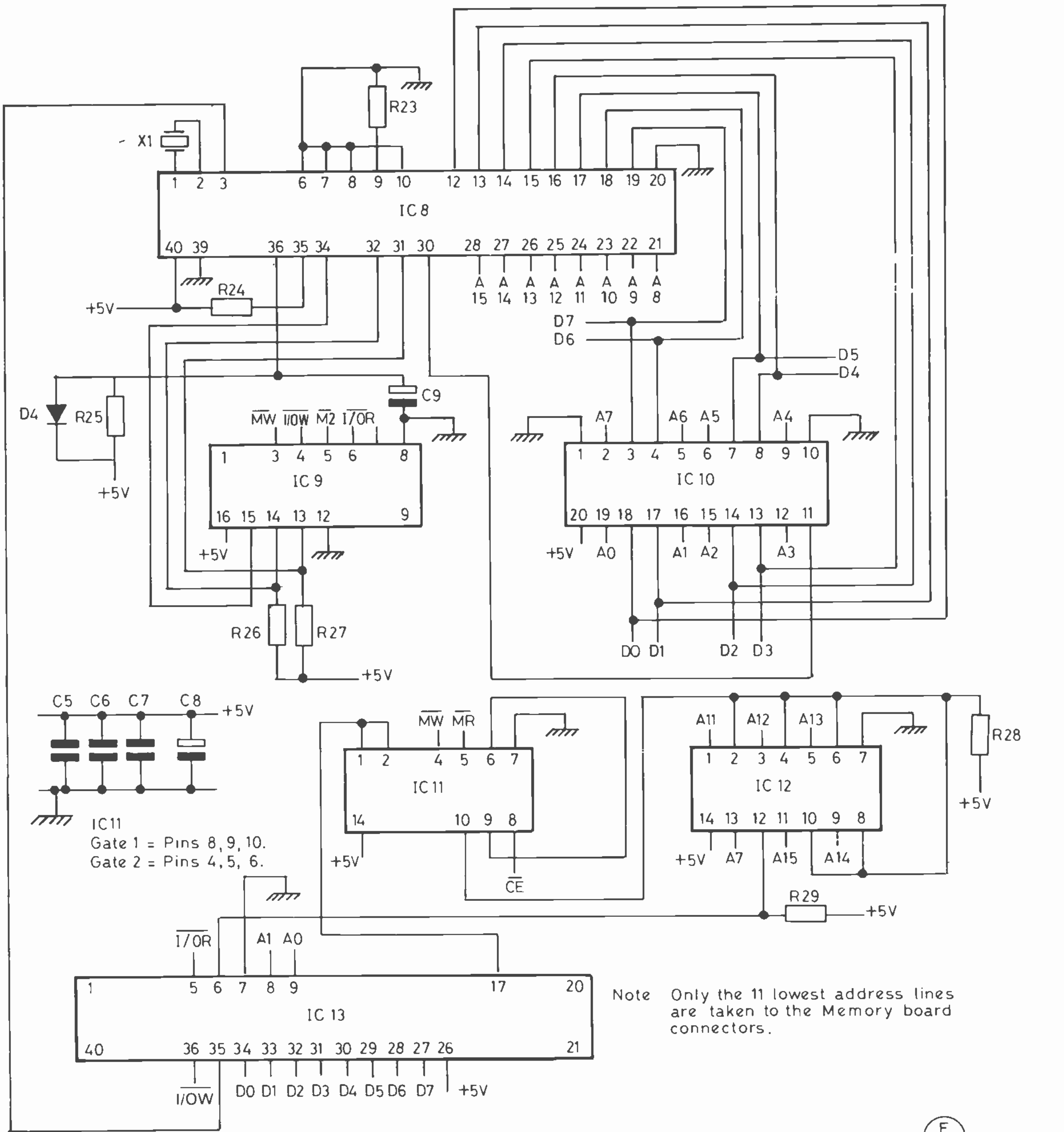


Fig. 4 PROCESSOR CIRCUIT

connected to the tag strip to correspond to Fig. 1. MW, will be switched at a later date but for the purposes of checking it must be connected to the tag strip by a temporary connection. This temporary connection stays in place until an interrupt controller is added to the processor board; it is convenient to put the wire on the back of the board. Fig. 5 shows the layout of the processor board, the dot on each IC indicating pin 1 from the top. It will be noted that pin 1 is always in the same place and, although this may mean some wires are a little longer than necessary (and some may be shorter!), it makes wiring much easier when counting pins on the rear of the board. Be sure to leave space on the board for the other IC's to be added later. A large board can be used and the surplus cut away when all wiring is completed.

Checking the Processor Board

In keeping with the writer's usual practice, arrangements have been made to check the operation of the board so far. Make up two Minicon 12-way sockets with lengths of wire to correspond to all data pins on the programmer board as well as a pair of wires on one set of power pins. Temporarily solder one set of data wires to the corresponding pins on port A of the 8255A and the other set to port B. Connect the two power lines to the processor board. The memory board programmed as Table 2 should then be plugged into the processor board and the flying leads from port A connected to the data switches on the programmer and the leads from port B to the indicator pins on the programmer. If power is now applied the 8085A will automatically reset itself to the first address, due to the presence of the components connected to pin 36, and will then carry out the program; in can be reset again at any time by momentarily taking pin 36 to 0v. (this will later be joined to a tag for connection to a push switch on the front panel). Provided the connections have been made correctly, some of the indicator diodes will light and it will be noted that these correspond to the data switches which are set high. Change the switches and reset the processor and the diodes will immediately change to correspond to the new data.

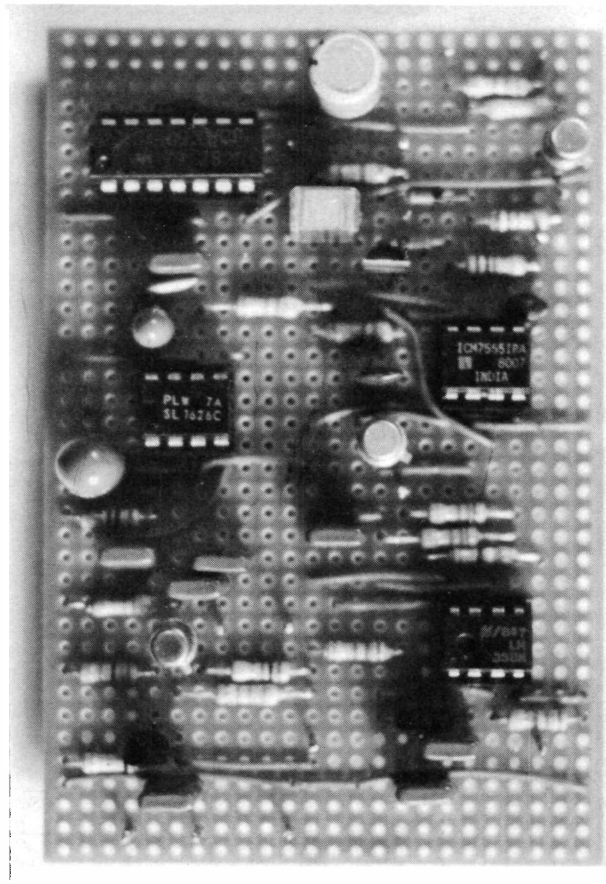
The program first instructs port A in the 8255A to act as an input, port B as an output and port C as input/output as mentioned above. This takes up the first four addresses. Addresses 004 and 005 input the data on the switches and addresses 006 and 007 output the data through port B to the indicators. Address 010 then stops operations until the reset is again shorted to 0v. A simple variation would be to delete the HLT at address 010 and substitute:

Octal address	*Decimal address*	*Data octal*	*Data binary*	*Mnemonic*
010	8	303	11000011	JMP
011	9	004	00000100	
012	10	000	00000000	

After reprogramming the board mount it on the processor board and reconnect the power supply. The indicators will again show the data on the switches but the processor will not halt as it did previously. The new instruction at 010 tells it to jump back to address 004 and carry out the same operation; it therefore continually inputs and outputs the data on the switches. No halt instruction is now required as the processor is in a loop from which it cannot escape without further modifications to the program. It the data switches are now altered the indicators will follow immediately without the need to reset each time.

The Automatic Speed Controller

Fig. 6 is the circuit diagram of this part of the circuit, which can be assembled on the same board as the processor circuits as it only needs five small IC's. The 74LS90 is not really necessary as the capacitor on the Morse clock oscillator (74LS624) can be increased. However, at slow Morse speeds this needs an electrolytic which is not as stable or small as the polyester capacitor used. The oscillator is voltage controlled by the voltage applied to pin 13 from the ZN428 which is a digital-to-analogue converter. By applying digital signals between 0000 and 1111 to the input pins 11 to 14, the output of the converter can be varied from about zero volts to 2.3v; these digital inputs are provided by a binary counter in the form of a 74LS193. A data line decoder is also needed to drive this counter though this is not the same data as is provided by the microprocessor data lines. Data is provided by port C (low) on the 8255A. The speed capacitor on the 74LS624 is not on the board but is connected by leads to the speed switch



The Filter Board

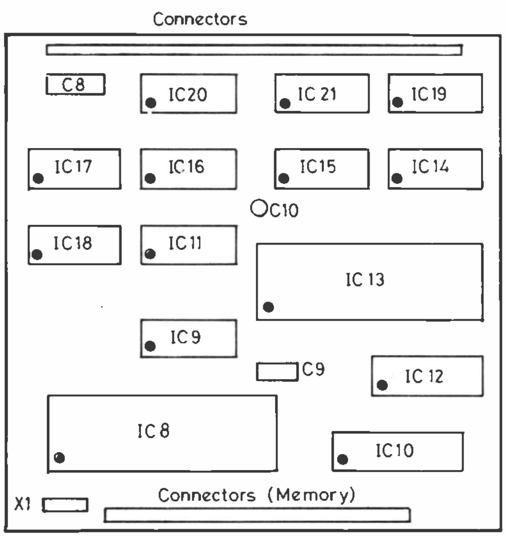


Fig. 5 PROCESSOR BOARD LAYOUT

E 017

Table 4

74LS193 *outputs DCBA*	74LS624 *input voltage*	74LS90 *output frequency*
0 0 0 0	0.03	64
0 0 0 1	0.18	73
0 0 1 0	0.33	85
0 0 1 1	0.48	99
0 1 0 0	0.63	116
0 1 0 1	0.78	132
0 1 1 0	0.94	151
0 1 1 1	1.09	170
1 0 0 0	1.24	190
1 0 0 1	1.39	210
1 0 1 0	1.54	233 — start
1 0 1 1	1.69	254
1 1 0 0	1.84	277
1 1 0 1	1.99	300
1 1 1 0	2.14	323
1 1 1 1	2.29	347

March issue due to appear on Friday, February 25th

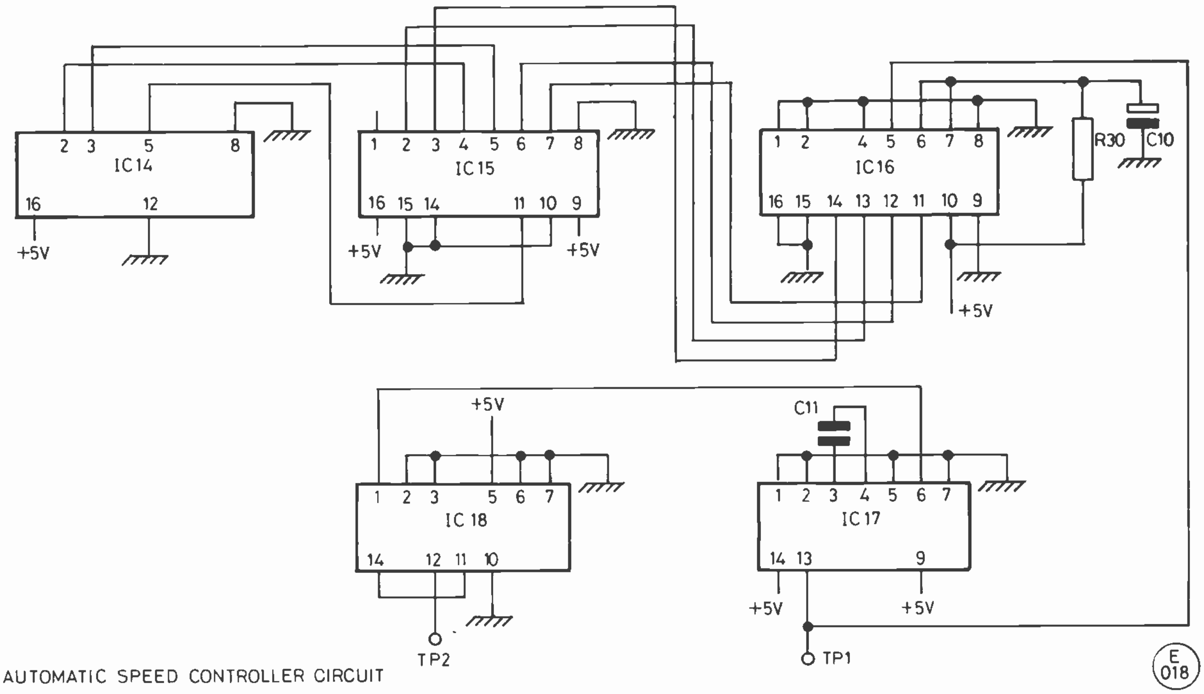


Fig. 6 AUTOMATIC SPEED CONTROLLER CIRCUIT

Tables of Values

Fig. 4

R23, R28, R29 = 1K	IC9 = 74LS42
R24, R26, R27 = 10K	IC10 = 74LS373
R25 = 47K	IC11 = 74LS132
C5, C6, C7 = 0.01 μF disc, at various points on the board	IC12 = 74LS05
C8 = 33 μF tant.	IC13 = 8255A
C9 = 10 μF tant.	D4 = 1N4148
IC8 = 8085A	X1 = about 6 MHz (not critical)

Fig. 6

R30 = 390R	IC15 = 74LS193
C10 = 1 μF tant. bead	IC16 = ZN428
C11 = speed capacitor, *see* text	IC17 = 74LS624
IC14 = 74LS42	IC18 = 74LS90

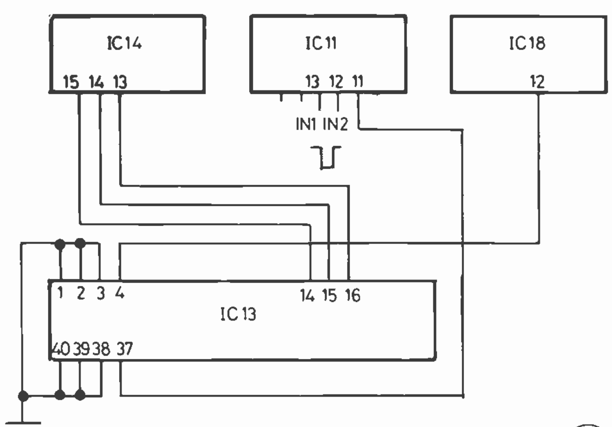


Fig.7 PROCESSOR TO SPEED CONTROLLER CONNECTIONS

via Minicon connectors; the switch is on the front panel. Use a 0.33 μF capacitor for testing.

Checking the Speed Controller

At this stage no connections are made between the processor section and the speed controller and it may be advisable to remove the 8085A and 8255A from their sockets for safety. Temporarily connect pins 14 and 15 on the 74LS42 to 0v. and connect pin 13 to D2 switch on the programmer. Connect a voltmeter to pin 13 on the 74LS624 and a digital frequency meter, if one is available, to pin 12 on the 74LS90. It is useful to provide test points on the board for this purpose. Switch D2 high and the meter should read approximately 1.54v. and the frequency meter 233 Hz. The frequency can, of course, vary slightly from this figure depending on the accuracy of the 0.33 μF capacitor used in the voltage controlled oscillator. When the speed controller is connected to the microprocessor section a pulse is generated early in the program which takes the place of the switch and sets the voltage controlled oscillator to its starting frequency (in this case about 233 Hz).

Return D2 switch to zero, connect pin 15 to the negative-going pulse provided by the programmer and remove the low on pin 14 of the 74LS42. If the programming microswitch is now pulsed the voltage and frequency readings will increase and the results obtained should be fairly near those given in Table 4. When the readings have reached a maximum the voltage and frequency readings will jump to a minimum and the cycle will repeat. Connecting the input pulse to pin 14 of the 74LS42 instead of pin 15 will reverse the direction in which the readings move. Ignoring the lowest five readings which the processor will be programmed to ignore, the range over which the decoder will track is from 132 to 347 Hz, a range of well over 2:1 so it will follow Morse which varies from about 12 to 28 w.p.m. with some safety margin. Substituting a different timing capacitor will vary the range covered.

As both the processor and the speed controller have been checked they may be connected together now; the connections required are shown in Fig. 7.

to be continued

PRODUCT REVIEW

THE ANT PRODUCTS "SILVER 70" SEVENTY CENTIMETRE ANTENNA

ON the LF and HF bands it is possible to achieve surprisingly good results with simple wire antennas, but at VHF and UHF, anyone interested in working any distance will need a gainy, directional antenna. Over the years many manufactures have offered such products and names like *Jaybeam, Tonna, Cushcraft, KLM, T.E.T., H.A.G., Cue Dee,* etc., come to mind. A relative newcomer to this group is the British company, **Ant Products,** from Pontefract in West Yorkshire who sent one of their new **Silver 70,** 432 MHz antennas for review.

Electrical Specification

The claimed gain is 16 dBd (*i.e.* gain over a half-wave dipole), the front-to-back ratio 24dB, the half-power beam widths being 22° in the horizontal, or E, plane and 24° in the vertical, or H, plane. Referred to 435 MHz, the boom length between the front director and reflector elements is 3.83 wavelengths. The bandwidth is quoted as in excess of 10 MHz for a VSWR not exceeding 2:1 and the feed point impedance is 50 ohms.

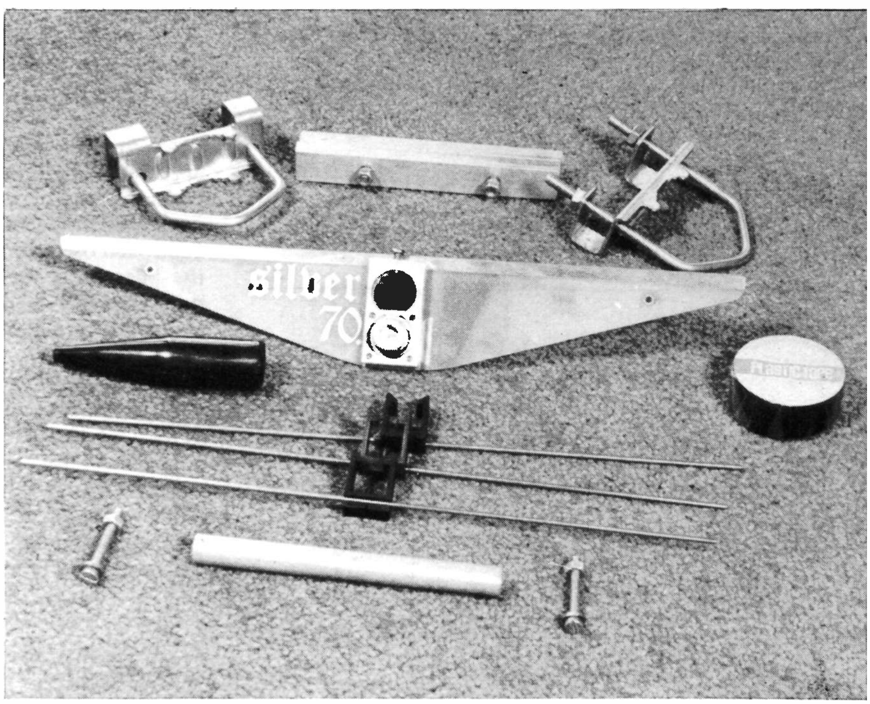
Physical Description

The boom is made from 15mm. square aluminium tube and is in two pieces which are spliced together by two, short U-shaped clamps bolted through the boom to make a total length of 2.68m. Two identical diagonal braces, also of 15mm. tube, are single-bolted through the boom and, with a short round piece of tube inserted in the bottom joint, makes for a rigid structure when fixed to a stub mast.

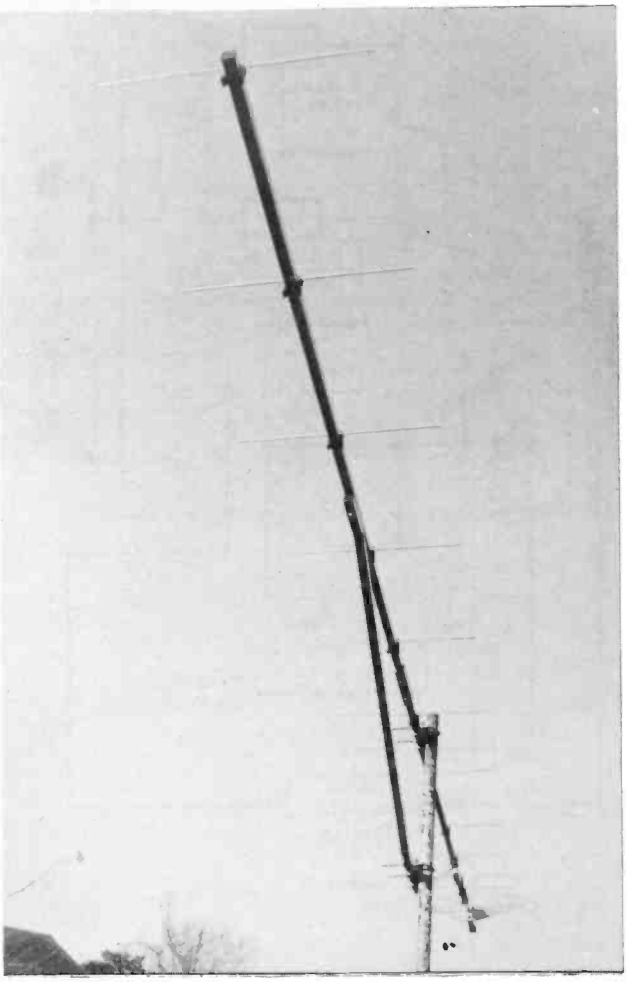
The reflector and twelve directors are stainless steel rods approximately 2½mm. diameter, with the ends de-burred neatly. All directors are the same length and the first three launcher elements are close spaced, but with the spacing increasing to D6. Between D6 and D12, the spacing is constant at about 0.39 wavelengths. The thirteen parasitic elements are fixed to the boom with U-shaped plastic clips which are supplied already fixed to the elements.

The novel driven element consists of a triangular piece of double-sided fibreglass PCB material. Along the top of one side there is a continuous strip of track about 6mm. wide forming the actual radiator, while on the reverse side there is a short length of track forming the Gamma-match feed, using the capacitance between the two tracks. The Gamma-match track is routed to the inner conductor of a silver-plated N-type socket bolted to the PCB and the centre of the driven element is grounded to the plug body. All the copper tracks are silver plated. The feed system is thus pre-tuned and optimally matched for 50 ohms cable. A vinyl shroud is provided to protect the connection. For fixing the antenna to a stub mast, two robust galvanised steel clamps are supplied suitable for masts up to two inches in diameter.

Some of the "Silver 70" aerial components. From top to bottom, the galvanised steel mast clamps and aluminium boom splice; the fibreglass driven element with vinyl plug shroud below; three of the parasitic directors and the reinforcing tube which slides into the bottom joint of the braces.
Photo: T. Traill



A new series article, "The Whitfield" transceiver, by Ian Keyser, G3ROO, starts in the March issue of *Short Wave Magazine*. Make sure of your copy now!



General view of completely assembled aerial. The overall boom length is 2.68 metres. The splice can be seen just in front of the mast.
Photo: T. Traill

Close up of the plastic clip with element inserted, showing key which positively locates the assembly into the hole pre-drilled in the boom.
Photo: T. Traill

Assembly

The **Silver 70** came in a 3½ in. square box, 5′-8″ long *via* Securicor Limited. The assembly instructions are clear and adequately illustrated with diagrams. It took only a quarter-hour to put it together and when fitted to a stub mast, the boom was quite straight and rigid. All the parasitic elements fitted very positively into their proper positions and, as can be seen in the photograph, the plastic clips have a small key moulded on which fits into the holes in the top of the boom. It is intended that all the parasitic elements should be fitted with the "open" side facing the front, a point not actually noted in the instructions, but obvious from the diagrams. The driven element has to be aligned over a mark scribed on the boom and is secured by a single screw.

A reel of plastic tape is provided for taping the coaxial feeder along the boom, down the brace and to the stub mast. The plug shroud should be filled with silicone grease but you will have to provide your own. The weight of the assembled antenna was 1.15 Kg (2½ lbs.) to which has to be added the stub mast, feeder and N-plug which are not supplied. The area for wind loading is quoted as 0.83 sq. feet (0.077m^2) which is quite low. The antenna "parked" itself with the boom in the direction of the wind.

Protection

The manufacturer states that it is not really necessary to protect the silver-plated driven element, but that it can be given a light coat of clear varnish but *not* polyurethane lacquer which tends to detune the system, low frequency. The plastic clips and stainless steel elements require no protection but if desired, the boom and braces may be sprayed with varnish before element assembly to inhibit the inevitable discolouration due to weathering of aluminium.

Conclusion

The manufacturer revealed that the 16 dBd gain figure was arrived at by substitution between a half-wave dipole and the **Silver 70.** With the latter, 16dB of attenuation were necessary in the receiving system to achieve the same p.d. across the input from a remote signal source. No facilities for gain testing were available to the reviewer and even if they had been, one has to be very wary about making any definitive gain measurements. Indeed, without the facilities of a professional antenna measuring range, it would be foolish and misleading for any reviewer to get involved in "the numbers game". This antenna is a straightforward Yagi with a 3.9 wavelengths boom: no trigonal reflectors but a rather ingenious driven element, nevertheless. Professionally measured gains of similar antennas with boom lengths of 3.2 to 4.5 wavelengths are typically between 13.4 and 14.4 dBd for the best specimens, so it would seem to be a remarkable achievement if the claimed gain can be substantiated.

However, gain is not everything; mechanical design and durability are very important considerations and in these respects the **Silver 70** is to be highly recommended. The product carries a two years guarantee against mechanical and electrical defect. All parts are available as spares from the makers or their dealers. The current price of the **Silver 70** is £31.95, including V.A.T. but not carriage. The company also makes the *ZL8, ZL12* and *Norcone 512* antennas, and has now introduced a range of 6, 8 and 10-element, 2m. Yagis. We are indebted to Messrs. **Ant Products** of All Saints Industrial Estate, Baghill Lane, Pontefract, W. Yorks. for the loan of this review antenna.

N.A.S.F.

IMPROVEMENTS TO THE YAESU-MUSEN FRG-7 RECEIVER

ADDING A 2.6 kHz BANDWIDTH SSB FILTER

R. K. SEATON, BRS51218

ALL designs have compromises and shortcomings. In general we live with them; however when a little thought and a few pounds are applied to these shortcomings, improvements are possible.

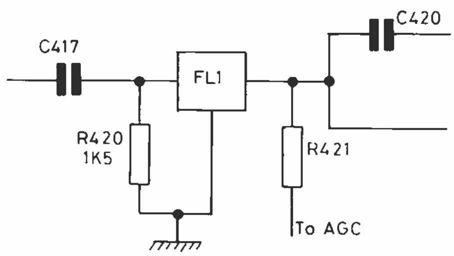


Fig.1 PART OF FRG-7 ORIGINAL CIRCUIT

E 008

The FRG-7 is an excellent design in most respects. Indeed it is still holding its own despite the availability of the broadband, digital breeds. However since purchasing and using the FRG-7 I found the selectivity at 6 kHz simply too broad for SSB/CW reception on the very crowded amateur bands, particularly now the diminishing sunspot cycle tends to drive everybody down to the lower frequencies.

A suitable SSB filter is readily available, having a bandwidth of 2.6 kHz and of the same physical size as the one fitted at the factory. It is electrically similar, with a slightly higher input impedance at 2K, as opposed to 1.5K of the one fitted. If the receiver is only required for amateur use it is a simple matter to remove the existing and replace it with the new. Ideally the input resistor, R420, should be changed from 1.5K to 2K, but in reality it makes little difference to the performance of the receiver, *see* Fig. 1.[1] I considered doing this, but decided the receiver would be rather limited and consequently I came up with the following modifications.

Investigation of the construction of the receiver showed two spare switch wafers on the mode switch. Whilst this is adequate for switching the two filters, I considered the wiring would be too long and preferred instead to use a relay, as can be seen from the circuit in Fig. 2. A small printed circuit was made, although I see no reason why *Veroboard* should not be used, as long as the leads are kept short. Details of the layout are shown in the associated diagram, Fig. 5.

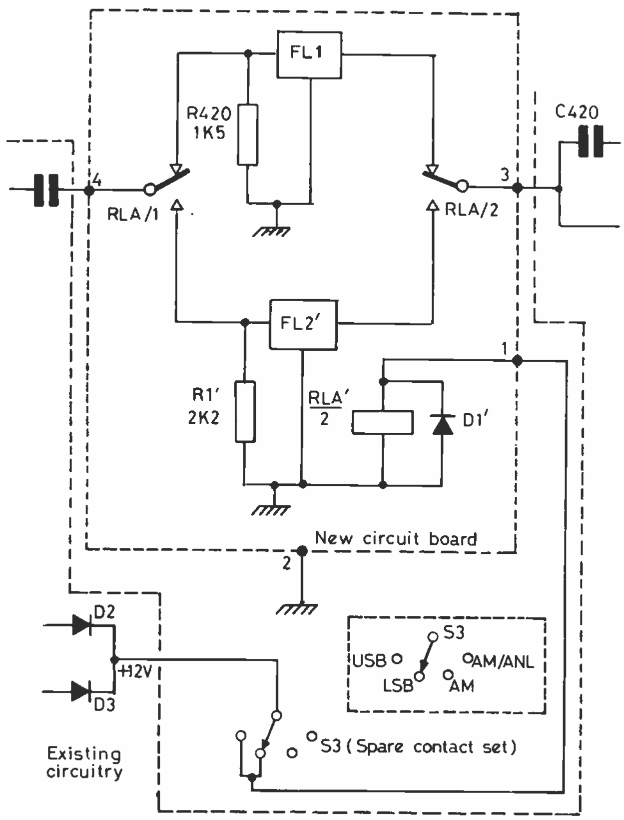


Fig. 2 DUAL FILTER CIRCUIT

E 009

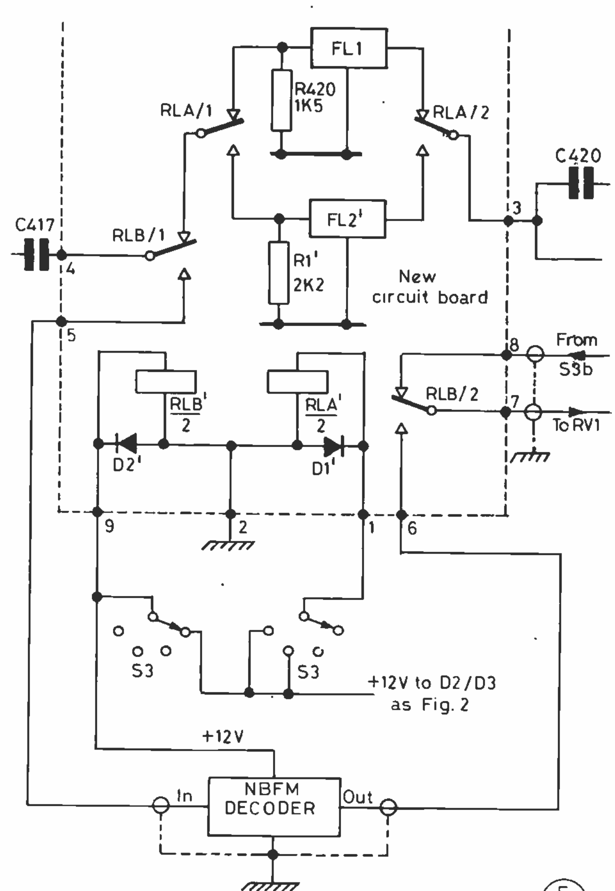


Fig. 3 COMPLETE CIRCUIT

E 010

Table of Values
Fig. 3

FL2' = CFM455J1 (Murata)	R1' = 2K2, ¼-watt
RLA', RLB' = DPDT sub-min. OUB type with 12v. coil	D1', D2' = 1N4004
	NBFM decoder = *e.g.* FM80

Also: solid PVC-covered copper wire, and PCB or Veroboard; all components available from *Ambit International*, 200 North Service Road, Brentwood, Essex CM14 4SG.

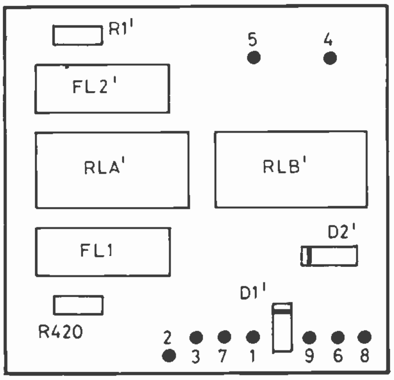


Fig.4 COMPONENT LAYOUT

E 011

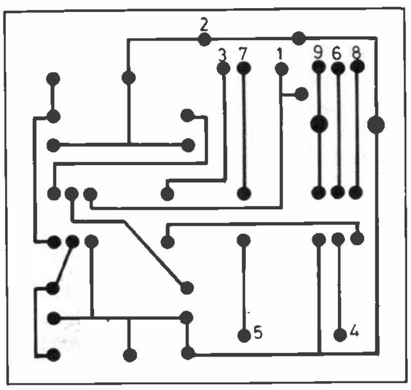


Fig. 5 SUGGESTED PCB LAYOUT (To scale)

E 012

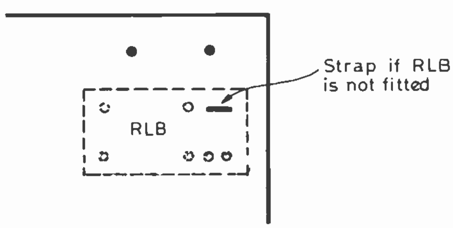


Fig. 6

E 013

The first job, having identified FL1 and R420 on the IF circuit board, is to very carefully remove them. I recommend the use of a lightweight soldering iron and a spring-loaded solder sucker for this job. Any damage caused to the PCB or filter more than outweighs the cost of these simple tools, which I consider absolutely necessary for any electronics work.

These components along with the new filter, relay and resistor are fitted to the PCB as shown in Figs. 4 and 6. Solid PVC-covered wire is soldered onto the input, output and earth points of the original filter and then onto the new PCB — to points 4, 3 and 2 — such that the latter is suspended below the existing board; these wires are kept as short as possible. By using solid wire this arrangement is quite satisfactory and no other mechanical support is needed. A tapping is taken from the junction of D2 and D3 to the input of one of the spare wafers on the mode switch. The output from the switch is taken to RLA on the PCB point 1 and is wired such that the relay is energised when the LSB or USB/CW selections are made. Should it be thought preferable, a switch could be fitted to the rear panel to give a change of selectivity as required.

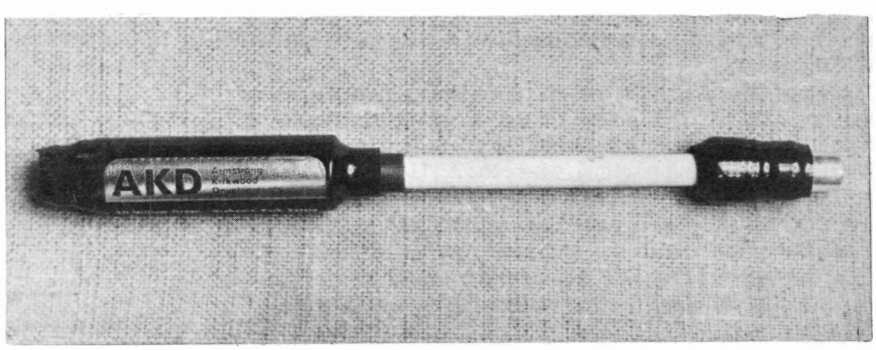
From the design of PCB, Fig. 5, it can be seen that a further relay RLB can be fitted to the board. This is to enable a narrow band frequently modulation (NBFM) decoder to be fitted as shown in Fig. 3. These decoders are now readily available usually based on the MC3357 IC, which is an NBFM IF system and detector. The input to this decoder is directly from C417, the output taken directly to the volume control *via* the relay RLB. As can be seen from the circuit in Fig. 3, this relay is again energised from the mode switch using the other set of contacts and energising the relay when the AM/ANL mode is selected. I used a design of decoder originally intended for the RX80[2] and experienced no problems — the AF output from the decoder being similar to that of the FRG-7's detectors.

Reversion to the original receiver circuitry is extremely simple. No chassis modifications are needed, thus allowing a pristine receiver to be sold, should such a thing be contemplated — for with these modifications a very versatile receiver is produced.

References

[1] FRG-7 Instruction Manual, Yaesu-Musen Co. Ltd.
[2] *Radio Communication,* October 1981.

AKD produce a range of anti-TVI filters, and shown here is the HNF2 which is stocked pre-tuned to some of the more common interfering frequencies. Full details of AKD "Blackline" filters are available from *Telecomms,* 189 London Road, North End, Portsmouth (tel: 0705-660036), who are exclusive distributors of the range.



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

SUGAR-COATED THEORY

FOR this session of *Basics* we're going to have a change of diet; which is to say we are now going to look at aerials and transmission lines. If W5JJ's piece back in the December issue tangled you up, then stay with us and we'll try and sugar-coat it a bit — though we have to admit that this is one part of the RAE syllabus where most candidates go glassy-eyed, and also an area where lots of professionals can, and do, get well bogged down.

Let's do a bit of revision first! Recall for a moment that if you surround a wire hanging vertically by a piece of paper covered in iron filings, and then passed a direct current through the wire, the filings took up a pattern of circles with the wire at the centre: Fig. 1(a). Recall also that if we have two plates separated by air, and we put a DC potential between them a field will exist between the plates: Fig. 1(b). Upon these two facts hang the Law and the Prophets of Aerials.

Looking at Fig. 1 again, it seems pretty clear that if we were to apply an alternating current, we would have both electric and magnetic fields existing at the same time, and that they would be at right angles to each other. Lots of books draw a diagram of this — and we believe that trying to do so on a flat piece of paper causes more confusion than it removes, so we are just going to ask you to *think* about it . . . the magnetic field is, as it were, co-axial with the wire, like the sheath round the inner of a bit of co-ax cable, while the electric field is t'other way about.

When we come to talk about why an aerial radiates, we say that the two fields build and collapse just as they would in any piece of wire, but that while they are considered in isolation they are insignificant in aerial terms; but when we consider the two together, then we find that at a distance the 'radiation field' set up by them is far stronger than the local fields, and that this is the one that does the trick for us. Take this for truth — the detailed truth and the associated mathematics are a bit too mind-boggling for us to bother with! Any piece of wire with an RF current flowing along it will produce a radiation field unless it is screened, although as we shall see, there are ways and means of making an aerial radiate well.

So — back to earth again, and we must consider just what we mean when we talk of an aerial system. In essence, it will consist of four parts, namely, something to 'match' the transmitter to the feeder, so that all the output from the transmitter is taken up by the feeder; the feeder itself, which may comprise coaxial cable — all-same the stuff we use to join the TV aerial to the set — or 'parallel line' which may be open-wire, or the 300-ohm stuff often called 'ribbon' because of its resemblance to that article of feminine adornment, or close-spaced looking rather like the parallel-conductor lamp-cord sold from the electrical counter at *Woolworth's* and similar emporia. Next we have another 'matching' device, this one being arranged to ensure maximum transfer of power from the feeder into the aerial; and finally we have the aerial itself.

Some of these four parts may be redundant or hidden in some way not obvious from a scan of the circuit; for instance the simplest possible arrangement would be an end-fed aerial fed off the transmitter output terminal, where the ATU has disappeared into the transmitter PA tank, the feeder is just not there at all, and since there isn't any feeder there's nothing to match it to the aerial — two out of four eliminated, one disappeared, and one hanging out of the window! However, all four of these elements are closely related to that old friend the 'resonant circuit' which will make it a bit easier.

Transmission Line

Imagine two pieces of wire stretched tightly, one above the other, in free space and stretching from where we sit away in a straight line to infinity. Imagine we have a signal generator and that we connect it to our end of the line and switch on. RF will travel from the generator along the line. We know from what we have already learned that the conductors will each look like an inductor, and we also know that each conductor will have capacitance between itself and the other conductor. If we started with the generator at zero frequency and gradually raised the frequency towards the RF range, we would find that at RF the ratio of voltage from the generator to current would become a constant, and referring again to memory we will recall that $E/I = R$. So, the generator will think that it is connected to a resistor rather than a transmission line. Let us now alter the spacing between the wires, and try again. Again we will see the same thing, but the ratio of E/I will be different, so the generator will think it is seeing a resistor still, but one of a different value. The value of the imaginary resistor the generator sees is called the 'characteristic impedance' of the line.

Now imagine we can find a perfect resistor equal to the characteristic impedance of the line, and a pair of cutters, and that we can hack off the far end of the line a few feet away from the generator; then solder the resistor in place of the bit we have cut away, between the upper and lower conductor — as in Fig. 2(c). The generator still thinks it is looking into the original line.

Summing up as far as we have gone, then, we have seen that at Rf the line has a characteristic impedance which is a function of the physical dimensions of the line and is independent of frequency as long as we are talking of RF.

Now consider the RF going down the line to infinity again. As long as the generator is supplying power, we have RF going down the line and heading into the great blue yonder looking for infinity. If our RF is, for example, at 30 MHz then we can imagine that as we stand at a given point on the line a wave of voltage and one of current, in phase with each other, go tramping past us, and the positive, say, peaks of voltage will pass at the rate of thirty million a second; since they are travelling at the speed of light, that means each positive peak is ten metres behind its predecessor and ten metres in front of its successor in a never-ending wave emanating from the generator and heading off for infinity. The ratio E/I, we have agreed, is a constant, so as E reaches a peak, so does I, and both reach zero together, rising simultaneously to a peak in the opposite direction, so E/I will always be 50 if the line impedance is 50 ohms for example.

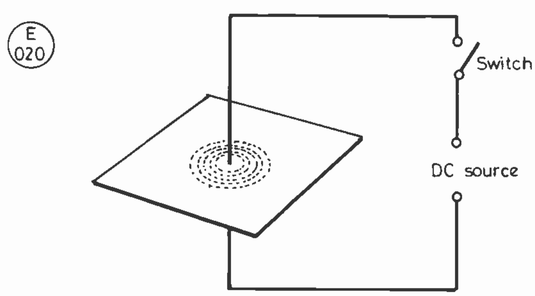


Fig. 1(a) Iron filings round a wire carrying current indicate the direction of the magnetic field relative to the wire.

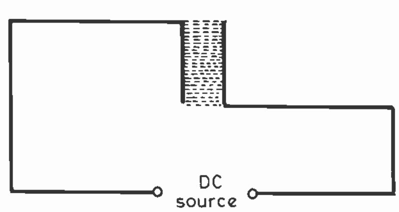


Fig. 1(b) Similarly the electric field between two wires (plates).

Now, imagine that some nasty soul suffering from TVI comes along and cuts your line off short just out of sight. What's going to happen? When the generator begins, the RF will flow out of the generator until it hits the open-circuit end, obviously. Equally obviously, it then has only one way to go — back to the source!

Clearly there isn't any current at an open-circuit; to achieve this, the forward going wave hitting the o/c and the reflected wave setting off towards the generator *must be equal and opposite*. Observe, before we leave the broken end, that we have a wave travelling towards the break, and another travelling away from the break, and that both are similar save for the phase reversal which is required for no-current at the open-circuit. All the outward power turns round and heads back to the generator, since we are assuming a perfect line and a perfect open-circuit (and a Good Fairy to hold up the broken ends exactly where they were before the cutter-fiend attacked!)

Leaving the Good Fairy for a moment doing her duty, let us step back exactly one quarter-wavelength from the break and look at the current waves heading out and back from this new viewpoint. Clearly the reflected wave left the generator *two* quarter-waves in time earlier than the wave heading out to the break: if a current maximum in the positive direction is passing at a particular instant, then we would expect that a half-wave back, or further on, at the same instant, there would be a negative peak of current wave. However we have a break, and as we have seen a phase reversal at the break, the reflected wave will also be at a current maximum a quarter-wavelength back from the break, and this will always be so. Let us go back now a half-wavelength from the break and we will see a situation where the outward and reflected current waves always add up to zero; a quarter-wave further back towards the generator (*i.e.* a three-quarter wavelength back from the break) we will again see the situation we saw at a quarter-wavelength back from the break. If we repeat this observation lots of times and record our results we will see that there appears to be a wave on the line which is *standing still* and this is the thing we call a 'standing wave' on the line. Note clearly, the standing wave is only the *result* of the forward-going wave hitting the break and causing a reflected wave to travel back towards the generator.

We can now remake our line, and we will see the standing wave disappear, as all the forward waves continue their merry way to infinity. Re-enter, stage left, the Villain, but this time he has both cutters and soldering iron, and he cuts us off from infinity and in addition solders the ends of our part of the line together, giving us a short-circuit. The Villain departs the scene laughing evilly. What now?

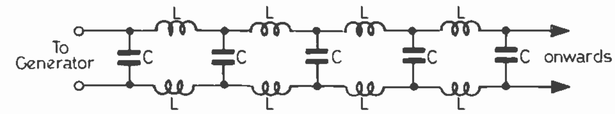
Clearly, this time the short-circuit is a point of *maximum* current so there is no phase reversal at the short. Stepping back a quarter-wave, therefore, and applying somewhat similar arguments as before, we see a point of zero current; half-wave back from the short there is a current maximum, three-quarter waves back another current minimum, and so on. Again we have 'standing waves'. Again the standing wave is no more than the result of the outgoing and reflected waves each travelling their allotted paths. Repair the line, so that the outgoing RF heads for infinity and nothing comes back, and *lo!* the standing wave again disappears.

Our next experiment is to cut the wires and join the upper and lower conductors by a perfect resistor; applying power, again we find there are no standing waves, if the resistor is equal in value to the characteristic impedance of the line, which confirms our assumption that the generator can't tell the difference between a properly terminated transmission line and an infinite-length one.

Note a couple of interesting things about this: a quarter-wave open-circuit transmission line looks like a series-tuned circuit at resonance from its other end; and a quarter-wave of transmission line with its end shorted looks like a parallel-resonant tuned circuit from the other end — zero impedance and infinite impedance respectively.

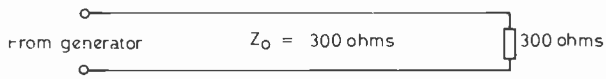
Of course, our practical transmission line is terminated in an aerial, and the aerial will usually 'look like' neither pure resistance nor short nor open circuit, but rather will it appear to be resistance and capacitance in series or resistance and inductance in series; but anything other than a perfect resistive termination of value equal to the characteristic impedance of the line will still give rise to standing waves, and this can be proven by applying arguments similar to the ones just discussed. This is rather convenient, insofar as the average amateur radio station is not equipped with the necessary tools to deal with oddball aerial systems, so one designs a system such that it should, when correctly set up, yield a 1:1 standing-wave ratio (*i.e.* no standing waves), and then confine one's setting-up procedure to 'pruning' until the SWR comes down to the desired figure.

Fig 2(a) The Transmission Line



Note: Both the inductance and capacitance are totally distributed, rather than in "lumps", as shown.

Fig. 2(b) Equivalent circuit



Note 1· No return current, no standing waves, all power put out by generator absorbed by load.
2 The generator "sees" this as identical to an infinite length of 300Ω transmission line (see text).

Fig. 2(c) Line terminated in its own characteristic impedance. (Say, for example, Z_0 = 300 ohms).

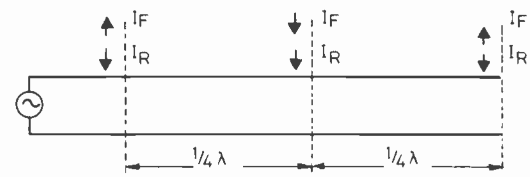


Fig. 2(d) Open circuit end to Transmission line (See also Fig. 2(f).

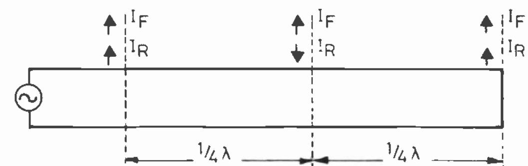


Fig 2(e) Short circuit end to Transmission line

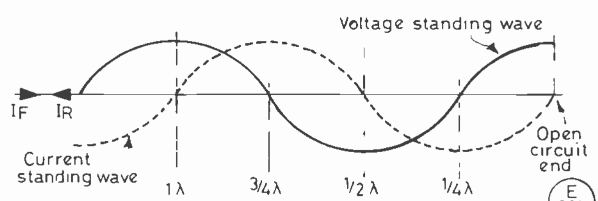


Fig. 2(f)

Fig. 2(f). Shows standing waves of voltage and current due to an open circuit at the end of a transmission line, over one wavelength from the open circuit end; note the different scale. In Figs. 2(d) and 2(f), I_F refers to current from generator towards load, I_R to current reflected.

Perhaps now we should explode a couple of myths. The first one is that a high SWR is of itself a bad thing: a solid-state transmitter may object and require some sort of tuner to get it to produce output power, but that is a function of the transmitter not the SWR. The second is that a high SWR involves losses in the transmission line. This is not so at all in a *perfect* line, and all we can say is that losses due to a given SWR increase as the line in question becomes lossy of itself. Thus, we have a very convenient way of checking that a transmission line is as good as it should be — put a whiff of power up it with an open-circuit at the aerial end, and one should see a very high SWR; as the line deteriorates with age, particularly with coaxial, the SWR seen at the transmitter gets lower and the time has come to throw it away, or at best examine it carefully and cut out all the deteriorated bits, keeping the best parts for odd jobs around the shack.

So far, we've been talking about a couple of wires in free space and magic to hold them in that correct place relative to each other. The reality is different; there will *always* be some infill between the wires, to support them at the desired distance apart, and sometimes the infill will be complete, as for example with solid-dielectric coaxial cable. The effect of this infill will be to slow down the speed of the wave travelling along the line. For example, solid polythene reduces the speed by a factor of 0.66, and so we say the polythene cable has a 'velocity factor' of 0.66. The low-loss, semi-airspaced coaxial will show a velocity factor of around 0.8, and even open-wire line will have a velocity factor of around 0.98, due to the inevitable small amount of supporting material. Moral: if you are using anything other than solid polythene, make quite sure you know its velocity factor, and mark it before you put it in the junk-box, lest it give you a surprise some time in the future!

Now, as to the formula by which you can calculate the characteristic impedance of a transmission line. Assuming air dielectric, the two-wire parallel conductor line characteristic impedance, Z_0, is given by:

$Z_0 = 276 \log_{10}(2S/d)$, where S is the spacing between the two conductors and d is the diameter of the conductors. In the case of concentric lines (coax) the formula modifies to:

$Z_0 = 138 \log_{10}(D/d)$, where D is the inside diameter of the outer conductor, and d is the outside diameter of the inner conductor.

In either case, if we have dielectric other than air (*i.e.* a dielectric constant of greater than unity) then we must multiply the right-hand side by the square-root of the dielectric constant. For polythene this is 2.3, and so our Z_0 would be 1.5 ($=\sqrt{2.3}$) times the figure calculated from the formula given. The velocity factor derives from the same source, being in this case $1/1.5 = 0.66$.

From the theory to the practice now, while the fevered brow cools a little (mine, not yours!) Coaxial cable has to be bought, but open-wire line can be home-brewed very easily. Bought parallel-wire feeder, particularly of the 'ribbon' variety is very prone to show change of loss with change of the weather (the effect shows as high SWR when the feeder is wet), and the 'clear' stuff is rather inclined to deteriorate through ultra-violet light quite rapidly. If you buy coaxial cable, be sure what you are getting: poor-quality coaxial will be lacking in two main areas, namely the number of strands forming the braided outer conductor will be considerably reduced, which increases the amount of 'RF leakage' out of the cable, and the quality of the PVC outer jacket (in the cheaper cables, one may find the plasticiser leaches out of the PVC, so that the jacket becomes porous and the braid corroded). In sum, there is a lot to be said for being unfashionable and using home-brew open-wire line, especially now the XYL's hair-curlers are made of low-loss polythene!

to be continued

SOME SIMPLE TRANSCEIVER SWITCHERY

ADDING A VARIABLE RF ATTENUATOR FACILITY TO THE TRIO TS-530S TRANSCEIVER WITHOUT REMOVING THE COVERS

MANY of the imported 'black box' transceivers benefit in the receive mode from use of RF attenuation, particularly if they are fed from a gainy antenna system well tuned to the frequency in use. The Trio TS-530S is no exception and Trio, recognising this, have wisely provided a front panel switch that introduces approximately 20dB of attenuation. This switch, although useful, is obviously restrictive and there are times when the need is felt for a device more variable in its characteristics; this is most evident when using the lower frequency bands especially after dark when overloading of the front-end can give rise to distortion.

Any easy way of discovering if a transceiver can benefit reception-wise from use of a variable RF attenuator is to first remove both microphone and key and temporarily hook up a 5-10,000-ohm linear potentiometer between the antenna input and ground, as shown in Fig. 1, and with the antenna connected to the slider. The normal RF gain control is not always overhelpful at reducing noise levels and can therefore be left well advanced for the test and using the simple attenuator for overall gain. Making certain that no RF can be emitted and by listening on Top Band, 80 and 40 metres in turn, it may well be found that signals come through cleaner and sweeter as the potentiometer slider is slowly moved towards ground.

Clearly this simple test set-up, although often revealing, cannot be left *in situ* since it would not take kindly to an accidental injection of even a few watts of RF from the transceiver!

Adding a Variable Attenuator Facility

The inbuilt switchable attenuator of the TS-530S — *see* Fig. 2 — when in the 'in' position places a fixed resistor potentiometer across antenna and ground to feed the RF unit, whereas in the 'out' position the antenna is applied to the RF unit direct.

At first sight it seems easy enough to open the line at point 'X' and make appropriate amendments, but on removing the covers it is soon evident that neither the relay nor the switch is easily got at!

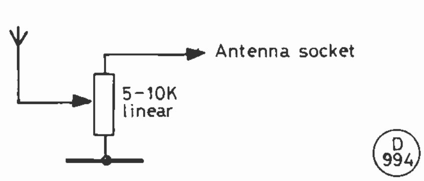


Fig. 1

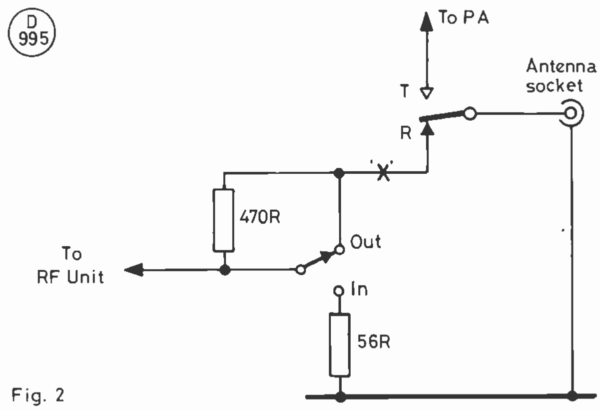


Fig. 2

Nor may it be prudent to attempt to do so particularly if the transceiver is under warranty or if one contemplates disposing of the rig at a later date; potential buyers of used apparatus are often chary of 'modded' equipment and experience shows that in general any changes made to commercial gear are best accomplished in such a way that they can be easily removed to leave the apparatus in its original condition.

Fortunately the TS-530S transceiver lends itself to the addition of an external add-on attenuator unit and the facility can be incorporated without even removing the covers!

At the rear of the transceiver a spare inbuilt relay is available — *via* the appropriate DIN Accessory Socket — that works in step with the antenna changeover relay and this can be used to suitably switch into circuit an added unit on 'receive' only. However even a very basic attenuator of the kind shown in Fig. 1 requires three terminals if it is to be completely isolated during the 'transmit' function, therefore the inbuilt relay cannot itself be used directly. It can be used, though, to switch a 2-pole changeover relay fitted to the outboard unit and many junk boxes contain suitable specimens — remembering that contacts must be capable of handling RF. The energising voltage can usually be picked up either from any small existing PSU being used to drive a keyer or other station accessory; or the DIN 'Remote' socket at the rear of the transceiver can possibly be made use of where, as the handbook shows, some low DC voltage points exist.

Looking at Fig. 3, changeover relay RLA/2 is energised only when the transceiver is placed at 'transmit' whereupon the rig operates as if the add-on unit was not present. On 'receive', however, relays cease to be active and the antenna and receiver sections immediately come under the influence of the attenuator.

Of course relays need not be used at all and a suitable manually operated changeover switch could be used instead; this would be satisfactory provided the operator remembered to always change it over correctly prior to transmitting for failure to do so would rapidly destroy the attenuator components!

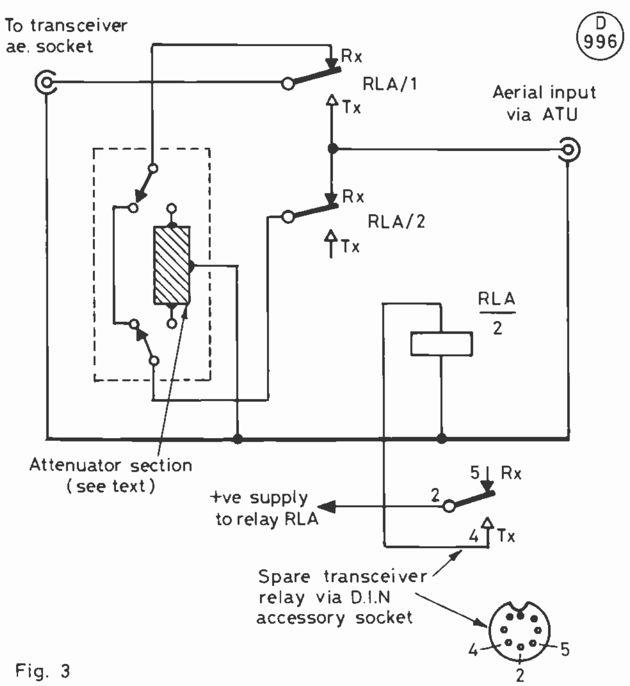


Fig. 3

The Attenuator Section

The simple attenuator of Fig. 1 is not ideal and preferable by far is to use one that can be bypassed at will whilst additionally possessing several 'steps' and still maintaining a fairly level impedance over its range. Over the years many suitable attenuator circuits have appeared in various publications and reference can be made to various textbooks such as editions of the American *ARRL Handbook* and/or the RSGB publication *Amateur Radio Techniques* by Pat Hawker, G3VA. Various designs can be found that can be adopted or tried out and it will be found that most consist of but a palmful of resistors and some switching to provide optional levels of attenuation of from 0-40dB approximately.

Conclusion

Built into a small metal box such an add-on device would be located directly after the transceiver between any SWR meter or ATU or combination unit using 50-ohm coaxial cable. In use considerable benefit should be apparent in the receive mode as noisy distortion-breeding signal accompaniments are attenuated and, as already mentioned, it may well be found that control of RF gain is more conveniently accomplished using the attenuator rather than the transceiver RF gain control which may then be left well advanced.

On a more cautionary note, where CW is the preferred operating mode a little thought will show that on 'transmit' less strain will be put on the outboard relay contacts if, instead of using semi-break-in (*via* the Vox button), the send/receive switch is used thus enabling the contacts to change over gently before any RF is keyed.

Corrections

There are two errors in *Part VI* of "Plug In Your Soldering Iron and Begin Here" in the November, 1982, issue: in Fig. 1 on p. 480 diode D2 should be reversed (shown correctly in Fig. 3), and in Fig. 2 on p. 481 there should be a connection on the copper side of the board between the non-grounded ends of R1 and C2.

In "A Power Supply for the Yaesu FT-707" (p. 601, January, 1983 issue) there are three omissions in the pin numbering for IC1 in Fig. 1 and these are: base TR1 to pin 10, R7 to pin 6, and junction R7/C6 to pin 5. Also, in the first line of the article the word 'transceiver' should read, of course, 'transverter', and in the Table of Values SW1 = *RS* 338-305. The text implies that an SCR should be shown in Fig. 1; however, this is not the case — but for the benefit of those who may wish to build the power supply using an SCR, a suitable circuit will be published shortly.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

WINTER conditions have been with us on the air this month, of course, although the Festive Season was blessed with weather mild enough to allow those who lost aerials in the earlier gales to put 'em back up — followed by enough high winds to have brought some down again! This month, due to Christmas no doubt, we seem to be a bit low on the current pile of contributors; G4AKY we know to be away out of the country on holiday, and we hear that G3NOF has been QRT for a couple of months through illness — get well soon, Don, and all our thoughts are with you. On t'other hand we have lots of nice chatty letters with no mention of DX — something to do with the Season, doubtless!

However we must commence the monthly examination of the bands, so for a change let us begin, as it were, in the middle.

Forty

Must be the first time ever that we've started here! GW4OFQ (Llandeilo) says he hasn't a lot to report as his amplifier went on the blink; but 80 watts of SSB into the G5RV around the 0800 period got out to JA3EMU, JA4CQS, JA4IKD, plus, at 2300z a contact with ZD7BW.

As far as your scribe went, it was a matter of no more than a quick listen once or twice in the evenings; but a wander through the bottom few kilohertz with the function switch at CW showed there to be various East Coast Ws, VKs (one as early as 1930z in the evening) and various other manifestations from Africa, and South America, not to mention weak JA stuff.

Eighty

A long and newsy letter from Chris at G4BUE (Upper Beeding) indicates he has been continuing to play with his 3.5 MHz sloper beams, encouraged by the fact that his highest attachment point can be wound up to 80 feet. At this height, such signals as 5T5TO, VK3NC, VK6HD, YB5AES, UM8MCU, UI8BI, and lots of JAs and Ws were taken, and on one evening eight JAs were taken in a half-hour. Then gales took out two of the four of them, so the top was lowered to forty feet, and the remaining two were compared with an inverted-vee with the apex at the same height; again the slopers, even with the feedpoint all but on the ground, still managed to outperform the vee, both at DX and in the 'local' sort of eighty-metre signals in EU. Bear in mind that G4BUE is a QRP man, normally only turns the Big Rig on in dire emergency; five watts input to G4BUE is high power!

By the time this comes to be read, the G4BUE aerials will all be taken down, and a similar design erected for another band — and we are promised that, as he has kept the notes of what he has done, he will let us have a write-up on it all, for which we wait with baited breath!

As far as old G3KFE was concerned, it was only CW, and all that swam into our ken was EU and just one W — we were really only checking out aerials and it was too early for sense — who was immediately swamped under a chorus of massed choirs from Mittel-Europa.

GW4OFQ and his 80 watts SSB wandered lonely as a cloud around the upper end of Eighty until he was able to snap up EP2TY for tea, OY5J and VK3DWJ as snifters before dinner, 3V8AL as the port went round, 5T5TO as a nightcap, and A4XFF around 0200 when a touch of insomnia crept in.

Now we turn to G2NJ (Peterborough) who remarks on the way The Gang made room at the bottom end of the band in the small hours of December 20 for DF2QS: heard at 0135 first, he sent "CQ SP de DF2QS" and got no reply, but at intervals he also sent "Vy 73 SP Best Wishes for New Year." We admire the thought, and we admire that it was done in such a manner that no licence rule was broken (think about that — it's all in the words!) and, above all, for the kindly way in which all of Europe stood aside for fifteen minutes while the message was sent. We are sure many SPs will have been listening round, and equally sure the word will have been passed; and we are also sure that the fact that the channel stayed clear implies tacit agreement by Russian amateurs too.

On a different tack, G2NJ says he worked a crop of QRP stations, of which the best was F6CRK in Auxerre, with whom Nick had a 30-minute QSO through the contest QRM. G2NJ also notes the /P activities of G2CNN, worked a half-dozen times since June from various places, and this month worked from Southend where he had just put up the aerial and connected the HW-8 in freezing weather — and he was on the same spot on Christmas Day. Not many of us would *dare* go in the shack on December 25!

Here & There

EU CW Association has declared 1983 to be the 'Year of the CW Novice', and as part of the programme the G-QRP Club offers a G-QRP Club Novice CW Award for which all the contacts must be made in 1983, and on CW. Basically, you have to work fifty stations; for Class-A the applicant must have been using five watts DC power input or less, and for Class-B anything up to the legal limit for the station in power-input. Applications to consist of a list of stations contacted, including date and band used, the list to be countersigned by one other amateur who has seen the relevant log entries; and for Class-A entries there must be a declaration that no more than five watts input were used when making the claimed contacts. Send 50p in stamps from U.K., or 3 IRCs from the rest of the world, to G8PG, Communications Manager, G-QRP Club, 37 Pickerill Road, Greasby, Merseyside L49 3ND, England.

On the question of Heard Is., the latest news we have is that the British vessel *Cheynes 2* left Hobart, Tasmania on January 2 and was to arrive Heard about 18th. Calls to be used were those of Jim Smith VK0JS, Kirsti Smith VK0NL, and (while aboard the boat, for RTTY, and for six-metre and satellite operating, from Heard itself) VK0SJ. You will have to be quick, though, after reading this, as their closing date was to be about two weeks after they arrive. Operators include Jim and Kirsti, WA8MOE, W7SE, and OE1LO.

About February 1, the opposition Heard Is. expedition, with operators K8CW, N4BQW, and VK3DHF, will be arriving on the island and we hear their operation is down to last for over a month, which must put them dangerously close to the limit for withdrawal from Heard; they will sign VK0HI.

Spratly has to be one of the places one would like to hear from; and we hear that there is a possibility of operation from there in March by a DU operator.

VR6TC, many will have noted, was honoured in the New Year Honours list with an MBE for his work at Pitcairn as radio operator.

Thirty Metres

Only one direct report, from ZB2GR in Gibraltar, who writes to say that he has tried the arrangement proposed in "Getting Out on 10 MHz" in the December issue of *Short Wave Magazine* with his 18-AVT; ZB2GR couldn't manage the ¾-wave proposed in the article so made do with just the ¼-wave. He says he's only had a few QSOs with the set-up as yet, but he seems to have covered much of Europe with it, and he is lavish in praise of the originator of the scheme.

Top Band

As far as your scribe goes, since last he operated the band on this aerial, a new noise has appeared and covers the whole band to a depth which even covers most of the fish-fone and Hi-Fix noises . . . and which seems to elude our attempts to find it!

G4BUE says that by the time this is with the readers he will have got his quarter-wave sloper set-up operational on Top Band, so that should give us a good new signal on the band — who knows, Chris may even be able to penetrate our local noise and make a QSO! Like most of us, Chris had his work cut out over Christmas, getting the youngster's radio-controlled car working and playing Space Invaders on a Vic-20 home-computer — but G4BUE says he bought the computer for other things and, please, has anyone got any programs which could be useful in the amateur radio context?

G2HKU (Minster, Sheppey) says that at this time of year he is always rather busy with other activities, so the shack has been deserted largely; but Ted did find a few minutes for SSB contacts with PA0PN and PA0SE, plus some CW to OZ1LO, OZ1EXZ, SP1ADM, ZB2EO, EI9J, UT5AB, LA5RBA, EZ2BAO. OZ5RM, OL4BDY, and OK1DTM.

GW4OFQ took a look around the band in mid-evening, and connected with RP2BEP, RA3DEX, and OK1DOK, plus one late-night session in which at 0200z he raised VE1BNN, also SSB.

"CDXN" deadlines for the next three months:

March issue—February 3rd
April issue—March 3rd
May issue—April 7th

Please be sure to note these dates.

Snippets

Often we have the pleasure of receiving visits from overseas readers to our little backwater of Welwyn which once was a direct part of the old Great North Road in coaching days (just peep at that hill to the south of us, and think of horse-drawn stages being dragged up that — or of the difficulties there must have been in controlling them *down* it, for that matter). Some while ago here we met a reader from West Australia, who now writes to let us know he has passed the tests and gained the call VK6NUJ: O. G. Millard, Unit 19, 64 Hastings Street, Scarborough, West Australia 6019. Congratulations are in order from us, and thanks for his kind words. Let us hope to hear VK6NUJ on the bands before long, and to have a QSO.

Twenty

GW4OFQ looked over the band's SSB end around 0800z and worked JA5KAM, JA9LS, ZL3ACT, VK2DHF; then around 1600 he managed A71AD, and M1C, with 1700 as the time for his latest contact, with TF5TP.

SSB for G2HKU meant ZL3RS and ZL3FV, but for a change Ted turned to QRP on CW to work IT9CJB and OE1AKU.

G4BUE had to take to the full power available in order to make his SSB contact with FB8XAB — but it gave him County Number 298 for one more towards that Magic Number.

G4LDS (Chelmsford) says he has a new toy in the shape of a ZX81 home computer which is intended for the shack in due course. Some time was, however, spent in the shack, and it was noticed while tuning-up that the SWR had changed for the worse. After a while this situation went back to normal so doubtless some damp had got into the traps. On 14 MHz, QSOs were had with WB7OZA/MM in the Mediterranean, UA9DC, OZ1DAF, OK3ADX, CN8EL/MM, who was 200 km south of Canary, LA7BF, and A4XX.

21 MHz

G2HKU reckons the Poltava thing has been more of a nuisance than ever of late, and notes that some DX-ers won't work Russians in consequence. Full power CW gave Ted CW contacts with ZB2EO, JM1APN, ZL1AGZ, HG100KZC, JT0GM, and ZL1BGT, while a short blast with the QRP rig produced a CW contact with JT0GM.

GW4OFQ mentions just one SSB contact on this band, with J73HA on SSB around 1500z one afternoon.

Another one with just one QSO to mention is G4BUE, who was rather chuffed to raise the 9N38 expedition on CW, to make country number 216 on QRP — five watts input or less.

G4LDS changed the driver bottle in his FT-101 and says he found that this brought the power output up on 21/28 MHz by nearly twenty watts. Chris worked VP8ANT, VO1BG. VE3AMT, CX9CB, VP8APK twice, VE3BWY (who, by the way, wrote this column for a short while just after the War), HC2HM, K2OZ, N1BGA, G4KXL/DU1, WA5HOD, and A4XX. The VP8APK contacts were of interest insofar as he had been previously worked as ZC4DY, and also because he was installing a Band 2 VHF FM BC transmitter which Marconi's had got out to VP8 in record time, and so Chris was able to tell colleagues who worked on it here at home how it was progressing in VP8.

Ten Metres

Proving your conductor a liar by still 'giving' with the DX, although admittedly not as well as in the past two years. Consequently, still a favourite with the contributors.

GW4OFQ looked around with his SSB and "G5RV", and worked J3AH, VP2VD, and HK3AWY.

G4BUE found conditions on the Sunday of the ARRL 28 MHz contest rather good, so he decided to go to the milliwatt level of QRP at which, as he says, one is amazed to work *any* DX. His 100 milliwatts worked 19 States, including W6, and at the ten milliwatts level QSOs were made with UB5VAZ, CN8CY, UA9QBT, and KX4R, which has sparked-off a serious intent to try and make a WAC with ten milliwatts input. Just think of it — Worked All Continents on ten milliwatts! On the Saturday, the band was by no means so good, and it was quite impossible to raise Ws in the contest with less than 350 milliwatts, even including some of the 'regulars' who always hear Chris if he calls them.

G4HZW (Knutsford) continues to stick to Ten and his TS-820 and two-element Quad, mostly SSB but some CW too. The month of December was reckoned to be pretty reasonable although poorer than previous years, this being noticeable by way of a shortage of the Pacific stations. Among those worked we note 3B8FK, 5Z4CL. 7P8CM, 7Z2AP, 9N38, 9J2BO, A4XJM, A71BH, C6ADV, CQ7OF (Portugal), G4KXL/DU1, EP2TY, HG5ZC who had ten watts to a dipole, HS1ABD, HK8BVN, JA6GGD, JA9YBA, JA3YQP, JR6WOL, LU1E, LU4DQ, M1V, PT7KW, UA0ADR, UK0AMM, UA0AIS, UA0SAU, UA9s, UJ8JKU, UK8MAF, UH8HCS, RH8HCV, UK7PAL, RL7PAD, RL7PCV, V2ARO, VO2CW, VE1-2-3-4-5-6-7, VE3MVQ, who was using five watts to a converted CB rig, VK2-3-4-5-6, VP2VA, VS6IW, all W call areas, Z26JC, ZL4AS, ZS3MS, ZS1FM, ZS4GL, and ZS6AYG. In addition Tony noted the evening openings to SM around 2300z as a bonus offering.

Ten for G2HKU looked like CW contacts with LU4DQ, N6HG, KF0M, K6LL/7, K7NHV, and N7CW.

The final offering comes from G4LDS, who worked WB2UVH, KA2HTV, W5AYL, VE1ACK, UB5VFO, RA9CPQ, 4N1R(YU1DZ), UA1TDW, RA9MAQ, RB5CCO, UB5RDB, G4KXL/DU1, W0KJ, K6LL, W1BFA, W4QQU, 6W8JB, WB8QEA, W4GCB, UC2AFZ, and 4XHK.

Complete

That's the bottom of a thinner pile than usual — hope those contributors suffering seasonal indigestion will feel better by next time! Deadlines for the next few offerings are in the 'box', and are as always to arrive, addressed to your scribe, "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

CONVERTING THE ICOM ICB1050 CB TRANSCEIVER TO TEN-METRES FM

H. ALLISON, G3XSE

OF all the legal FM CB transceivers available in this country it seems fitting that one of the easiest to convert to amateur use should be the one bearing the well-respected *Icom* name. Having used the FT-220 two-metre rig on Ten *via* the excellent *Microwave Modules* transverter I became interesed in something smaller to use mobile.

Amateurs who have used the legal FM CB system — (hang your heads in shame!) may be interested to know that on ten metres your nominal four watts will go much further. This is due to many factors. For starters there is much less traffic on the frequency so a weak signal is not so likely to be stamped on by anyone else; secondly there are no aerial restrictions; and thirdly, by-and-large amateurs are gentlemen. Thus, mobile-to-mobile, range on Ten can be twenty miles or so, mobile-to-base up to fifty; and all the foregoing under 'dead band' conditions. When it is open, 28 MHz FM simplex can go right round the world on milliwatts. As a bonus there are ten-metre repeaters in the States accessible both on ten and two metres. In good conditions it is possible to work somebody hand-portable in the Bronx who is on two whilst you are driving in the U.K., and all with only a few watts!

Where is 28 MHz FM?

The action is centred around 29.6 MHz, the calling channel. The repeaters have their outputs *up* from this channel, with the inputs 100 kHz lower. Channel spacing is 10 kHz, and deviation normally 5 kHz.

How to Get Going

Interested? Now for the good news. You can join in the fun for, at the most, £30; you may be lucky and get away with less. What you need is an Icom ICB1050 FM CB set. Put on your false beard and dark glasses, plus trilby hat, turn up your collar, look round to make sure nobody is about to recognise you — and sneak into your local CB shop. Do *not* be fobbed off with anything less than a real, live, genuine Icom ICB1050 (the only known possible alternative at the moment being the *SMC* 'Oscar' (new range) equipment. Get out the handbook and check that it has *(a)* three crystals and *(b)* that delightful Motorola chip, the MC145106. If in luck pay up, and wipe your feet on the way out, making sure you are not seen leaving with a CB set in your hand.

Circuit Description

What you have bought is a double-conversion superhet (10.695 MHz/455 kHz) and single heterodyne FM transmitter. The block diagram is helpful, though much improved if you draw in the feed from the VCO to the 16 MHz mixer, which seems to be missing.

To help explain what is happening, let us consider a transmission on CB channel 40, 27.99125 MHz, which we will call 27.991 MHz; let us also assume that the VCO is on frequency, that is 10.240 MHz *low* of the required frequency, or 17.751 MHz. This is mixed with the 'Tx' crystal of 19.961 MHz, to give 0.790 MHz. Since the synthesizer runs in 10 kHz steps this is equivalent to a binary count of 79, which is 1001111. If you run a 'scope or *Avo* along the programmable divider inputs of the MC145106 chip you will find, surprise, binary 79. Note, pin 17 is the least significant digit, pin 9 (permanently grounded) the most significant digit. The actual binary count goes from 40, which is channel one, to 79 which is channel 40. *Warning:* do not listen to the CB frequencies if checking this out; it could destroy your sanity.

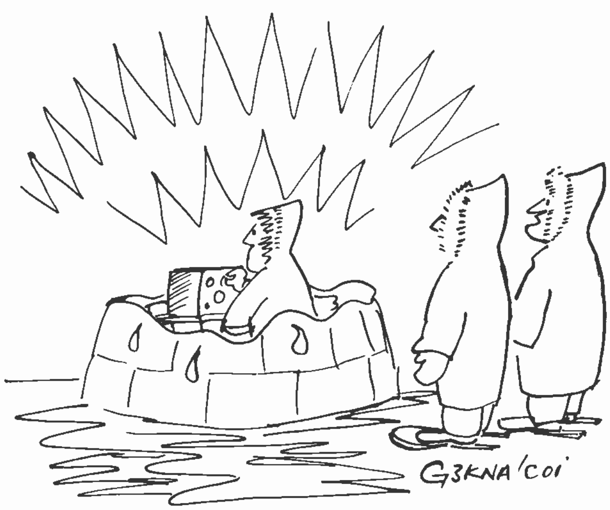
If the program ran high enough, 29.6 MHz would be a count of (29.6 — 10.240 — 16.961) divided by 10 kHz, *i.e.* 239.9, known as 240, and we're going to be 1 kHz out; this is binary 0111100000. Channel 25 of the legal CB is 001000000; thus if we 'hold up' pins 10, 11 and 12 *via* a 10K resistor, we are on 29.6 MHz — sneaky, eh? Connect up your aerial and 12 volts, and turn on the shack HF rig; tune the latter to 29.6 MHz. Link pins 10-11-12 and then from them, *via* a 10K resistor, to pin 1 of the MC145106. Whilst holding the Transmit button down, unscrew the core of T202, the VCO, until a signal is heard on 29.6 MHz. Now tweak the Tx strip for maximum output; T209, T301, T303, T307, about four watts. On receive, tweak T101 and T102.

Now the bad news; the Icom will now transmit and receive up from 29.6 MHz, but not down; this is due to a wrong count from the channel select switch. To deal with this problem, unsolder the green lead from pin 13 and discard, unsolder the violet lead from pin 13 and transfer to pin 11, The rig will now step down in 10 kHz steps to channel 9, which is 29.440 MHz. Ignore channels 1 to 9; channel 35 is the band edge. The slight count error can be eradicated with CT202 on Tx and CT201 on receive.

Results

Super! A pre-amp will help, as will a linear, but, barefoot, within an hour of modification and with only a vertical dipole, contacts had been made across town, across Russia, and across to U.S.A. On all sets modified, RV303, the deviation control, can be set to maximum, *i.e.* fully clockwise. Repeater working can be effected either by winding down ten notches from the repeater output frequency when transmitting, or you can switch in a 16.861 MHz crystal for repeater working in place of the 16.961 MHz fitted, a feat easily accomplished by the use of the Hi-Lo switch.

Editorial footnote: any CB-er who might feel a bit uptight at G3XSE's remarks on CB should be aware that they are at least a little tongue-in-cheek: G3XSE is himself a practising CB-er!



". . . told him he should have a fan on that linear. . . ."

Jaybeam Catalogue

Jaybeam's new "Amateur Radio Antennas" catalogue is now published and contains technical details, including VSWR graphs, of their entire range of amateur antennas. The catalogue is available from most Jaybeam stockists, or direct from Jaybeam Ltd., Dept. AM/CAT, Kettering Road North, Northampton NN3 1EZ, the envelope marked "SWM/1" and containing a medium-sized *s.a.e.* with a 12½p stamp.

SOME VERTICAL ADDITIONS

MORE 'CUT AND TRY' FOR EXPERIMENTERS

If you like experimenting with antennas — and most of the radio amateur fraternity do — then the short article entitled "Getting Out on 10 MHz" which appeared in the December, 1982, issue of this journal may have been of interest.

The arrangement described consisted of nothing more than adding to an existing 5-band vertical antenna a length of wire (approximately three-quarters of a wavelength overall at 10.12 MHZ) in an inverted 'V' configuration using a separate timber mast to support it.

The original diagram is repeated here — *see* Fig. 1 — the added wire length chosen permitting the same section of coaxial cable that feeds the vertical to accommodate the 10 MHz wire, since this, too, must offer a low impedance in respect of this frequency at point 'A'. The physical distance between the vertical antenna and the additional timber will of course depend partly on the height of the latter and partly on the above-ground feed point of the existing vertical; a few pencil and ruler sketches made beforehand soon reveal the best spacing whilst remembering that point 'B' should be at a high point in the interests of maximum radiation.

The manner of adjusting the added 10 MHz wire for a low SWR indication is described in the earlier article; it consists basically of gradually shortening the wire at the insulator end until a satisfactory 'in the shack' reading results — say 1·5:1, or better.

Incorporating Top Band

Clearly if sufficient wire could be added to the system at the insulator end it would be possible to load up and operate on 160 metres. This would, however, immediately throw the earlier carefully set up adjustments for 10 MHz into disarray and as such is impracticable. One could of course fit a switch at the end of the 10 MHz section to bring in or remove any additional wire, but trips to and from the garden end do not appeal on dark, wet winter nights!

A more refined approach to the problem would be to fit one side of a suitable frequency trap to the end of the 10 MHz wire and then add sufficient further wire to accommodate Top Band to the other side — *see* Fig. 2. Such a trap if carefully resonated at 10 MHz would act as an automatic frequency switch; it is not over-difficult to construct a suitable item.

Making a 10 MHz Trap Coil

For precise frequency checking of trap coils use of an accurately calibrated GDO (grid-dip oscillator) is called for, but in cases where no such item is available (provided construction is identical with that described here) good results should be obtained at 10 MHz. The items required are:—

(1) A 7-ft. length of 18 s.w.g. copper wire with PVC insulation 3mm. thick.
(2) An oddment of standard plastic waste pipe 2·5-in. long, 1·5-in. i/d and $1^{11}/_{16}$-in. o/d.
(3) One 47pF high voltage capacitor — say 4 kV.
(4) A short length of fine cord or string.
(5) One 2-terminal plastic block connector.

Anchor the wire firmly at one end of the 'former' then tightly close-wind on exactly 13 turns and secure. Attach the connector to the 'start' together with one lead-out of the capacitor placed inside the former; solder the other capacitor lead-out to the coil end. If a GDO is available the coil should now show a pronounced 'dip' slightly lower in frequency than 10 MHz and this is satisfactory. To raise the resonant frequency take the length of cord or string and, commencing at either end, force-wind it between a few turns at a time re-checking with the GDO until resonance is noted at, say, 10.12 MHz when the overall winding length will be approximately 1·75 inches. Thereafter snip away the superflous cord and seal the turns against movement. If there is any tendency for the assembly to be pulled apart when external connections are made attach a stiff cord tensioner to take the strain between each end. Solder some 20 to 30-ft. of aerial wire to the

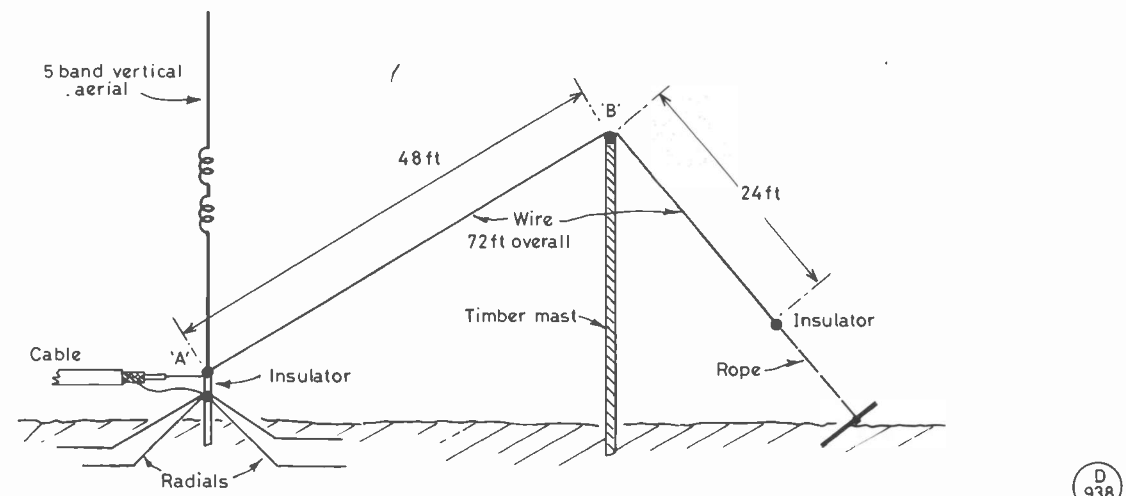
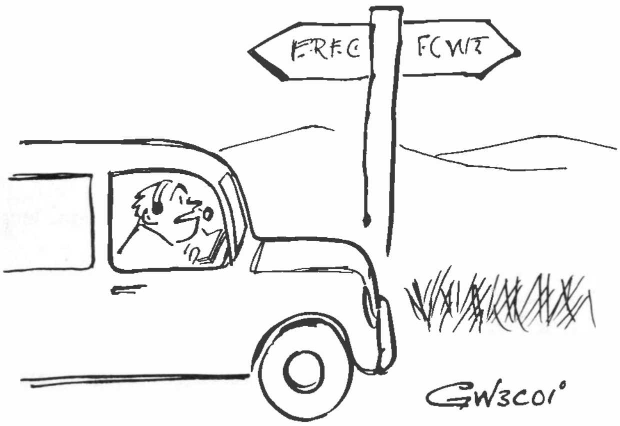


Figure 1 Not to scale

coil end remote from the connector and attach the connector to the end of the 10 MHz antenna wire. Place the trap in a suitable plastic container (filched from the kitchen perhaps) and seal ends well. Extend the added wire horizontally or as convenient and anchor.



". . . using an Atlas here. . . ."

Adjustments

At the station tune up on 10 MHz and note that, due to the trap, the tuning and other transmitter adjustments are virtually identical with previous tests.

Retune the equipment to a Top Band frequency — say 1.960 MHz or thereabouts — into a 50-ohm dummy load and adjust for optimum working. Exchange the dummy load for the antenna feed and without altering any of the transmitter controls obtain a low SWR indication by means of the station ATU; use of an ATU will normally be obligatory on this band.

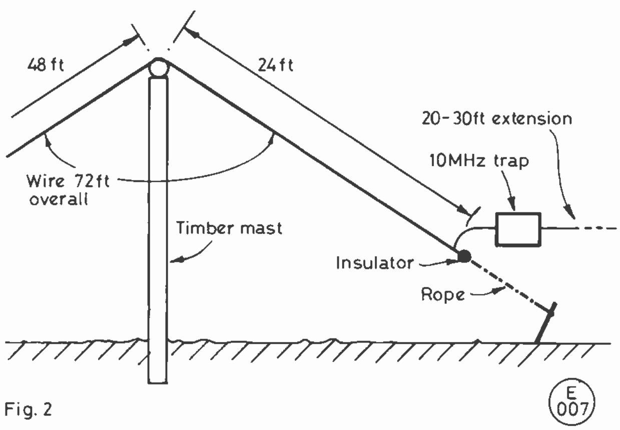


Fig. 2

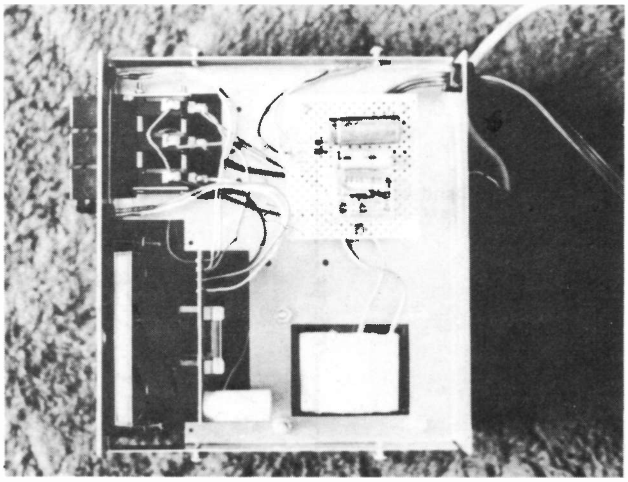
Conclusion

The apparatus used in connection with this and the earlier short article consisted of a Butternut HF5V-III vertical antenna covering 80, 40, 20, 15 and 10 metres, a Trio TS-530S transceiver and a Trio AT-200 combined SWR/power-meter with incorporated and optional switchable ATU.

The Butternut vertical was initially adjusted in conjunction with its radial system for low SWR indications over the five bands covered by it and in the CW patches; the 10 MHz and Top Band additions were made later as described so providing a 7-band system using a single coaxial feed line. Moving up the band on Eighty to the SSB section makes use of the ATU necessary if it is essential to maintain a low SWR, and this also applies to 160m. On all other bands the RF can be beneficially pushed into the system direct, the worst SWR indication being 2:1. The whole caboodle is capable of being squeezed into quite a small garden space, but where space is no problem clearly the added wire need not be bent and some benefit might result when operating on Top Band. At a great many locations, however, existing antennas for this band can already be said to be 'laying on the ground' since to get them up but an eighth-wavelength above it requires mast heights of some 60-ft!

Super results might not be obtained DX-wise with this simple arrangement on 160m. but at least it makes possible contacts with locals who still prefer the band to 2m. FM!

Hopefully other types of vertical antenna can be adapted; no guarantee can be given performance-wise of course, but if the desire to experiment has been stimulated, so be it — after all that is what the hobby is all about. No mention has been made regarding the 18 and 24 MHz bands since at present special restrictions apply to them.



David Jolly, G3TJY, sent us this photo, as a satisfied user, of an *L.J.E.* D-LAY-5 rotor brake delay, fitted to his Ham II control box. Designed for C.D.E. rotors, Models CD-44, CD-45, Ham II, Ham III and Tailtwister, G3TJY says he finds it invaluable, automatically delaying brake action for 5 seconds. Full details of the D-LAY-5, which costs around 20 U.S. dollars, are available from *Lance Johnson Engineering,* P.O. Box 7363, Kansas City, Mo. 64116, U.S.A.

MAKING THE MOST OF AN SSB TRANSMITTER

SPEECH PROCESSING EXPLAINED

J. V. Moss, B.Sc., G4ILO

SINGLE sideband is second only to CW as the most effective mode of transmission for communication over difficult paths. One of the reasons for the superiority of CW is that 100% of the output power is used to carry information. In SSB transmission, speech peaks must be kept below the maximum peak power rating of the transmitter in order to avoid peak clipping, which would result in splatter. The peak-to-mean ratio of a voice waveform may be as much as 5:1, which means that a correctly driven transmitter rated at 100W p.e.p. could have an average power output as low as 20W.

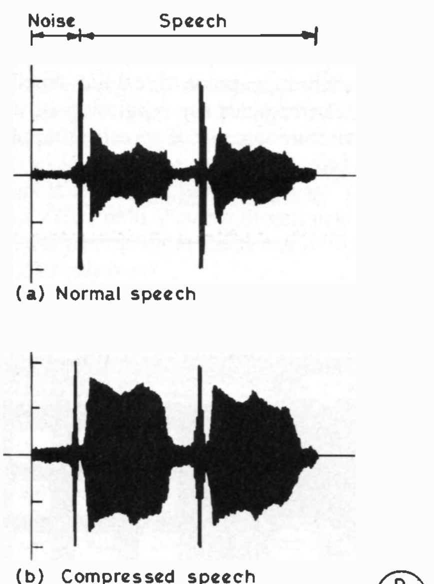


Fig. 1 MODULATED SSB RF ENVELOPE

Voice peaks convey very little useful information. It is the average power level which reflects how well a signal will be copied at the other end. One of the most effective ways to improve the talk power of a station without the need for an expensive, power-hungry linear amplifier is to artificially reduce the peak-to-mean ratio of the voice waveforms, and hence increase the average power. This can be done either by clipping or compression, at AF or RF.

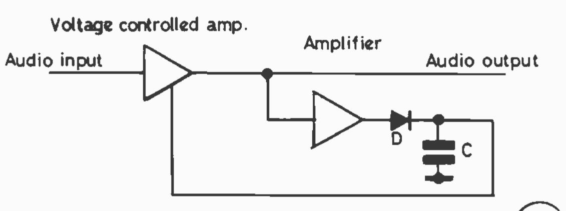


Fig. 2 SPEECH COMPRESSOR

Fig. 1 shows a sample of the output of a modulated SSB transmitter, with and without speech compression. It can be seen that the overall shape of the modulation envelope, as generated by the interaction between the many different frequencies making up a complex speech waveform, is basically the same in both cases. The sharp peaks, which are present to a varying extent in all speech waveforms, have been limited or clipped in Fig. 1(b) to allow the modulation to drive the transmitter to something like twice the original power. This increase in power can also be seen when the transmitter is modulated by noise. It is a characteristic of speech processed signals that background noise sounds louder in the pauses between speech. This is not normally a problem over distant propagation paths, where it is usually masked by general noise and QRM.

There are four basic methods of achieving speech processing. Fig. 2 shows the block diagram of an audio compressor. This is one of the simplest speech processor circuits, and is often built into the casing of a microphone, when it is known in the CB world as a 'power mike'.

The circuit contains a detector which produces a DC voltage related to the level of audio. This voltage is used to control the gain of a preceding amplifier stage and hence keep the output constant above a certain threshold. The time-constant of the control voltage, determined by the capacitance, C, in the detector circuit, is generally fairly slow, and so the compressor will not substantially alter the peak-to-mean ratio of syllabic voice waveforms. It will, however, hold the average output at a constant level, either when the operator moves away from the microphone, or if he becomes too enthusiastic and starts to shout!

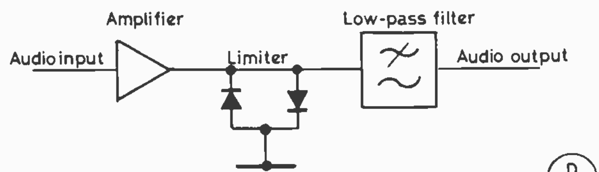


Fig. 3 SPEECH CLIPPER

If the time-constant of the control voltage is reduced in an attempt to design a compressor which can reduce the peak-to-mean ratio of voice waveforms, problems with stability and distortion ensue. These problems can be overcome, for example, by the use of feedforward, rather than feedback, techniques. The effect is similar to that obtained by the use of audio clipping (Fig. 3), which is commonly used in FM modulators, but which has certain limitations, particularly for SSB work.

Clipping a waveform produces harmonics. Many of the harmonics of a clipped audio waveform will still fall within the audio passband, for example, an 800 Hz wave will produce harmonics at 1600 Hz, 2400 Hz, 3200 Hz, etc. These harmonics will degrade the quality of the original audio, and waste power, although their effect may be reduced by following the limiter with a low-pass filter with a sharp cut-off at about 3 kHz. Nevertheless, the resulting audio can sound far from natural, and although an audio clipper may be effective at keeping the power meter at a healthy reading, it may often result in reduced intelligibility at the other end.

Most SSB transmitters have automatic level control (ALC). This is a form of RF speech compression (Fig. 4). A detector coupled to the transmitter output produces a voltage which varies in proportion to the RF power out. This voltage is used to control the gain of one or more driver stages, in order to prevent the output devices from being overdriven. As with an audio compressor, the capacitance in the detector circuit determines the time-constant of the control voltage. This is usually fast enough to allow a limited amount of compression, perhaps 3dB, but fast peaks, in conjunction with too much mic. gain, will still get through, resulting in splatter and TVI.

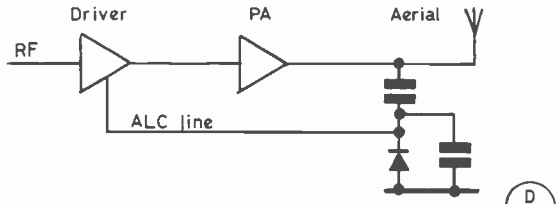


Fig. 4 RF COMPRESSION (ALC)

Any form of compression will introduce distortion and, in the output stages of a transmitter, where there are no narrow filters, this will result in some widening of the bandwidth required by the transmission. It should also be remembered that distortion generates harmonics, and harmonics of the transmit frequency will fall in other, possibly non-amateur, bands, providing a potential cause of TVI. It is therefore preferable that all speech processing takes place before the crystal filter, so that the selectivity curve of this filter determines the bandwidth of the transmitted signal, and allowing the RF stages to operate in as linear a manner as possible.

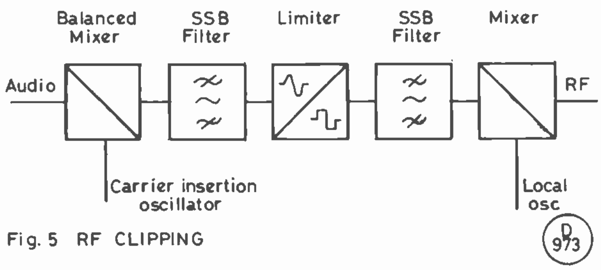


Fig. 5 RF CLIPPING

RF clipping is the most effective way of increasing the average power output of an SSB transmission without increasing the bandwidth. The clipping can take place either at the IF, just before the crystal filter (Fig. 5), or in an outboard unit, in the microphone lead. Whichever method is adopted, the principle is the same. The incoming audio is translated to SSB at a high frequency, greater than 100 kHz. The SSB signal is then clipped. The harmonics which are produced (for example, a 9 MHz IF would result in harmonics at 18 MHz, etc.) are removed by the sharp selectivity of the SSB filter which immediately follows. The SSB signal is then either heterodyned to the wanted frequency, in a built-in unit, or translated back to audio again, in the case of an add-on device.

An RF clipper should not alter the tonal quality of the transmitted audio at all, although the person at the receiving end will become aware of breath and background noises, as the difference in level between these and full modulation will have been reduced.

ALC COMPRESSION USED	RF CLIPPING USED	AVERAGE POWER OUTPUT (100W pep Tx)	EFFECTIVE POWER GAIN
0dB	–	15W	0dB
3dB (max)	–	30W	3dB
0dB	18dB	50W	5dB
0dB	24dB (max)	60W	6dB

Table 1 : EFFECTIVE POWER GAIN WITH RF COMPRESSION & RF CLIPPING

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The sort of improvement which can be obtained using RF clipping can be seen from Table 1, which was derived from practical results using an average-reading power meter, a 100W p.e.p. SSB transmitter and a commercial outboard RF clipper. It can be seen that a doubling of average output power was obtained using RF clipping, rather than ALC (RF compression). The results will vary from rig to rig, and will also be affected by the operator's voice characteristics, but a transmitter with poor ALC or low mic. gain could be expected to produce an even greater improvement of perhaps 6dB. A 100W transmitter could thus be made to perform more like 400W!

In order to obtain the full benefit of an RF clipper, the device must be properly set up. If the output from it is too high, the transmitter ALC will be working to keep the RF output down to the rated level, causing unnecessary distortion and possibly splatter. The output control of the clipper should be slowly advanced, while whistling into the microphone (preferably using a dummy load!), until the power output indicator just reaches the reading which it will normally reach on a whistle without the clipper connected. Advancing the output control beyond this point will not produce any more RF output, due to the action of the ALC.

RF clipping can increase the effective power output of a transmitter by 2 to 4 times. Even a correctly set up clipper will sound unnatural to local stations however, and it is a matter of personal choice as to when to switch in speech processing. A linear will produce the same increase in talk power without any degradation of audio quality, but at much greater cost.

However it must be remembered that an amateur is judged by the quality of his signal, in much the same way as people are judged by their appearance in real life. Intelligent use of speech processing can enhance the reputation of an amateur and his station; indiscriminate use of speech processing can only do the opposite.

I.C.S. Electronics Ltd. **announce the availability in the U.K. of the KT-2, a new low-cost microprocessor controlled keyer/trainer from A.E.A Inc. of Seattle, U.S.A. It can be programmed in keyer mode to act as a normal electronic keyer, or will simulate a mechancial 'bug' key. Sidetone frequency, Morse speed and character weighting are all individually programmable. In trainer mode, code groups can be sent at gradually increasing speed in either slow code or fast code modes. The KT-2 Morse Keyer/Trainer costs £89.00 inc. VAT, plus £2.50 post/packing and insurance, and is obtainable from I.C.S. Electronics Ltd., P.O. Box 2, Arundel, West Sussex BN18 0NX. (Tel: 024365-590.)**

CLUBS ROUNDUP
By "Club Secretary"

A NICE large clip of reports, so let us get straight into them with no more ado.

The Mail

We kick off with the report from **Abergavenny,** where the Hq is still at Penyfal Hospital, in the room above Male Ward 2 every Thursday evening. The club also advise that they are registered for the RAE — entries to the Hon. Sec. by February 15 for the May exam; late entries may be taken subject to the usual late-entry extra fee. Their RAE class runs on Tuesday evenings at the Seminar room, Nevill Hall Hospital.

February 15 is the date for **Acton, Brentford & Chiswick,** as usual at Chiswick Town Hall, High Road, Chiswick. The subject is a discussion on the most suitable aerials for G3CCD's F0UT site in France.

Addiscombe is primarily a contest club, who foregather every Tuesday evening in "The Woolpack", Gloucester Road, Croydon; details from the Hon. Sec. or just turn up from 2100 onwards.

The **Axe Vale** crowd have moved to the Cavalier Inn, West Street, Axminster, where they are to be found on the first Friday of every month.

For details of the **Aylesbury Vale** doings we must refer you to the Hon. Sec. — *see* Panel — as they have just had their AGM.

The **Biggin Hill** Hq is the Memorial Library, where on February 15 they have Pat Hawker, G3VA to come along and talk about "The Secret Listeners."

It is the Community Centre in Victoria Street, next to the bus station, where they have a booking on the first and third Monday in each month. This is **Braintree.**

B.A.R.T.G. looks after the interest of those involved in RTTY, whether old-fashioned teleprinter, new fangled home-computer or specialised electronic machine or even AMTOR; details from the Hon. Sec. — *see* Panel.

Rally

February 6 is the date for one with a difference, we are told. This is the **Bury** rally at their Hq at Mosses Community Centre, where they hope the collection of stalls and the bring-and-buy will contrive to result in a veritable Aladdin's Cave for the home-brewer or buyer. The Hon. Sec. will tell you more — and throw in details on the club, too, for that matter!

Down to Devon, **Caradon Hill Repeater Group** are based in the general area of Launceston and Holsworthy; details from the Hon. Sec. — *see* Panel.

For **Cheltenham** we must refer you to the Hon. Sec. — *see* Panel — as we understand a move of Hq is afoot and we don't have the latest details.

At **Chesham** the Hon. Sec. was re-elected at the AGM; and it is to him we must refer you for details of the club, its Hq and dates.

Cheshunt still have their place at Church Room, Church Lane, Wormley, on Wednesday evenings. For February they have natter sessions on 2nd and 16th. February 9 sees G8NDR on state-of-the-art video recording, while on 23rd G4MIU talks about engineering workshop practice.

The Green Room, Fernleigh Centre, 40 North Street, is home to the **Chichester** lot; an ATV evening is down for February 1, and on 17th G3YHM will be guiding them through the intricacies of building a QRP transceiver.

Looking now at **Colchester,** we find them on February 10 at Colchester Institute, Sheepen Road, when various members will combine to discuss the construction of amateur radio equipment; on 24th, G4LSP talks about club motor racing.

It is always the first Thursday of the month for **Cornish;** the venue is the SWEB Clubroom, Pool, Camborne. Sad to say we don't have the February details, as we mislaid our copy of the **Cornish Link** — shame on us! What we can say from personal experience is "Get there early if you want a seat!" The room is always filled to bursting with some sixty-plus members in attendance each month.

As to **Crawley** they alternate their main meetings at Trinity United Reformed Church Hall, Ifield, with informals at members' homes. Details on everything from the Hon. Sec. at the address in the Panel.

Like Crawley, **Cray Valley** seem to have had a fine year to look back over at their February meeting at Christchurch Centre, High Street, Eltham. Details for February from the Hon. Sec. — *see* Panel.

February 19 is AGM time at **Crystal Palace** and they hope to have the RR there, too, to answer any questions on RSGB matters that may arise. The venue is, as usual, All Saints Parish Room, at the junction of Beulah Hill and Church Road, Upper Norwood, opposite the old ITA mast.

We now head for **Derby** and that means the top floor at 119 Green Lane every Wednesday evening. February 2 is a junk sale, and on 9th they have a night-on-the-air. Technical topics come on 16th, and on 23rd they have a film show.

Deadlines for "Clubs" for the next three months—

March issue—January 28th
April issue—February 25th
May issue—March 25th
June issue—April 29th

Derwentside wrote to send their Seasonal Greetings, as did so many others, and we are pleased to hear that they are doing better than ever at the R.A.F.A. Hq, Sherburn Terrace, Consett, every Monday evening.

Anyone interested in the hobby is welcome to the **Doncaster** club, who have their base at Gertrude Bell Hall, Church Street, Armthorpe, Doncaster, every Monday evening.

We don't have the latest from **Echelford,** so we have to refer you to the Hon. Sec. for the details and dates. *See* Panel for his details.

A "Beginners Evening" is down for **Edgware** on February 10, and a talk on D/F by G4GYS on February 24. The Hq is at 145 Orange Hill Road, Burnt Oak, Edgware.

The **Farnborough** crowd are based on the Railway Enthusiasts Club, Access Road, off Hawley Lane, near the M3 bridge; they are to be found there on the second and fourth Wednesday each month.

If you want to join the **Glenrothes** club, you head for Provosts Lane, Leslie, Fife, on any Wednesday evening; we notice they have a limited-numbers visit set up on February 16 to the BBC's MW station at Falkirk.

We have a note from the **Gloucester** club about an award, details of which we have passed to *CDXN.* However, it includes the name and address of the Hon. Sec. — so no doubt he would be pleased also to give details of the club and its activities; his details are in the Panel.

Anyone interested in home-brew or QRP operation should be a member of the **G-QRP Club;** its leading light, of course, is our old friend and contributor G3RJV — and nearly 1600 members can't mean anything but a lively and interesting club and magazine. Details from the Hon. Sec. — *see* Panel.

"The Five Bells", East Finchley is the home these days of the **Grafton** Radio Society, where they are to be found on second and

Names and Addresses of Club Secretaries reporting in this issue:

AVERGAVENNY: D. F. Jones, GW3SSY, 2 Dalwyn House, Llanover Road, Blaenâvon, Gwent NP4 9HY. *(0495-791617)*
ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London W3 8LB. *(01-992 3778)*
ADDISCOMBE: P. Hart, G3SJX, 42 Gravel Hill, Croydon, Surrey CR0 5BD. *(01-656 9054)*
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DERWENTSIDE: P. Howes, G8WEJ, 26 Hadrians Way, Ebchester, Co. Durham DH8 0PE.
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GRAFTON: J. W. Chambers, 12 Sylvan Avenue, Finchley, London N3 2LE. *(01-346 5841)*
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HAVERING: A. Negus, G8DQJ, 17 Courtenay Gardens, Upminster, Essex RM14 1DH. *(Upminster 24059)*
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KSC: P. J. Fay, G3AKG, 116 Lowfield Road, Caversham, Reading RG4 0PB. *(Reading 476718)*
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fourth Fridays. The venue is in East End Road, a half-mile east of Manor Cottage on the North Circular Road.

On February 17, the **Greater Peterborough** lads will be at Southfields Junior School, Stanground, Peterborough, to see one of two video talks, the final choice depending on factors outside their control.

One of the places your scribe always recalls is the **Guildford** venue, which is at the Model Engineers' Hq in Stoke Park — he's been there in connection with the models, but never for amateur radio! February 11 is down for G4KET to talk about the business of electricity supply.

We lack an update for **Harlow**, but we can say that their place is at Mark Hall Barn on First Avenue, and that they are to be found every Tuesday evening. There is normally something organised during the month, interspersed with natter sessions and the club transmitter operation.

Harrow don't have any programme data in the current issue of the *Newsletter,* but on the front page is the main detail: Harrow

Arts Centre, in either the Belmont or Roxeth Room, every Friday evening.

The **Hastings** club seem now to have concentrated their activities at Ashdown Farm Community Association, and they appear to be there on more than one evening each week; for the rest we must refer you to the Hon. Sec. to clarify. His address and details are in the Panel.

We get our **Havering** club data in person — like the man comes and sticks it in our ear! All of which having been said, he forgot this month, leaving us simply to say they are at Fairkytes Arts Centre every Wednesday, and that normally there is something organised every other week, the intervening ones generally being down for a natter.

Hereford's AGM falls on February 4, at County Control, Civil Defence Hq, Gaol Street, Hereford; since they meet on the first and third Friday that gives 18th for the other February date.

The **Ipswich** gang now foregather at the "Rose & Crown", 77 Norwich Road, at the junction with Bramford Road. The regular meetings are on the second and last Wednesday in each month, but there is a chance that there may be some members there on other Wednesdays doing a Morse class.

The national society for Eire is **I.R.T.S.** and they know all that is going on in EI-land, so they are the folk to tell you where the local clubs are to be found. The Hon. Sec. would be pleased to give you all the gen — *see* Panel for his details.

The **Jersey** meetings are on Friday evenings at Le Hocq Tower, St. Clements — more details from the Hon. Sec. at the address in the Panel.

KSC is a club whose membership is open to Catholic radio amateurs and SWLs world-wide; details from the Hon. Sec. — *see* Panel.

At **Lincoln** the venue is the City Engineers Club, Central Depot, Waterside South, where the group foregather on the second and fourth Wednesday of the month; on other Wednesdays they have an RAE class and Morse practice.

On the second and fourth Thursday of the month, amateurs in the Edinburgh area head for the **Lothians** Hq at the Drummond High School; February 10 is down for a talk about "Jack's Black Box" by GM8GEC, while on 24th the virtues of QRP as a way of life will be explained by GM3OXX.

The **Macclesfield** arrangements are to meet at St. Andrews Old School, St. Andrews Road, Brough Street West, on the second Tuesday of the month for the 'formal' with talk, films, or whatever; and on the fourth Tuesday they have an on-the-air session at the same venue.

The February 3 talk at **Maidenhead** was still to be finalised at the time of their letter — doubtless they have a speaker organised by now; and on February 15, Richard Eaton of the Post Office will talk about "Current Developments in Satellite Communications". The Hq is at the Red Cross Hall, The Crescent, Maidenhead.

Fridays at the Methodist Church Hall, Blyth Road, is the thing for amateurs in **Maltby** — details from the Hon. Sec. at the address in the Panel.

There is a quiz evening on February 18 for the members of **Melton Mowbray**, at the St. John's Hq in Asfordby Hill. Melton Mowbray.

The **Midland** gang have their own place at 294A Broad Street, Birmingham, where they have a monthly meeting — February 15th G4JBB on the new pay phone. However, you can be pretty sure of finding someone at the Hq on any weekday evening as well.

If you are in the Leamington area, then you should know about **Mid-Warwickshire**; they are to be found at 61 Emscote Road, Warwick, on the first and third Tuesday evenings.

The weekly gatherings of the **Norfolk** crowd at Crome Centre, Telegraph Lane East, Norwich, alternate between 'short meetings' — February 2 and 16 — and the more formal sessions. The first of these will be on February 9 and is an initial HF Field Day meeting, and on 23rd there will be a talk on RAEN by G3HRK and G3PYN.

Thursdays at Carr Gate Working Men's Club is the **North Wakefield** arrangement; February 3 is a Computer Club night, on 10th they have home-brew (no, not best bitter, son!), followed on 17th by 'nothing confirmed.' That leaves February 24 when G3SDY will be talking about HF mobile.

Nottingham group are at Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood, Nottingham, on Thursday evenings — visitors welcome.

The club room of the **Pontefract** lads is at Carleton Community Centre; February 3 is down for the completion of some home-construction, or showing off the already-complete; on 10th the club station will be on the air, and on 17th they have a quiz. Projects evening is on 24th, and on March 3 G3HCW will be talking about HF aerials.

January 18 is the date for **Reigate**, and the venue the Constitutional and Conservative Centre, Warwick Road, Redhill. As for the topic, G3JKF will be talking about the antenna vector processor.

If you are in the **Rhyl** area, the locals foregather at the 1st Rhyl Scouts Hq in Tynewydd Road, on the second and fourth Thursday of each month; the latter is the 'formal' one, with talk and films or whatever, while the other one sees the club rig in use or something practical going on.

Did you serve in the Royal Navy, or in the Merchant Service, or even in a foreign navy? Then, you are eligible for membership, in one grade or another, of the **Royal Navy** Amateur Radio Society, and of course of the subsidiary groups at *HMS Belfast,* or in other parts of the world. Details from the Hon. Sec. — *see* Panel.

If you are into **Sharp Computers** as well as amateur radio — contact the Hon. Sec. at the address in the Panel, as he has news for you!

Down in Dorset the local brogue is quite strong, but there is no mistaking the message from the **South Dorset** Hon. Sec. — "come and join us!" Unfortunately we don't have the current details of the programme, so we must refer you to him — he is in the Panel.

At Brecon, one hopes, the Hon. Sec./Treasurer has by now received the confirming call he has been waiting for; if you want to ask him yourself, why not go and visit the **South Powys** gang at Concorde House, The Street, Brecon, on the first or third Tuesday of the month — and *you* could volunteer a talk or something like that yourself!

For the latest details on the **Stevenage** group we must refer you to the Hon. Sec. — *see* Panel — as they have now moved to a new Hq address.

On to **Stourbridge**, where they now foregather at the Cross Inn, Hagley Road, Oldswinford; February 7 is down for a natter and on 21st the subject is still to be arranged at the time of writing.

10 GHz and how to get going on this band is the matter in hand for **Stratford-on-Avon** on February 10, while on 28th there is a junk sale. The Hq these days is at the Control Tower, Bearley Radio Station.

Mondays, Thursdays, and Sunday mornings are the times when the **Sutherland** crowd get together at the Brewery Yard, Westbourne Road, Sutherland; of these the 'main' gathering is on the Mondays.

Surrey will have a talk and discussion on *OSCAR 8* with G4GTO on February 7, and on 21st there is the usual informal meeting. Both are at *TS Terra Nova,* 34 The Waldrons, South Croydon, on the Mess Deck on the first floor.

Over to **Sutton & Cheam** where the meetings for February are not specified in the *Newsletter* we have on hand — so we have to refer you to the Hon. Sec. for the needful. His address is in the Panel, of course.

A change of Hq address is noted for **Swale**; they now have their meetings at Nina's Restaurant, 43 High Street, Sittingbourne, every Monday evening.

It is the **Thames Valley** Golden Jubilee year in 1983; on February 1 G4NNS will be giving a talk on a DX-pedition to Andorra, at Thames Ditton Library Meeting Room, Watts Road, Giggs Hill, Thames Ditton.

We head now for **Thanet**, where our records show the Hq as being Birchington Village Hall; February 4 is a talk on test gear, 11th a visit to the Police Hq at Maidstone, and on 18th a talk on the history of VHF operating. Confirm that venue, though, with the Hon. Sec. — *see* Panel.

"The White Horse", on the main A38, Grovesend, **Thornbury** on the first Wednesday of each month, is full of local amateurs; for the February date they have a talk on Raynet.

Torbay have informals every Friday evening, plus a 'main' meeting on the last Saturday of the month, at Bath Lane, rear of 94 Belgrave Road, Torquay; the latter, for February will feature a talk on Teletext by G8HHS.

Up at **Tynedale** the gang have a place at the Falcon Hotel, Prudhoe-on-Tyne, Co. Durham on the first Tuesday of each month, in the room at the end of the bar; this booking is firm, we understand for the whole of 1983.

Looking at the **Vale of White Horse** newsletter, we see they are based on the "White Hart" in Harwell Village, every Tuesday in the upstairs meeting-room. The 'formal' for February is on 1st, and is down for G4PMK to talk about getting started on 23cm.

The latest issue of the **Verulam** newsletter doesn't give the February details, so we must refer you to the Hon. Sec. — *see* Panel.

WACRAL is a group of amateurs and SWLs who are all committed Christians; they keep in touch by way of an annual get-together, and nets both in the local and world-wide sense. Details from the Hon. Sec. — *see* Panel.

A visit to Radio Aire's studios is down for February 8 in the **Wakefield** calendar, and on 22nd they are 'at home' for a discussion on Amateur Radio; the Hq is at Holmfield House, Denby Dale Road, Wakefield, and the indications are that they are highly chuffed with things now the period of disruption due to the refurbishment of the building is completed.

West Kent have their main meetings at the Adult Education Centre, Monson Road, Tunbridge Wells. On February 4 they have their Energy Conversion Competition which, to judge by the Rules, should be quite entertaining, and on the 18th they have Richard Scott of the Open University, talking about "Micros — a Wider View."

February 7 sees the **Worcester** lot at the Oddfellows Club in New Street, where G3PQR will talk about matching aerials and SWR. Then on 21st, the informal will be at the "Old Pheasant" in New Street. Looking forward, the Worcester Mobile Rally for 1983 will be on July 10 at Droitwich High School, Ombersley Road — details from G8ASO.

Tuesdays at the Amenity Centre, Pond Lane, Worthing is the time to find the **Worthing** club in session. We were amused at the bit a member spotted in the back of someone's car: "Support Mountain Rescue — Get Lost!"

The **Great Yarmouth** club has its base at the STC Sports and Social Club, Beevor Road, South Denes; for the dates we must refer you to the Hon. Sec. — *see* Panel.

It is always interesting to hear about a club from somewhere else, and this time we heard about **Yeovil** from the newsletter of another club, and a member who has just moved down to the West; he rates the Yeovil club 100% by the sound of it. They foregather at Building 101, Houndstone Camp, on Thursdays, and we gather they have several rooms available to them for various activities. For February, the first three Thursdays are all down to G3MYM — how they make the lad work! — and all on widely different topics. February 24 is the odd one out, when they have a natter night and committee meeting.

Finally, the Happy Gang at **York**; every Friday evening finds them at the United Services Club, 61 Micklegate, York.

Finis

Once again we have seen the bottom of the pile — how nice to see the desk-top once a month! Deadlines for the next issues are in the 'box' in the piece, and are to arrive, addressed to "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ. 73, *BCNU.*

"A Word in Edgeways"

Letters to the Editor

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

Dear Sir—I feel there is a need for a bit of retraining in the art of communication: many QSO's are ruined by over-enthusiastic stations, in their hunt for that new country or prefix, calling over other stations already on the air. There are many licensed amateurs today who have not spent time as an SWL; you can always tell the licensed ex-SWL by the altogether different style of operating.

A novice licence could be a good idea, perhaps CW-only on 160/10m., 10 watts input; or each new licence should be on the air for the first 6 months on 10 watts input until confidence is gained for higher power operation. It's interesting to note that JA and W novices seem to be much better than many EU's.

Chris Baker, G4LDS

Dear Sir—Commenting on Mr. McIntyre's, GI3YDH, letter in the January issue, may I suggest that he should think very seriously of taking up Amateur Radio — in all its aspects? And to Susanne Tilley (same page), it is pretty obvious that a cure for her problems would be to take up CB!

After all, Amateur Radio is still a fascinating, challenging game — for those of us who want to take part without wishing to change the rules to suit ourselves. So let's stop squawking into our "hand helds" and get to know the subject in depth; any effort put into it will be repaid a thousand-fold, and it beats jogging any day!

Nev Kirk, G3JDK

Dear Sir—Three cheers for *Short Wave Magazine* for publishing the letter from GI3YDH in the January issue. There speaks a man after my own heart!

Not only is the whole spectrum (SSB or CW) taken over by the contest operators, but it frequently brings out the worst in many of them. Bad manners and, to say the least, questionable operating practices are painfully evident.

The question Mr. McIntyre should be asking is not what are the contest operators trying to prove, but rather who are the people who organise them in the first place — and who gives them the authority to proclaim that on certain weekends the amateur bands may not be used for their prime purpose.

I have been sounding-out opinions on this subject for years and it is my conclusion that if space were allocated to contests according to popularity then they would be fortunate to find themselves with 10 kHz.

The answer is to restrict contests (if, indeed, we have to have them) to a particular range of frequencies and place the onus of policing these frequencies upon the contest organisers. Contest operators would surely think twice about operating outside their allocated spectrum if, by doing so, their scores were invalidated by an adverse report from a monitoring station.

If the present trend continues and any old Tom, Dick or Harry is permitted to announce a "contest weekend" then I may well be joining Mr. McIntyre on CB, together with (if my enquiries reflect the true state of fellings) about 90% of the Amateur Radio fraternity.

E. Longden, G3ZQS

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

NEW QTH's

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

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G4MSS, R. Levenscote, 7 Lea Court, Huntsmans Close, Rochester, Kent. ME1 2RF.

G8JBZ, P. J. Bradbury, 52 Moss Park Avenue, Werrington, Stoke-on-Trent, Staffs. ST9 0EP.

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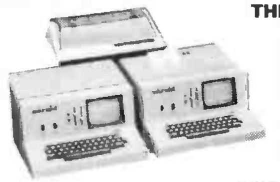

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Printed by K&SC Printers Ltd., Tunbridge Wells for the Proprietors and Publishers, The Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ. The *Short Wave Magazine* is obtainable through the following: Continental Publishers & Distributors Ltd., William Dawson & Son Ltd.; AUSTRALIA AND NEW ZEALAND — Gordon & Gotch Ltd.; AMERICA — International News Company, 131 Varick Street; NEW YORK. Registered for transmission to Canada by Magazine Post. *February 1983.*