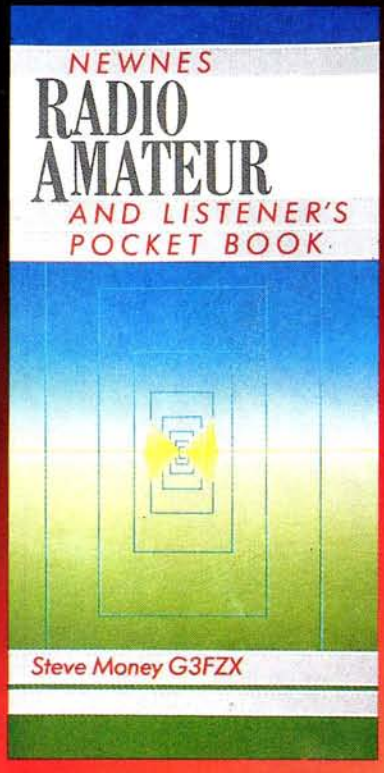
NOVEMBER 1987 £1·20

ISSN 0141-0857

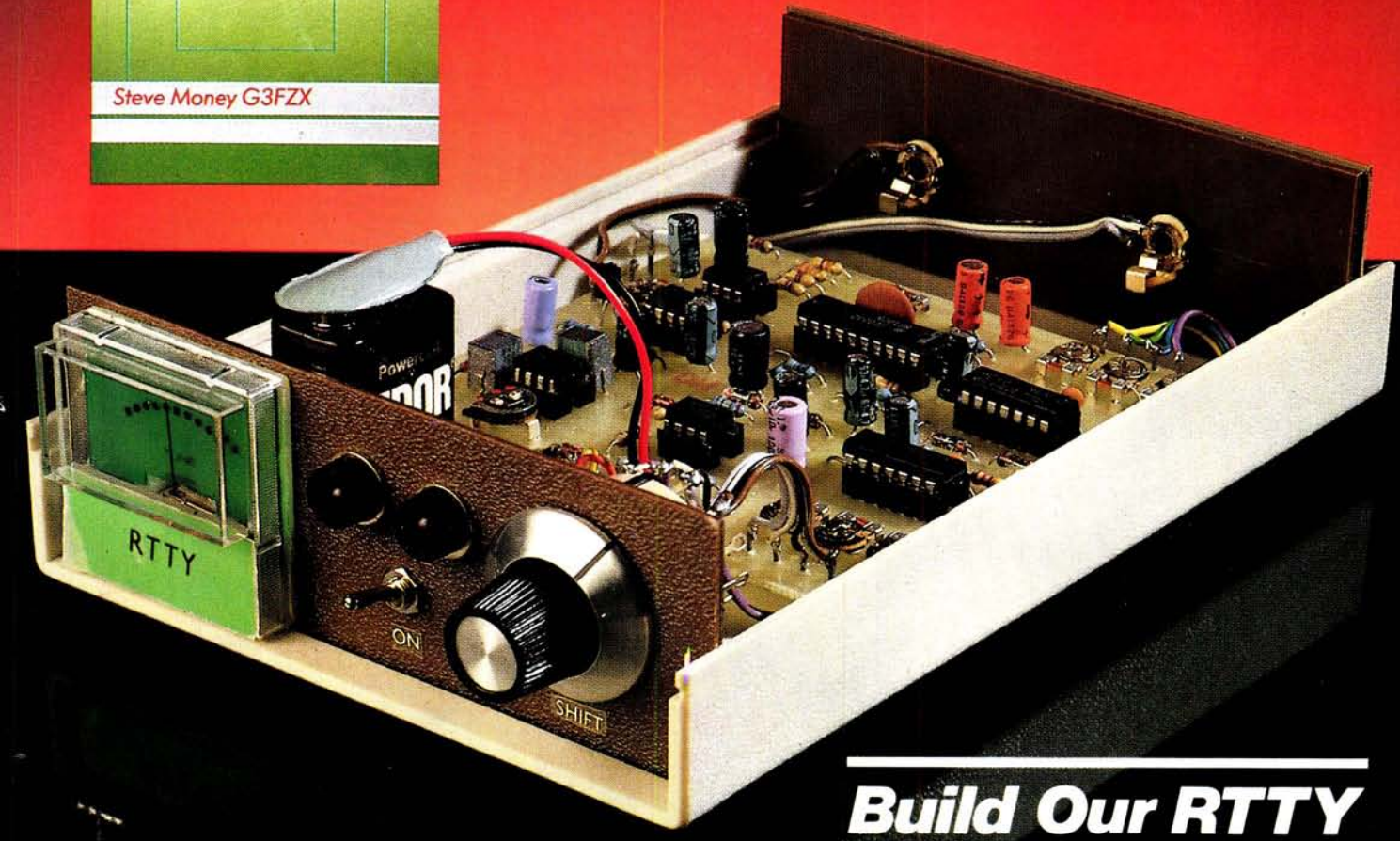
Practical Wireless

The Radio Magazine



PRE-PUBLICATION OFFER
Newnes Radio Amateur & Listener's Pocket Book

REVIEWED
The PK-232 Intelligent Terminal Unit



Build Our RTTY Tuning Indicator

Introducing the next logical step.

Yaesu's Dual Band Handie.

Two affordable radios in one–that's exciting.

Yaesu's dual-band FT-727R packs our best hand portable know-how into one compact design. At a price that's in step with your amateur budget.

Hit hard-to-reach repeaters with a powerful 5 watts on both 2 meters and 70 cms.

Work the bands quickly and easily with a wealth of microprocessor-controlled commands:

Jump between the separate VHF and UHF VFO registers. Program each of the ten memories for instant recall of repeater input and output frequencies and odd splits.

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Conserve power with the battery saver. It lets you monitor silently while drawing negligible current. And measure your battery level with the digital battery voltmeter. There's even a "Low Battery" LED.

Finally, your operation is rounded off with features like VOX capability. A one-touch repeater reverse switch. An LCD readout with illumination lamp. A high/low power switch. Remote computer control capability. And Yaesu's full line of optional accessories.

So step up your operating capability now with the logical choice in portable operation.

Yaesu's dual-band FT-727R.

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Practical Wireless
The Radio Magazine

NOVEMBER 1987 (ON SALE 8 OCTOBER) VOL. 63 NO. 11 ISSUE 968

THIS MONTH

Regular Features

NEXT MONTH

Build our Semiconductor Tester

"Making Waves" A new series on propagation and antennas

"Valved Comms Receivers" The Hammarlund Super-Pro

plus

All the usual features

Don't miss it—place your order with your newsagent now!

On sale November 12

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THE BRAINS AND THE BRAWN

THE BRAINS OF THE OPERATION: THE FT-767GX

Features include 160 to 10 metre transmit, including WARC bands. Optional plug-in modules for 6-metre, 2-metre and 70-cm operation. Receiver coverage from 100KHz to 30MHz. AM, FM, SSB, CW, AFSK modes built in. Ten memories that store frequency, mode. Dual VFOs with one-touch split frequency capability. Digital SWR meter. Digital RF power meter. Built-in RF preamplifier. Adjustable drive level from 0 to 100 watts.

Up to 30 minutes continuous transmit (100% duty cycle). Quick turnaround time from TX to RX for AMTOR, Packet, and QSK CW. AGC slow/medium/fast/off selection.

RRP FT767GX £1550.00 inc. VAT

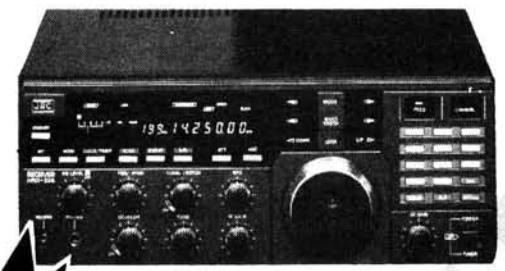
THE MUSCLE TO GET YOU OUT: THE FL-7000.

This solid-state amplifier covers 160 to 15 metres, and includes a built-in power supply, automatic tuner and lots of powerful operating features.

There's fast turnaround time for break-in (QSK) CW, HF, packet, radio, and AMTOR. Only 70 watts excitation for full output, and 1200 watts PEP input power. Automation antenna matching sensor turns off amplifer and rematches tuner circuitry if SWR rises above 2:1. Hands-free automatic band change when used with FT-767GX, FT-757GX or FT-980. Connection to up to four antennas, including automatic selection via optional unit.

RRP FL7000 £1600.00 inc. VAT

GENERAL COVERAGE RECEIVER



NEW

The JRC NRD525 receiver covers from 90KHz to 34MHz and with optional plug-in VHF/UHF convertor, can operate in the ranges 34-60MHz, 114-174MHz and 423-456MHz. Frequency selection is by either main tuning knob or more quickly from the ten-key pad. The receiver comes complete with a 200 channel memory, each storing freq, mode, band width, AGC and ATT. For further user convenience the NRD525 is equipped with twin clocks and an optional RS-232C computer interface.

JRC NRD525 £1195 inc. VAT

NOW EVEN BETTER!

- ★ All Mode SSB (USB + LSB) CW, AM & FM
- ★ All Band Tx (General Coverage Rx)
- ★ 100% Duty Cycle (100w CW, FM 25w AM)
- ★ Pushbutton mode selection
- ★ Switchable VFO steps (all modes)
- ★ New Notch Filter
- ★ Dual VFO's and 10 Memories (Freq. & Mode)
- ★ Computer Compatability (with optional interface)

OPTIONAL ACCESSORIES

FP757HD	Heavy Duty P.S.U.	£239	FAS-1-4R	Remote Antenna SW.	£80
FP757GX	Light Duty P.S.U.	£69	FC757AT	Automatic ATU	£349

FL7000 500W Solid State Linear Amplifier **£1,600**

FT757GXII RRP £969 inc. VAT

Prices subject to fluctuation

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Interlink delivery available, upon request, for items other than radios, from £7.30 depending on weight.
Same day despatch whenever possible.

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Importer warranty on Yaesu Musen products.
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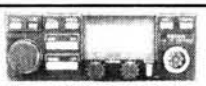
IC28E/IC48E



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ACTIVE ANTENNA
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28MHz – 50 – 144 – 432 –1200
All in one unit. Full duplex.
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108-136MHz
150KHz-2194KHz

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76-108 MHz
116-136 AIRBAND
153kHz-29.995MHz
FM - AM - SSB 32 MEMORIES
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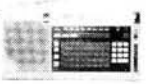
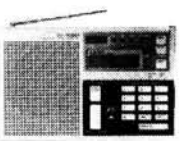
£325



SONY ICF 7600D 76-108MHz

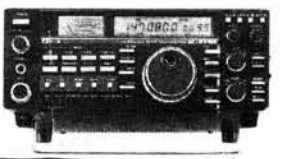
76-108MHz
153kHz-29.995MHz
Complete with case, mains power supply, earphone and frequency list.

£169



NEW! ICOM IC275

2M Multimode Base Station



£940

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50 kHz . . . 40 MHz

WITH LIMITED PERFORMANCE UP TO 100MHz

Professional electronic circuitry with very wide dynamic range. Meets professional demands both in electronics and mechanical ruggedness. 75 cm long glass fibre rod. Circuit is built into waterproof 2,5 mm thick aluminium tube. Ideal for commercial and swl-receiving systems. £129. See Review in August 1985 Issue p.35

NEW

DRESSLER ARA 900 ACTIVE ANTENNA

50MHz to 1300MHz
Gain 17dB Typical

TECHNICAL SPECIFICATIONS FOR ARA 900

Gain	17dB Typical (14-17dB)
Frequency Range	50-1300MHz
Noise Figure	1dB at 50-180MHz 1.5dB below 300MHz 2.0dB below 350MHz 2.7dB below 400MHz 3.0dB below 500MHz 3.8dB below 650MHz 4-6dB below 1300MHz

£139.00

Intercept Point 3rd Order: +18dbm at Input
Post £3.00 or Securicor £7.00 extra

Both antennas come complete with 7 metres of cable, interface, power supply and brackets.

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4 ONLY D200S £925

D200	2 MTR 500W SSB	£858
D200S	2 MTR 750W SSB	SEE PANEL ABOVE
D70	70 CMS 550W SSB	£1030

CARRIAGE FREE – SECURICOR

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MODEL	FREQ.	NOISE	GAIN	POWER	PRICE
EVV1296C	1.25-1.3GHz	0.9-1.2	16-18dB	100W	£162
EVV700SMD	430-440MHz	0.5-0.9	15-18dB	500W PEP	£124
EVV2000SMD	144-146	0.6-0.9	16-18dB	1KW PEP	£124
EVV200VOX	144-146	0.6-0.9	16-18dB	450W PEP	£112
EV2GAAS	144-146	0.6-0.9	15-18dB	100W PEP	£75
VV INTERFACE FOR ABOVE PRE-AMPS					£31

RECEIVE PRE-AMPS

MODEL	FREQUENCY	NOISE	GAIN	PRICE
EWPA 560	50-600-1GHz		16.5dB-1dB	£79
EWPA 560(N)	50-600-1GHz		16.5dB-1dB	£89
IP3 order	+18dBM			
ERPA 1296	1.25-1.30	0.8	17-18dB	£120
ERPA 435	430-440	0.5	15-18dB	£70
ERPA 144	144-146	0.7	16-18dB	£66
ASA 12	0-1GHz	Masthead Antenna Switch		£59

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FT980	HF Transceiver	1750.00	(—)
FT767GX	HF Transceiver	1550.00	(—)
144/767	2m Module (767)	169.00	(2.50)
430/767	70cm Module (767)	215.00	(2.50)
50/767	6m Module (767)	169.00	(2.50)
FT290R2	MkII New Super 290	429.00	(—)
FT290R	2m M/Mode Port/Transceiver	379.00	(—)
FT23R	2m Mini H/H W/O Batt Pack	223.50	(2.50)
FT73R	70cm Mini H/H W/O Batt Pack	243.50	(2.50)
FNB9	Spare Battery Pack (23/73)	25.00	(1.50)
FNB10	Spare Battery Pack (23/73)	30.00	(1.50)
NC.18C	Charger (23/73)	12.35	(1.50)
NC.28	Charger (23/73) FNB10	15.40	(1.50)
PA6	Car Adap/Charger (23/73)	16.00	(1.50)
MH12A2B	Speaker Mic (23/73/727)	27.00	(1.50)
FT727R	2m/70cm H/H	425.00	(3.00)
FNB4A	Spare Battery Pack	46.00	(1.50)
FBA5A	Empty Cell Case	10.00	(1.50)
FT209R	2m H/Held/C/W FNB3	P.O.A.	(—)
FT709R	70cm H/Held	P.O.A.	(—)
FT270RH	2m 45W F.M.	299.00	(—)
FT211RH	2m FM 45W	299.00	(—)
FRG9600M	60-950MHz Scanning RX	509.00	(—)
NC9C	Charger	11.50	(1.50)
PA3	Car Adaptor/Charger	21.85	(1.50)
FNB2	Spare Battery Pack	25.00	(1.50)
FT726R(2)	2m Base Station	999.00	(—)
430/726	70cm Module for above	349.00	(3.00)
FRG8800	HF Receiver	639.00	(—)
FRV8800	Convertor 118-175 for above	100.00	(2.00)
FRT7700	A.T.U.	59.00	(2.00)
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MD1B8	Desk 600 8pin mic	79.00	(1.50)
MF1A3B	Boom mobile mic	25.00	(1.50)
YH77	Lightweight phones	19.99	(1.50)
YH55	Padded phones	19.99	(1.50)
YH1	L/weight Mobile H/set-Boom mic	19.99	(1.50)
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SB2	PTT Switch Box 290/790	22.00	(1.50)
SB10	PTT Switch Box 270/2700	22.00	(1.50)
FF501DX	Low Pass Filter	38.50	(1.50)

Kenwood

TS940S	9 Band TX General Cov RX	1995.00	(—)
AT940	Auto/ATU	258.23	(2.50)
TS930S	9 Band TX General Cov RX	1750.00	(—)
AT930	Auto/ATU	192.75	(2.50)
TS440	**NEW** 9 Band TX General Cov RX	1195.00	(—)
AT440	Auto/ATU	152.73	(2.50)
PS50	H/Duty PSU	234.63	(2.50)
TS830S	160-10m Transceiver 9 Bands	1095.00	(—)
AT230	All Band ATU/Power Meter	220.05	(2.50)
TS530SP	160m-10m Transceiver	895.00	(—)
TS430S	160m-10m Transceiver	995.00	(—)
PS430	Matching Power Supply	183.26	(3.50)
FM430	FM Board for TS430	50.68	(2.50)
SM220	Station Monitor	362.37	(3.50)
SS5	Band Scope Unit (520/530)	72.05	(2.00)
BS8	Band Scope Unit (830/940)	81.22	(2.00)
TL922	10/160 2K Linear	1495.00	(7.00)
TM201A	2M 25W Mobile FM	269.00	(3.00)
TM401A	70cm 12W Mobile FM	392.82	(3.00)
TH21	2M Mini H/H	189.00	(2.50)
TH41	70cm Mini H/H	218.00	(2.50)
TH205	2M H/H	218.01	(3.00)
TH215	2M H/H Keyboard	258.00	(3.00)
TR751	2M 25W M/M Mobile	649.00	(—)
TS711	2M 25W Base Stn	991.29	(—)
TS811	70cm 25W Base Stn	1085.00	(—)
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VC10	118-174MHz Converter (R2000)	170.76	(2.00)
R5000	**NEW** General Coverage HF/RX	895.00	(—)
VC20	118-174MHz Converter (R5000)	176.32	(2.00)

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HL 30V	70cms, 3W in, 30W out	122.50	(2.50)

Icom Products

IC761	New Super HF Transceiver	P.O.A.	(—)
IC751A	HF Transceiver	1465.00	(—)
IC735	New HF Transceiver	949.00	(—)
AT100	100W ATU (751/745)	365.00	(3.50)
AT150	150W ATA (735)	315.00	(3.50)
PS55	Ext PSU (735)	185.00	(3.00)
IC505	50MHz multi-mode portable	459.00	(—)
IC290D	2m 25w M/Mode	542.00	(—)
IC28E	25W FM	359.00	(—)
IC28H	2m 45W FM	399.00	(3.00)
IC Micro	2E New Mini H/H	239.00	(3.00)
IC2E	2m The Original H/H	225.00	(3.00)
IC02E	2m H/H	299.00	(3.00)
IC275E	New 2m 25 Base Stn	1029.00	(—)
IC4E	70cm H/H	285.00	(3.00)
IC04E	70cm H/H	299.00	(3.00)
IC48E	70cm 25W FM Mobile	449.00	(3.00)
IC490	70cm 10W M/Mode	617.00	(—)
IC3200	2m/70 Dual Band FM Mobile	556.00	(—)
IC12E	23cm H/H	428.00	(3.00)
ICR71	Gen Cov RX	825.00	(—)
IC7000	VHF/UHF Scanner	957.00	(—)
CK70	DC Cable (R70/R71)	7.00	(1.50)
EX257	FM Board (R70/R71)	41.00	(1.50)
GC5	World Clock	43.00	(2.00)

Miscellaneous

DRAE	Wavemeter	27.50	(2.00)
T30	30W Dummy load	8.50	(2.00)
T100	100W Dummy load	38.00	(2.00)
T200	200W Dummy load	56.00	(2.00)
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Transverters

MICROWAVE MODULES			
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MMT50/144	2m-6m Transverter	289.80	(3.00)
MMT144/28R	2m-10m 25W O/P	289.80	(3.00)
MMT144/28	2m-10m 10W O/P	139.84	(2.50)
MMT432/28S	70cm-10m Transverter	195.50	(3.00)
MMT1296/144	23cm-2m Transverter	258.75	(3.00)

CW/RTTY Equipment

Tono 550	Reader	329.00	(3.00)
ICS/AEA			
PK64	Complete Packet/Amtor terminal	239.00	(3.00)
PK232/Fax	Packet/RTTY Terminal	269.95	(3.00)
BENCHER			
BY1	Squeeze Key, Black base	67.42	(2.50)
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Iambic Standard	63.33	(3.00)
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20813N	13 element portable	£46.00(a)
20817N	17 element	£61.54(a)
144/435MHz		
20899N	9 & 19 element Oscar	£57.86(a)
435MHz		
20909N	9 element	£28.62(a)
20919N	19 element	£34.35(a)
20438	19 element crossed	£39.66(a)
20921N	21 element 432MHz	£44.57(a)
20922N	21 element ATV	£44.57(a)
1296MHz		
20623	23 element	£30.36(b)
20696	4 × 23 element – power splitter – stacking frame	£160.00(a)
20655	55 element	£46.20(a)
20666	4 × 55 element – power splitter – stacking frame	£230.00(a)

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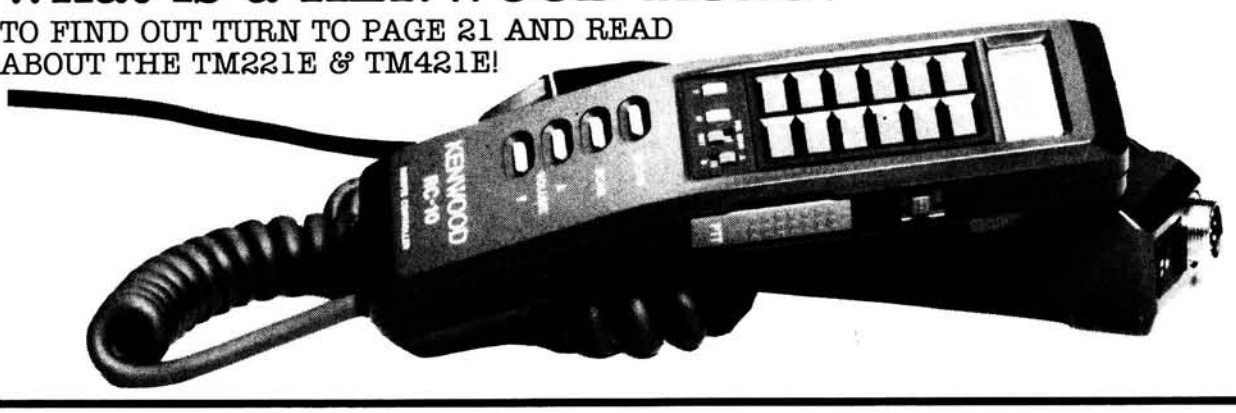
what is a KENWOOD **RC10**?

TO FIND OUT TURN TO PAGE 21 AND READ ABOUT THE TM221E & TM421E!



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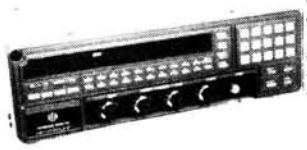
JIL SX-400
THE PROFESSIONAL SCANNER



- Basic coverage 26-520MHz
- AM, NFM & WFM
- Expandable from 100kHz to 1.4GHz with SSB and CW
- Computer control options
- IF output terminals
- Specifications set by professionals

£649

AOR 2002
THE WIDE RANGE SCANNER

- Covers: 25-550MHz, 800MHz-1.3GHz
- AM & NFM & WFM on all bands
- Computer interface socket
- 20 memories
- Compact size
- 12V dc operation
- Up/down step control knob

£487

REVCO RS-2000E
THE VERSATILE SCANNER

- Covers: 60-180MHz, 380-520MHz
- AM & NFM on all bands
- Search & store of active channels
- Channel activity counter
- 70 memories
- 12V dc & 240V ac

£279

REGENCY HX-850E
THE SMALLER HANDY-SCANNER

- Covers: 75-106MHz or 60-90MHz plus 118-175MHz, 406-496MHz
- AM & NFM programmable on all bands
- Full scan & search functions are available
- 20 memories
- Measures only 2.5"×5.5"×2"
- Nicads, charger & BNC whip antenna included in the price

£279

JIL SX-200N
THE SUPERIOR SCANNER

- The choice of the professionals
- Proven reliability
- Covers: 26-88MHz, 108-180MHz, 380-514MHz
- AM & NFM on all bands
- Positive action keyboard
- 16 memories
- 12V dc & 240V ac

£325

DON'T FORGET THE ANTENNA!

All receivers need a good antenna and the BRITISH-MADE REVCONE is used throughout the world by discerning scanner owners. Covers 50-500MHz, extremely well made & excellent value at..... **£31.95**

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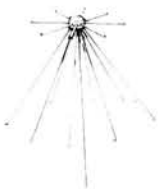

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good for HF/2Mtr
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were £35 – **£25**
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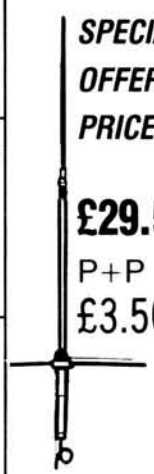
2Mtr AERIAL



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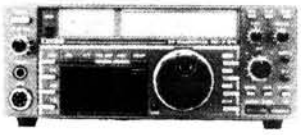

ICOM IC735

IMPROVED YAESU FT767 RWC/MK2 HF-UHF BASE STATION

We are pleased to announce that we have now improved the synthesizer (see reviews) leading to better dynamic range by up to 20dB which now puts this transceiver in a class of its own! This modification is only available from RWC and is fitted FREE to all New units sold by us, or we will modify any existing unit for £50.50 inc. return carriage.

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FT757 MK2 NEW IMPROVED HF TRANSCEIVER	£895.00
FT726R MULTIMODE BASE STATION WITH 2MTRS. (SPECIAL PRICE)	**£825.00**
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ICOM IC275E 2MTR 25W BASE STATION C/W AC PSU	£949.00
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FT767GX MK2/RWC

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NEW

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YAESU FT209R/FNB3 3.7W 2MTRS C/W CHRGR/CASE	**£199.00**
ICOM ICO2E QUALITY 2.5W (5W) BP3 C/W CHRGR	£225.00
*ICOM MICRO 2E MINI 2.5W 2MTR C/W CHRGR	£195.00
CTE 1600 (VY SIM. IC2E) 2.5W 2MTR C/W CHRGR	£165.00
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*KENPRO KT220EE 2.5W (5W) 2MTR LCD C/W CHRGR	£199.00
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SCANNERS

YAESU FRG9600/RWC

FRG 9600

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ICOM ICR7000/AH7000 ABOVE WITH MATCHING DISCONE	£945.00
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REGENCY MX7000, SAME COVERAGE, SAME MAKE AS AOR2002	£399.00
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NEW

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Model 877R for use with Dry cells	£39.50
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(Both above units for use in ICOM BC30/60 OR RAYCOM NC580)

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P&P £2.50 per order.

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RWC MOD KITS, ANNOUNCEMENT

We apologize to customers waiting for various mod kits, supplies of crystals and components are inconsistent and demand for kits varies, so there is occasionally a delay before we can send your kit of parts, please be patient, Rome was NOT built in a DAY! Kits still available:

SANYO LC7137 SYNTHESIZER, CB-10MTRS, LCL/DNT, CB-10MTRS, FT757GX MK1 FAST TUNING MOD, STORNO COM713 PMR 2MTR KIT, PYE A200 E-BAND 50MHZ KIT, call for technical details, prices and delivery.

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1N4002	05	555	22
1N4005	07	555 CMOS	64
1N4148	03	741C	20
OA47	14	CA358	43
OA90	11	CA3140E	40
OA91	10	CA3240E	100
W005	26	ICM7555	64
TRANSISTORS		LF351	48
BC107	14	LM358	43
BC108	14	LM566	128
BC108C	17	MC1458	40
BC109	14	MC1496	140
BC109C	17	SO42P	230
BC148	14	SBL1	655
BC178	20	SL1621	610
BC212L	14	SL1640	510
BC213	14	SL6440	465
BC214L	14	TBA810	98
BC337	10	TL071	45
BC478	28	TL072	55
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BC548	10	TL084	110
BC549	14	XR2206	480
BC559	12	XR2211	350
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BF200	36	7812	45
BF224	45	7815	45
BF241	40	7824	45
BF244	36	78L05	32
BF244B	40	78L09	65
BF245A	48	78L12	32
BF256	42	78L15	32
BF256L	48	**CMOS**	
BF961	70	4001B	16
BF981	88	4011B	16
BF990	90	4015B	39
BSX20	30	4017B	35
J304	65	4021B	38
J309	68	4023B	16
J310	68	4046B	49
TIP41	30	4047B	49
TIP41A	48	4060B	45
TIP42A	54	4070B	20
VN10KM	65	4075B	16
VN10LM	65	4077B	29
2N2926	10	4093B	22
2N3055	55	4541B	42
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ECF80	1.50	OA2	3.25	SP61	4.00	6BN6	2.00	12BA6	2.50
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EF39	2.75	PCF80	2.00	UCL82	1.75	6C6	3.50	30PL14	1.80
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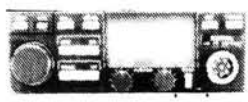

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Calling 50MHz

As a recently licensed amateur I am undoubtedly ignorant of many aspects of our fascinating hobby, but I would be grateful for some enlightenment on the subject of calling channels.

To my mind, the beauty of a calling channel is that one can have the rig permanently tuned to that frequency, and any interesting CQ calls may be answered: everyone knows where to listen for a contact. No such channel is allocated on 50MHz. One often finds the frequency called "Centre of Activity" occupied—quite legitimately—by other amateurs having extended QSOs.

The advantage of a calling channel, well proved on 2m, is even more pronounced during the early years of a band, when users may be relatively few.

When I make a successful CQ call, and suggest we QSY, I am frequently told not to bother as there is no calling channel: yet I feel it's a courtesy to other amateurs to move to one side, leaving the frequency open for other CQ callers.

Why was it decided to have no calling channel on 50MHz (or on several other bands)? Wouldn't it be beneficial for everyone if a calling frequency was stipulated? If so, why cannot the "powers that be" and amateurs alike adopt the frequency of 50.200MHz now? Or am I, as a newcomer to the hobby, misunderstanding the situation?

Stephen Nicholls G1YOU
Brixham, S. Devon

The RSGB has just announced a band-plan for n.b.f.m. on 50MHz, with channels in 20kHz steps from 51.410 to 51.590MHz. The f.m. calling channel is 51.510MHz—Ed.

Morse Tests

I feel that we should respond to the items raised in the two letters published in *Practical Wireless*, July issue.

I think most people would agree that with few exceptions Rallies do not provide the ideal accommodation for the taking of Morse Tests. So, many will ask why do we offer the facility and even some might wonder why anyone would apply to use them!

The latter I cannot answer; however, I must take some responsibility for there ever having been such facilities, for a number of years ago as a Senior BT Surveyor/Examiner I agreed to attend and offer the first ever Morst Tests at the Blackwood Rally in Gwent, South Wales. The facilities offered by the organisers, although not ideal, were first class and the event a success. Even so BT were quite rightly very mindful of the problems Rally tests could produce, not least of which was finding volunteer staff. Contrary to general belief, there were many who were not prepared to give up their evening or weekend time off for amateurs. However, the argument that the official tests were only conducted Monday–Friday, which for many meant taking a day off work and often costly travel to the test centre, and their desire to be helpful finally persuaded BT to agree that if staff could be found attendance might be authorised.

Circumstances have now changed, the RSGB is providing many more test centres than ever before and at hours convenient to the candidates, and we believe it is perhaps now time to cease Rally examinations at all but those providing ideal facilities.

We have therefore recently introduced more stringent requirements to be met before organisers are permitted to offer the facility. It is now necessary for the organisers of such events to consult first with the Senior Examiner for the Area in which the event is to be held. He will then, if necessary, inspect the accommodation and afterwards make a full report and recommendation to myself before we agree to attend. While such procedure will not of course please everyone, especially those who are refused facilities, it should improve the situation.

Mr Mayer remarks about his letter to RSGB: "No doubt there will be no reply". This is something else he got wrong as his complaint was fully investigated and responded to within 48 hours of its receipt by me. The candidates who took the test at the same time as Mr Mayer had no difficulty in producing perfect copy of the receiving part he missed.

Regarding the second letter by Mr Hiam, he also wrote to me and was responded to in detail. As it is RSGB policy not to discuss any candidate's results except with the candidate, I can only confirm that the result notified to Mr Hiam was considered correct. However, I must take him up on a couple of general points.

He suggests we leave it to the professionals. We do! All our examiners prior to appointment have been given a Morse Test first at the professional speed of 20 w.p.m. and then are required to demonstrate their ability to send at the 12 w.p.m. examination speed. Many of our examiners are holders of professional qualifications in excess of these requirements but all are happy to be retested.

The inference that so much has changed since BT days is just not true. The RSGB service is with little variation the very same. It was set up by retired BT Officers who did not see any point in re-inventing the wheel. The Post Office Wireless Service which became BT built up an excellent service over 50 years, and one that many present RSGB examiners

Mains Hum

A tip for those who may be installing a passive low-pass filter (*PW* August issue). BEWARE OF THE MAINS TRANSFORMER!

In my experience, the ferrite cores of inductors are fiendishly efficient at absorbing hum from this source and re-routing it through the a.f. stages. I could find no angle and no position within my receiver where my filter did not pick up hum, even when as far away from the mains transformer as possible.

Eventually, by replacing the transformer with a toroidal type, and limiting the gain after the filter, the problem was solved. Building the filter was quite simple and I am very pleased with the result. It cuts out h.f. hiss introduced in the i.f. amplifier after the crystal filter, much improving the noise factor.

There are two l.p.f. circuits in the *Radio Communication Handbook*, one for a direct conversion receiver and one in the G3PDM receiver. I built the latter, using Maplin Electronics pot-cores for the inductors.

P. J. Lawton
Birmingham

AR-88

I have found your series on *Valved Communications Receivers* extremely interesting, but the article on the AR-88D gave the somewhat sad impression that the "D" version was the only one that RCA made.

There was of course the AR-88 with the same intermediate frequency (455kHz) as the "D" version. This also applied to the rack-mounted version the AR-88F. Frequency coverage of all these three versions was almost identical at 540kHz to 32 or 32.5MHz, with only slight electronic differences.

Then we come to the AR-88LF, which had an i.f. of 735kHz. Its different frequency coverage of 73 to 555kHz and 1.48 to 30.5MHz turned a number of amateurs against it. To me it was a better version. I could well do without the medium wave broadcast band, as this was obtainable on any normal receiver.

were proud to serve. We feel that the RSGB even in its first year is providing an equal service and one the fraternity can be proud of.

The remarks about production line sudden-death testing show a lack of knowledge and are rather hurtful to the examiners, who without exception go out of their way to be helpful as evidenced by the many letters of thanks we receive. If one considers the number of letters of doubtful complaints against the 2000-plus tests conducted I suppose we might be forgiven for wondering if those few should not be doing more c.w. practice, but perhaps they need the money.

Three candidates are given the receiving test at one time and this is not unreasonable. Indeed it was quite normal for several candidates to take the receiving test together in BT days. We try to keep to three as this means the delay between the receiving and the sending tests is reasonable. As only one candidate is taken at a time for the sending test, the others have to wait and thus build up tension. Sessions often over-run as the scheduled time per session is considered average for normal candidates, but in the end candidates are given as much time as it takes within reasonable limits.

I am pleased to note that Mr Hiam thinks the BT charge of £15 was good value, but I rather think the majority of Amateurs would rather have the present system at £7. He is of course quite right, you may not get an instant test, but then if you plan your practice you should know whether you will be ready in a few weeks' time. As one of the old school I can assure him that especially in the latter years his telephone call to Coast Radio Stations or SRIO depots was not always received as he indicates . . . on the contrary, it would have been processed at their convenience. Not everyone loved the Amateurs. To many they were considered to be the cause of pain in the nether region. At least now you are tested by people who understand your problems and want you to pass. It gives the examiners no pleasure to fail you but if you are not up to scratch then fail you they must.

I am pleased to say that the RSGB service is now considered fully operational. However, like its predecessors, RSGB intend to keep everything under constant review and make amendments whenever and wherever necessary to improve the service to Radio Amateurs.

A. N. Ianson G3GDO
Chief Morse Examiner
RSGB

HE'S TAKING HIS MORSE SOON — WE'RE GETTING HIM USED TO GRIEF.

Morse

My sympathies are extended to Mr S. Mayer G6KYO, whose letter in July *PW* demonstrates the folly of using ill-chosen facilities for the Morse examination. I do however advise him to allow for human frailties when he next attempts the test, and to take sound-excluding headphones with him.

The checking of candidates' credentials is vital, and is normal at RAE examination centres. Have you never heard of misrepresentation, which has happened in both professional and amateur circles. Successful prosecutions for this offence have been reported in past issues of *Radio Communication*.

As for "settling-in" time, I can assure you from my 32½ years experience of teaching radio communication and allied electronic subjects, that you can allow as much settling-in time as you like, but the candidates will invariably be "screwed up tight". So, where do you draw the line below this feature.

To all potential and actual candidates for the Morse test, do remember that this is a hobby and not a test for your job application. Perhaps you failed—it is not the end of the world. The ionosphere will still be present in six months time!

Wm. G. Andrews G3DVW
Liverpool

THIS CORRESPONDENCE IS NOW CLOSED

The 14MHz amateur band was spread over a larger segment on the dial, helping one to tune those awkward signals. The missing 1.5MHz from 30.5 to 32MHz was of no interest to me, so therefore not worth considering, in my opinion.

The RAF knew these receivers by yet another number. The AR-88 was the R1556, the AR-88D was the R1556A, and the AR-88LF was the R1556B.

The American forces used the AR-88 in a triple-diversity role, cabinet mounted. As well as the three receivers, the set-up (known as the OA-58/FRC) included a tone keyer unit, monitoring unit, power supply, antenna unit and speaker unit. The sheer size of this cabinet (22 x 84 x 21in) makes it unthinkable for shack use (so my long-suffering XYL says) especially the weight factor of 650lb.

As a collector of radio communication history, and the proud owner of an AR-88D and an RA17L, I hope that this series of articles will be carrying on long into the future.

R. J. Shaw
Poole, Dorset

RSGB HQ

The letter from GW6RXA (Sept. *PW*) made me laugh. The RSGB has "pleasant and comfortable offices". Go there, Mr Railton. The front entrance is not too bad, but go upstairs and into the gents' loo. Clean—yes; decoration—not been done since they changed the urinals. Go to the GM's office—not bad, but don't look over in the corner by the window where it leaks, and paper's coming off the wall. Try the penthouse flat—more paper coming off, and mould. Window-frames need replacing throughout. Try the heating—a boiler George Stephenson would have rejected, and pipes corroding under concrete. Nice cars? The last time I went in one of the Society's employee's cars, I had to fix it on the road! All this in an area where a 3-bed semi costs about £85 000. A lot of repair work needs doing on HQ, but it needs money.

Can't afford £18.50? If you costed *RadCom* at the same rate as *PW*, that's £4.50 for the other services like QSL Bureau, GB callsigns, IARU representation, DTI liaison, CGLI liaison, and so on. £18.50 is less than 50p a week.

The RSGB has its faults, but you won't do any better with setting up another organisation and splitting support. The IARU Charter means you wouldn't be recognised internationally, so no QSL Bureau. The only ones who would win would be the manufacturers of domestic rubbish who want no EMC legislation, the councillors who don't want outside antennas, and the commercial interests who want our bands.

Peter E. Chadwick G3RZP
Swindon, Wilts

WRITE ON

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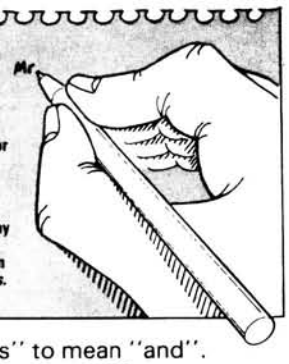


Beacon Mode

I read with interest the first part of G4CLF's article entitled *A Smarter Repeater* in the September issue of *PW*. There is, however, one part of the article which is misleading and not strictly correct.

The section headed "Beacon Mode" opens with the statement that: "There is a case to be made for all repeaters to transmit continuously . . . so that they may be used as beacons . . .". The next sentence goes on to say: "This may not be practicable under UK licensing regulations and is certainly not done".

It is this second sentence which is misleading. It is certainly true for the 144MHz and 430MHz repeater networks, but not for the bands above 1GHz, where there is a growing chain of speech and TV repeaters. One of the main reasons for not having the v.h.f./u.h.f. repeater network act as a beacon "chain" is, of course, the question of mutual interference. This is less important on the microwave bands, not only because coverage or "service" areas are smaller, but also because there are more potential channels available in these bands.

It has been accepted practice for very many years to design, build and licence all microwave repeaters, regardless of band, as continuously operating beacons in the absence of signals to be relayed. Indeed, it is mandatory that all proposals for microwave repeaters submitted to the DTI for approval conform to this specification. All microwave repeaters are therefore more correctly described as "beacon-repeaters" (or as "repeater-beacons", according to your view of the main function of the device!).

The only microwave band in the UK in which beacon-repeater licensing is not permitted, under present regulations, is the 5.75GHz band. On the other bands, because of the secondary nature of the amateur allocations, licensing may take quite a long time, and it may not be possible to licence some frequencies within the bands.

I trust that this information will be of interest to *PW* readers. The RSGB Microwave Committee would welcome proposals for more beacon-repeaters, particularly above 1.3GHz.

Mike Dixon G3PFR (RSGB Microwave Committee) Warrington

Abbreviations

It was most interesting to read the letter (*PW* July) from G3BGJ regarding wireless telegraphy abbreviations. I understand the Morse characters . . . . (es) to represent the ampersand "&". We all know that an ampersand is a ligatured "et", and therefore this still does not explain the use of what sounds like "es" to mean "and". However, in Morse telegraphy there are many combinations of dots, dashes and spaces which bear no reasonable relationship to the information they impart. Surely this is no baad thing if one understands the language—the same situation applies to the written/spoken word.

I do, though, believe the use of the letters "c.w." (meaning continuous wave) to imply wireless telegraphy coded in Morse is incorrect, and that w.t. is the only correct and acceptable expression to use.

Bern Whitford G3ZNF Loughborough

I wonder, why does "w.t." mean wireless ***telegraphy,*** *and yet "r.t." means radio* ***telephony****?—Ed.*

OUR SERVICES

QUERIES

We will always try to help readers having difficulties with a *Practical Wireless* project, but please observe the following simple rules:

1. We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
2. We cannot deal with technical queries over the telephone.
3. All letters asking for advice **must** be accompanied by a stamped, self-addressed envelope (or envelope plus International Reply Coupons for overseas readers).
4. Write to the **Editor, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP,** giving a clear description of your problem.
5. Only one project per letter, please.

COMPONENTS, KITS AND PCBS

Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the article. **Kits** for our more recent projects are available from **CPL Electronics,** and from **FJP Kits** (see advertisements).The **printed circuit boards** are available from our **PCB SERVICE** (see page 1 of this issue).

CONSTRUCTION RATING

Each constructional project is given a rating, to guide readers as to its complexity:

Beginner
A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently.

Intermediate
A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.

Advanced
A project likely to appeal to an experienced constructor, and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Definitely not recommended for a beginner to tackle on his own.

BACK NUMBERS AND BINDERS

Limited stocks of most issues of *PW* for the past 18 years (plus a few from earlier years) are available at £1.30 each, including post and packing to addresses at home and overseas (by surface mail).

Binders, each taking one volume of *PW*, are available price £3.95 to UK addresses, or overseas, including post and packing. Please state the year and volume number for which the binder is required. Prices include VAT where appropriate.

CLUB NEWS

If you want news of radio club activities, please send a stamped, self-addressed envelope to **Club News, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP,** stating the county or counties you're interested in.

ORDERING

Orders for p.c.b.s, back numbers and binders, *PW* computer program cassettes and items from our Book Service, should be sent to **PW Publishing Ltd., FREEPOST, Post Sales Department, Enefco House, The Quay, Poole, Dorset BH15 1PP,** with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders **must** be drawn on a London Clearing Bank.

Credit card orders (Access, Mastercard, Eurocard or Visa) are also welcome by telephone to Poole (0202) 678558. An answering machine will accept your order out of office hours.

SUBSCRIPTIONS

Subscriptions are available at £14 per annum to UK addresses and £18.50 overseas. For further details, see the announcement on page 31 of this issue. Airmail rates for overseas subscriptions can be quoted on request.

PW REVIEW

Newly available from Cirkit Consumer Division are two r.f. power sensor heads which allow a 200mV d.c. digital voltmeter to be used to measure transmitter output power in the frequency range d.c. to 2GHz. Geoff Arnold G3GSR has been looking at one of them.

The two heads cover a measurement range of 0.5W to 75W, with characteristics shown in the accompanying table. The sensor device used is a rugged bolometer. Power fed to the unit is dissipated in a precision 50Ω termination. The resistor used for this termination comprises a pyrolytic carbon film on a beryllium oxide substrate, ensuring that the value of the resistor does not change with heat and that any heat generated is conducted swiftly away from the film.

The majority of the heat is dissipated via the matt black aluminium case to the surrounding air, but a small percentage (determined by the relative thermal paths in the unit), is allowed to flow through a thermoelectric generator. The resultant voltage is then scaled to enable a reading in millivolts to correspond with the power input in watts. The output voltage, which leaves the sensor on a pair of 4mm sockets fitted on the end, can be read directly on a d.v.m. using the 200mV range. Both power heads can be calibrated from a d.c. source.

Impressions

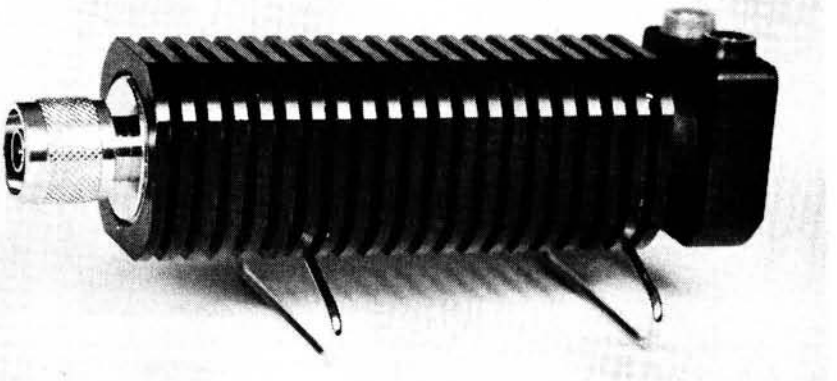
We were given the opportunity to test out one of the 5 watt sensor heads, and were able to check it on a number of different transmitters.

The measurement of r.f. power is one of the least accurate sciences in radio engineering, and at the quoted figure of ± 5%, the Cirkit heads are the equal of most professional measurement devices such as the Bird Thruline which we use in the *PW* test lab. On accuracy, therefore, all we can say is that the head showed no real departure from our regular standard.

The photograph of the 5W unit (supplied by Cirkit) shows it in use mounted directly on top of a hand-held transceiver, and connected to the d.v.m. via a conventional pair of unscreened test leads. We found that this arrangement gave very variable results, producing power output readings which varied wildly with movement of the d.v.m. leads, or even when a hand was waved near them. However, using a 1 metre coaxial lead between the transmitter and the sensor head, with a screened single lead (with its "inner" on the positive connection and its "outer" on the negative) between the head the d.v.m., gave consistent and steady results across the 144MHz and 430MHz bands.

Recommended selling prices for the heads are £55.00 (5W version) and £95.00 (50W version), plus VAT. Our thanks for the loan of the review unit go to ***Cirkit Distribution Ltd., Park Lane, Broxbourne, Herts EN10 7NQ, telephone 0992 444111.*** ***PW***

The 50W sensor ▶



▼ The 5W sensor in use

★ MAKER'S SPECIFICATIONS

	5 watt head	50 watt head
Input impedance	50Ω	50Ω
Input connector	BNC male	N or UHF male
VSWR (d.c.–1GHz)	1.1:1	1.1:1
(1GHz–2GHz)	1.1:1	1.2:1
Output (true r.m.s.)	1mV/watt	1mV/watt
Output impedance	470Ω	470Ω approx.
Accuracy (d.c.–2GHz)	±5%	±5%
Response time to 95% of final reading	15 secs	20 secs
Power rating:		
Continuous	5W	30W
5 mins. max.	10W	50W
1 min. max.	15W	75W
Peak pulse (10:1 duty cycle)	50W	300W

LOWE SHOPS

In Glasgow,
the shop manager is Sim, GM3SAN,
the address, 4/5 Queen Margaret Road, off Queen Margaret Drive, Glasgow, 041-945 2626.

In the North East,
the shop manager is Hank, G3ASM,
the address, 56 North Road, Darlington, 0325 486121.

In Cambridge,
the shop manager is Tony, G4NBS,
the address, 162 High Street, Chesterton, Cambridge, 0223 311230.

In Cardiff,
the shop manager is Carl, GWOCAB,
the address, c/o South Wales Carpets, Clifton Street, Cardiff, 0222 464154.

In London,
the shop manager is Paul, G4PTI,
the address, 223/225 Field End Road, Eastcote, Middlesex, 01-429 3256.

In Bournemouth,
the shop manager is Colin, G3XAS,
the address, 27 Gillam Road, Northbourne, Bournemouth, 0202 577760.

LOWE ELECTRONICS SHOPS are open from 9.00am to 5.30pm Tuesday to Friday and from 9.00am to 5.00pm on Saturday. Shop lunch hours vary and are timed to suit local needs. For exact details, please telephone the shop manager.

packet radio from Kantronics

KPC 2 ... This KANTRONICS designed AX25 version 2 TNC features a built-in VHF and HF modem, full duplex operation and multiple connect facilities. The serial RS232 port, combined with the enhanced generic command structure allows operation with any computer.
KPC2 . . . £165.00 inc. VAT, carriage £7.00.
KPC4 ... A KPC4 is your gateway into packet flexibility. Having two packet ports, digipeating on each port and gateway between ports, the KPC4 lets you bridge two frequencies on one band or operate cross band. The KPC4 also includes the Personal Packet Mailbox feature.
KPC4 . . . £310.00 inc. VAT, carriage £7.00.
KAM ... Combine VHF packet, HF packet, CW, RTTY, ASCII and AMTOR in one unit.
KAM . . . £289.00 inc. VAT, carriage £7.00.

1300HC frequency counter

Small enough to fit into a shirt pocket, the 1300HC frequency counter brings easy and accurate frequency measurement well within everyone's reach.
The 1300HC uses a full 8 digit display, and measures to 1300 MHz, thus being ideal for amateur as well as all mobile radio bands including cellular.
The unit contains its own rechargeable NiCd battery pack which is charged from an external supply. The frequency counter can also be powered from any 9 to 12 volt dc supply, which charges the batteries as well.
The 1300HC has excellent sensitivity, and when used with the optional telescopic whip, easily measures transmitter frequencies of mobile or handheld transceivers, even low powered "bug" devices. When used in conjunction with a simple "dip oscillator", the 1300HC makes checking tuned circuit or aerial resonance an easy task.
The high performance of the 1300HC frequency counter makes it an indispensable tool for every amateur, engineer or technician. Its small size makes it suitable for either shack or "on the move" use.

SPECIFICATION

Range	1-1300 MHz
Resolution	100 Hz at 2.5 sec. gate 1 kHz at 250 mS. gate
Display	8 digit 0.3" LED MHz decimal point Leading zero blanking
Gate times	Fast. 250 mS. Slow. 2.5 S
Sensitivity (typical)	1-10 MHz ..... 10-150 mV rms 10-1000 MHz ..... 3- 50 mV rms 1-1.3 GHz ..... 10-150 mV rms
Accuracy (typical)	+/- 1ppm, +/- 1 count LSD
Aging	0.1 ppm/month (typical)
Gate indication	Red LED during sampling
Input connector	B.N.C.
Input power	9-12 Vdc at 150 mA
Power connector	Concentric. Centre positive
Case	Brushed anodised aluminium
Size	3.9H × 3.5W × 1D (inches)
Weight	255 g
Power supply	Internal NiCd pack (supplied) or external dc source (option)

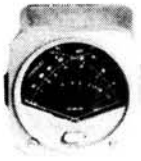
1300HC ... Handheld frequency counter **£138.00 inc VAT,** carriage £2.00

OPTIONS
PS12 ... AC mains power supply **£8.50 inc VAT,** carriage £2.00
BNC6 ... Telescopic whip **£7.46 inc VAT,** carriage £0.50
CC12 ... Padded carrying case **£9.90 inc VAT,** carriage £1.00

DAIWA meters

CN410M . . . Frequency range 3.5 to 150 MHz, forward power switchable 15/150 Watts, reflected 5/50 Watts, SO239 connectors.
CN460M . . . Frequency range 140 to 450 MHz, forward power switchable 15/150 Watts, reflected 5/50 Watts, SO239 connectors.
NS448 with remote head . . . Frequency range 900 to 1300 MHz, forward power switchable 5/20 Watts, reflected 1.6/6.6 Watts, N type connectors.
NS660P . . . switchable meter reading (average, normal PEP and hold PEP) and provision for optional remote head (U66V), frequency range 1.8 to 150 MHz, forward power switchable 15/150/1500 Watts, SO239 connectors.
U66V . . . remote head, frequency range 140/525 MHz, max 300 Watts, N type connectors.
SC20 . . . extension cable for U66V, approx 20 metres long.
CN410M . . . £61.72 inc VAT, carriage £1.50.

NS660P . . . £115.00 inc VAT, carriage £2.50.



CN460M . . . £65.40 inc VAT, carr £1.50.

NS448 . . . £86.60 inc VAT, carriage £2.50.

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE
Telephone 0629 580800 (4 lines)

The new KENWOOD TM221E and TM421E two metre and seventy centimetre FM mobile transceivers have been specifically designed to condense maximum performance and operating convenience into a compact package. Output power is 45 watts on two metres (TM221E) and 35 watts on 70 centimetres (TM421E). Receiver sensitivity matches the output power of the set and measures an amazing 0.141uV for 12dB SINAD (across 144-146). The figures are those given by Chris Lorek in his recent TM221E review published in the July edition of HAM RADIO TODAY.

Much discussion has taken place recently regarding 12.5 and 25 kHz spaced frequency channels on the two metre band. With the new mobiles channel spacing is not a problem. KENWOOD with their usual attention to detail have made the frequency step user selectable. The steps available are 5, 10, 12.5, 15, 20 and 25 kHz. Once programmed either microphone up/down button or the transceivers front panel knob can be used to step the transceiver across the band. Of course should it be necessary the selected step can easily be changed.

A new orange backlit liquid crystal display gives the transceiver an amazingly clear frequency readout that can be read in the brightest of sunlight.

The transceiver has all essential operating aids. There are 14 memory channels, each of which holds frequency, whether simplex or repeater operation is required and whether or not the tone burst is on or off. Scanning can either be memory with the ability to lock out unwanted channels or band with the scan limits set by the operator. The usual priority channel facility is also included to make sure that no call is missed. As well as showing the operating frequency the display also indicates which of the facilities are being used.

Occasionally a piece of equipment comes along which catches the imagination; the RC10 remote controller/handset for the TM221E and TM421E does just that. Designed to operate with either transceivers or link both together, the RC10 looks more like a cellular radio car phone than a piece of amateur radio equipment.

In fact the RC10 not only looks like a car phone, but as a speaker and microphone are built-in, operates as would a telephone handset. Easily mounted in any car, dashboard or transmission tunnel, the RC10 controls all transceiver front panel functions with the exception of on/off and high/low power selection. The functions controlled by the RC10 are volume, squelch on/off, frequency readout, keypad frequency entry, memory selection and frequency or memory scanning. Full duplex operation is possible when both transceivers are fitted.

From a security point of view it is possible to mount the transceivers out of sight and only have the controller on view. Since most thieves now know that a cellular phone is not a saleable item, owning an RC10 may be a wise investment!

An additional feature of the RC10 unit is that when used in conjunction with both the TM221E and TM421E transceivers, private crossband repeater operation is possible. This means that you can park your car in a decent location and wander off into an RF black spot. Armed with a small low power handheld, you can talk back to the TM221E/TM421E/RC10 combination which, since you left, has been constantly checking the two pre-set crossband frequencies. Your transmission is received and simultaneously retransmitted by the other transceiver on the other band. If a station replies, the message is again simultaneously retransmitted to you. Of course you need to have another amateur in your car to oversee the operation and it must be a recognised RAYNET use.

TM221E	**£317.30 inc VAT,** carriage £7.00
TM421E	**£352.84 inc VAT,** carriage £7.00
RC10	**£169.00 inc VAT,** carriage £7.00

Colour photograph shows Japanese home market version.

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE
Telephone 0629 580800 (4 lines)

Special Offer

To *PW* readers—a special pre-publication offer on a new book by Steve Money G3FZX.

Save £1.00 off the published price of £8.95

Although conventional telephony and telegraphy are the most widely used communications techniques in amateur radio, there has been in recent years an increase in interest in the more exotic forms of communication. Radioteletype (RTTY), amateur teletype over radio (AMTOR), slow scan television (SSTV) and more recently packet radio, are communications techniques which have benefited from the widespread availability of home or personal computers, which can be used to provide the decoding and display facilities for such transmissions. In this book a simple description is given of the principles involved in these modern communications techniques. Details are also given of the frequencies where such transmissions may be found.

With the coming of the space age, radio amateurs were able to design and build their own space satellites which were launched into orbit as part of the payload when commercial satellites were launched. Earlier amateur satellites provided simple radio beacons, but the current series are used to provide communications transponders which allow radio amateurs to achieve world-wide contacts via satellite using the v.h.f. and u.h.f. bands. Details of current satellites and the frequencies used are given in this book.

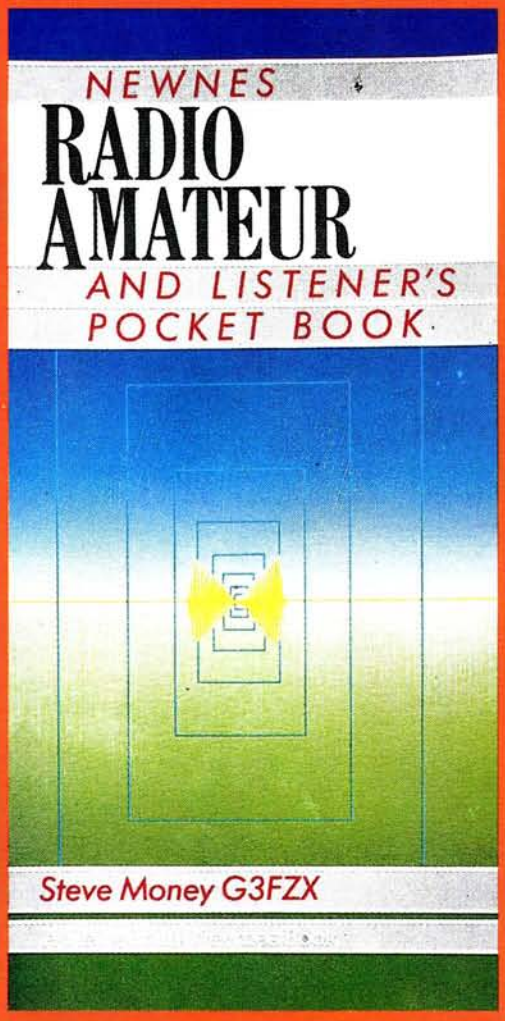
Radio enthusiasts may also be interested in receiving weather pictures from the numerous weather satellites now in orbit, or receiving television transmissions from communications satellites and the future direct broadcast TV satellites. This book gives details of these satellites and the frequencies they use.

The availability of scanner receivers and all-band communications type receivers, combined with the use of home computers, has increased interest in listening to some of the wide variety of utility stations that operate on the h.f., v.h.f. and u.h.f. bands. Among these are aircraft and maritime stations, also the various press agency stations which transmit news using radioteletype transmissions. Details of the bands where these stations are to be found, and some sample frequencies are given in this book.

As an aid to operating, the book also includes much general information such as lists of callsign prefixes, both alphabetically and by country, useful abbreviations such as Q codes, and general information on the principles of receivers, transmitters, antennas and propagation.

The aim of this book is to provide a useful quick reference for radio amateurs and listeners, and a short bibliography has been included which will provide sources of more detailed information on some of the subjects covered in this book.

The *Radio Amateur and Listener's Pocket Book* is in hardback, comprising 160 pages 90 x 190mm, and will be published by Heinemann Newnes. The special pre-publication offer price to *PW* readers is £7.95 plus 50p post and packing—a total of £8.45. (Books are zero-rated for VAT.)



HOW TO ORDER

Complete both coupons in ink, giving your name and address clearly in block capitals. Coupon (2) will be used as the address label to despatch your book to you.

Send the coupons with your cheque to: Practical Wireless Book Offer (Nov), FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP. No postage stamp is needed. If you wish to pay by credit card (Access, Mastercard, Eurocard or Visa only), please fill in your card number and sign the coupon where indicated.

Available to readers of *PW* in England, Scotland, Wales, N. Ireland, the Channel Islands and the Isle of Man. Orders are normally despatched within 28 days, but please allow time for carriage. The closing date for this offer is 30 December 1987.

Variable Power Mod for the IC-251E

This simple modification from N. Montanana G8RWG will at last enable you to try a few of those really QRP contacts on s.s.b. and c.w.

The Icom IC-251E 144MHz multimode transceiver has a nominal output power of 10 watts on all modes.

Whilst there is the facility to vary the output power in the f.m. mode from 1 to 10W, no similar facility exists for the other modes.

The author required lower output power on s.s.b. and c.w. to drive a 430MHz transverter and a valved amplifier on 144MHz. For some time a variable negative voltage was used on the a.l.c. line but this entailed a separate power supply and control unit.

Since there was already a front panel control available, a method was sought to enable this to be used on all modes.

Circuit

The output power is varied by altering the gain of the pre-driver transistor Q30.

The original power control potentiometer is used together with the emitter resistor R126. The circuit formed by R4 and R126 varies the output power from 500mW to full power on all modes. Resistor R4 is isolated from the original f.m. power control circuit.

Modifications

1. Unplug the mains lead and remove the four screws securing the top lid.

2. Locate and identify R126 (ref: A3 on main unit p.c.b.). Cut the earthy lead of the resistor and connect a flying lead to the earthy side R126.

3. Pull off the power control knob and remove the dust washer, securing nut and plain washer.

4. Gently pull out the potentiometer control board and turn to reveal the track side of the board.

5. Desolder the right hand tag, see Fig. 2, and bend away from the board. Connect the flying lead to this tag. Ensure that this will not short out when the board is replaced.

6. Solder a link between the earth plane and this unused track.

7. Replace the board and secure the potentiometer with the washers and nut. Rotate the control (R4) fully anticlockwise and replace the control knob. This corresponds to the minimum power setting.

8. Replace the lid and screw down.

Conclusion

The output power of the transceiver may now be varied on all modes from 500mW to 10W. A larger value potentiometer could be used to decrease the power even further if necessary.

No problems were encountered with linearity but some operators may wish to decouple the circuit at both ends of the flying lead. ***PW***

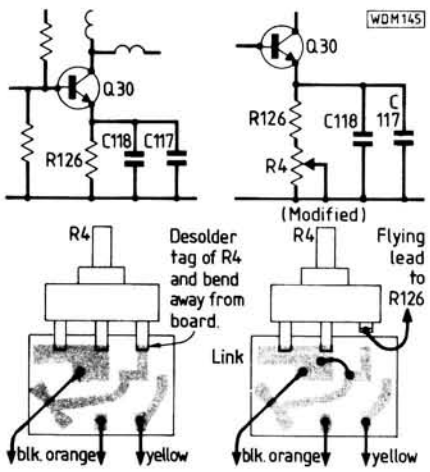


Fig. 1: (Top) Circuit diagram of pre-driver stage before and after modification. (bottom) View from the track side of the control p.c.b. before and after modification

Safe Cable Reels

Briticent have two cable reels with built-in safety features.

The reels combine good looks with durability, and are suitable for use both in and out-of-doors. They have a wind-on/wind-off action and incorporate a safety cut-out to protect against overloads and a neon light to indicate mains on.

The cable reels are supplied with cable and fused plug. A 1500W version comes with 10m of cable and the 3250W version with 8m of cable. Both versions are fitted with twin outlet sockets.

More information is available from:

Briticent Int. Ltd., Crow Arch Lane, Ringwood, Hants. BH24 1NZ. Tel: 0425 474617.

Catalogues

Cricklewood Electronics have just published the 10th Edition of their component catalogue. Listing the wide range of components stocked by them, together with prices, you can obtain your copy from:

Cricklewood Electronics Ltd, 40 Cricklewood Broadway, London NW2 3ET. Tel: 01-450 0995.

If you are after difficult-to-get i.c.s for a piece of oriental equipment then you need Grandata's list. This covers a wide range of semiconductors including Japanese transistors. Also covered are valves, Servisol products and video and cassette heads, belts and motors.

For a free copy contact:

Grandata Ltd, 9 The Broadway, Preston Road, Wembley, Middlesex. Tel: 01-904 2093.

HRS Activities

The Hilderstone RFS has a growing interest in radio foxhunts, on top band. They are planning some appropriate events in the near future, to which all are welcome. Technical/map reading prep sessions can be arranged if you need them.

Their "resident tutor" Ken Smith G3JIX plans to offer a post RAE practical course entitled "Practical Radio-Electronics". On this course, numerous projects such as fault-finding and bits of "how-it-works" will be covered.

The RAE studies will again form an important activity. Students are advised to join the practical course and to come along to the study circle they hold. Morse classes on the go all the time.

For more details contact the club secretary *GOCLO on 0843 69812.*

GB3EY

Work on the GB3EY 10m repeater has now reached an advanced stage. Although information is not yet available as to when the licence will be issued, the group is working on the assumption that the repeater should be ready and working by the autumn of 1987.

The output frequency is 29.68MHz and the input is 29.58MHz. Access to the repeater will be available by the presence on the input frequency of a carrier on which is superimposed a sub-audible tone of 146Hz ± 10Hz at a deviation of 400Hz ± 100Hz. This tone must be present on the input signal at all times when the repeater is being used. If the repeater is not in use, a toneburst of 1750Hz ± 25Hz must also be presented for a period of, not less than, 500ms. The time-out period is 5 minutes.

RAE Courses

Eccles: There are a variety of courses to be found at the Brookhouse Evening Centre, Northfleet Road, Eccles, Manchester this year. The classes take place on Tuesday or Thursday evenings from 7pm to 9pm. The topics are Electronics (Basic and Advanced), RAE, Morse, Amateur Radio Construction and Radio & TV Repair. For details ring the main AEC on 061-789 1894.

Grafton: The Grafton RS are holding their RAE courses at Elizabeth Garrett Anderson School, Riseing Hill Street, London N1 on Monday evenings. The lecturer, B. C. Bond G3ZKE, and more information is on 01-485 7065. A Morse class is also available for a limited number of students on Wednesday evenings.

Southampton: Evening classes are being held at the Cantell Centre, Violet Road, Bassett on Tuesdays and the Totton FE Centre, Testwood Lane, Totton on Wednesdays. Further details either from the centres or David Webb G8TMT, 4 Glasslaw Road, Southampton.

Callsign Search

The North Staffordshire RAYNET Group are looking for the holders (or ex-holders) of the callsigns G6RNS or G8RNS.

If you know anything about the history or whereabout of the holders of the callsigns then contact ***Allan Drake G1EBD on 0782 612868.***

Polyfet

Polyfet is claimed to be the world's first gold-metallised silicon f.e.t. series of devices capable of operation at frequencies up to 2GHz.

Made by Polycore RF Devices, and available from Anglia Microwaves, Polyfet provides low capacitance, high G_m (typically 10 to 13) and high F_t for use in v.h.f., u.h.f. and microwave circuits. Power levels range from 1 to 300W in Class A, B and C and the devices can be supplied in the majority of standard r.f. packages including new microstrip, single-ended and push-pull types.

Anglia Microwaves Ltd, Radford Business Centre, Radford Way, Billericay, Essex CM12 0BZ. Tel: (0277) 630000.

Continuity Tester

The Cirtest PS-12P Continuity Tester is designed for electrical, electronics and automobile component and installation testing.

It is a high-quality, maintenance-free instrument measuring 100 x 60 x 25mm.

It features a piezo-ceramic buzzer of variable tone and volume. It is also electronically protected against voltage overload up to 220V. The PS-12P covers the resistance range 0 to 100kΩ, using a test current less than 1mA.

For more details contact:

Cablecheck Systems, Sanderson Centre, Lees Lane, Gosport, Hants PO12 3UL.

934MHz

I have been sent a copy of the newsletter by the Personal Radio Club of Great Britain 934MHz. It's an 11-page A4 newsletter with all kinds of information in it. There are news items on which groups have done what, technical articles as well as letters to and from the DTI affecting 934MHz users.

If you would like more information on the group and their activities, write to

PRCGB, 41 Twyford Avenue, Shirley, Southampton SO1 5NZ.

Foreign Speech

People who cannot speak a word of each other's language will soon be able to talk over the 'phone using a system developed by British Telecom.

The world's first instantaneous translation of speech by computer was unveiled publicly by the BT Research Labs early in August.

Simple sentences in English were translated into French and vice-versa. The prototype equipment can translate English into German, Spanish, Swedish and Italian and the reverse capability is being developed. This will then also make possible translation between any pair of these languages.

Each speaker has a microphone linked to a Merlin 5200 personal microcomputer. These are connected by a telephone circuit capable of handling computer data. The first participant speaks a sentence in English, the computer repeats the sentence, this is confirmed by saying "yes", and then the message is passed to the distant computer which translates it and speaks to the other participant.

The system is based on a set of more than 400 phases in common business use stored in each computer's memory. The speech translation project is sponsored at the research labs by BTI, who are looking into the possibilities for carrying out a trial with another country.

BAEC

I have received the July issue of the British Amateur Electronics Club Newsletter. As usual it is full of all kinds of information. The series *Electronics A–Z* is now on digital i.c.s, there is an article on *Using "Junk Box" Transformers,* useful ideas from members, letters and help wanted.

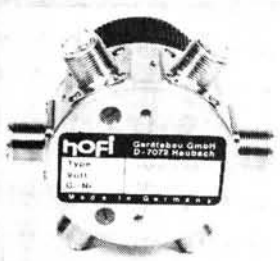
If you would like more details then write to:
Mr J. G. Margetts,
53 High Oaks Close,
Locks Heath,
Southampton
SO3 6SX.

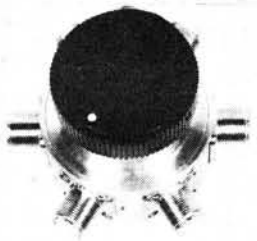
Telecomms Becomes Nevada

Although they have been trading under the name "Telecomms" since 1969, the Portsmouth based importers, distributors and manufacturers of amateur and CB radio equipment have found that their customers have been confusing them more and more with "British Telecom". Reluctantly, therefore, they have decided to move on to a "new" name.

As they have been using "Nevada" for some time on products manufactured by Telecomms in the UK, it seemed logical that they should adopt this name for the company's new trading title.

As from November 1 you should no longer be looking for Telecomms but
Nevada Communications,
189 London Road,
North End,
Portsmouth,
Hants PO2 9AE.
Tel: (0705) 698113.





Coaxial Switches

A new range of professional 5-way coaxial switches is now available from Winchester Communications.

The Hofi range of switches are available with either SO239 or "N" type sockets and are supplied with individual certificates of performance showing factory guaranteed figures for insertion loss and isolation. A unique double contact system is claimed to give high power transfer and excellent performance up to u.h.f. while the use of corrosion resistant materials and rugged construction gives long life.

The units can be either remotely or manually operated. The remote versions are available with weather protecting cover and an optional remotely controlled switch box to enable a rotator to be controlled via the same 8-way control cable offering savings in multi-way cable.

Power handling capability is quoted as up to 3kW, s.w.r. of better than 1.06:1 at 50Ω with an insertion loss of 0.04dB.

Hofi switches cost from £54.00 from the sole UK distributors.
Winchester Comms.,
Trinder House,
Free Street,
Bishops Waltham,
Hants SO3 1EE.
Tel: (04893) 3404.

Welsh Award

The Carmarthen ARS have decided to run the Welsh Award covering the eight counties of the principality. They believe that it is the first Welsh Award that has covered the whole of Wales.

You need to contact or hear 24 stations (3 in each county) in Wales.

It is available to all licensed radio amateurs and short wave listeners. All contacts on or after 1 March 1987 are valid.

Log extracts are acceptable, so no QSL cards need to be sent. Logs must show full details of the contacts made and must be verified by two licensed radio amateurs.

The award is issued for all contacts made on any mode on any band.

The fee for the award is £1.50 or 8 IRCs, cheques and postal orders should be made payable to the Society.

The address for the applications and any other details you require is:
Awards Manager,
Carmarthen ARS, PO Box 4,
Carmarthen, Dyfed SA31 1AA.

Raffle Winner

The lucky winner of Lowe Electronics Open Day free raffle was Chris Reynolds. He won an R2000 plus headphones, donated by Kenwood in Germany.

Chris G1LDV, already owns a TS-530S and TH-21E, so the general coverage receiver will be a useful addition.

The photograph shows Alan Whitford, Managing Director, Chris G1LDV and his son (an s.w.l.!).

NEWS DESK ... compiled by G4LFM and G8VFH

Photo competition

Newport ARS are organising a photographic competition as part of the presentation for The Royal National Eisteddfod of Wales.

The theme of the competition is Amateur Radio and is open to anyone, licensed or not. Entries are invited for 3 categories, in 2 groups.

Group 1—Over 18 years of age, Group 2—Under 18 years of age. In each group there are:

Category A—Depicting amateur radio in Gwent
Category B—Depicting amateur radio in Wales
Category C—Depicting amateur radio in the world.

A maximum of two entries allowed per entrant.

Three prizes will be awarded in each section, with an additional prize for the first ten entrants to identify their prints in their Eisteddfod display.

For a copy of the rules, send and s.a.e. to:

NARS,
PO Box 33,
Newport,
Gwent.

Club Videos

The Radio Communications Division of the DTI now have three videos available for free loan. An idea for a radio club evening?

The subjects are Fixed Links Mobile Service, The Work of the Radio Division and An Interview with the Director of the RIS. This last video is rumoured to have been filmed in a helicopter!

To order the videos you should ring their 24-hour order number, 01-275 3072.

Aircraft Bits

I'm sure you have been following the series on Aeronautical Radio in *Short Wave Magazine*. Well, do you have any aircraft equipment you don't want, or do you know of any sources of such equipment. Anything, whether instruments, controls, bits of airframe, manuals or charts would be interesting —even if broken and non-working.

If so please contact G. L. Manning on 01-958 5113. You can also ring him on that number if you wish to visit his collection.

FT-102 User Group

There is a user group developing for those people who drive a Yaesu FT-102. They hope, as they grow larger and stronger, to provide an information exchange for fault diagnosis and maintenance tips, as well as an occasional newsletter and a regular on-air net.

If you are interested in the group then drop a line to:

Sean Quinn GI4PCQ,
58 William Alexander Park,
Belfast BT10 0LX.

Ex-G Radio Club

Unfortunately when we last mentioned the Ex-G Radio Club, my fingers got tied up on the address. This group caters for amateurs born in the UK and domiciles abroad. If you would like more details, write to:

F. W. Fletcher,
53 St Ives Park,
Ringwood,
Hampshire BH24 2JX,
England.

WAB Awards

R. J. Nash G4GEE is Acting Contest Manager for the Worked All Britain Awards. He has sent us the results of the Worked All Britain VHF/UHF contests.

QRO

Mobile
1st G4LAB/M 26 100 pts.
2nd G4WET/M 23625 pts.
SWL Section
1st Helen Rose 30780 pts.
144MHz Fixed Station Single Op
1st G6XVV 299040 pts.
2nd G0EMS 267960 pts.
144MHz Portable Single Op
1st G0CDA/P 406640 pts.
2nd G1UUX/P 233650 pts.
Fixed Multi Op
1st G3IUB 103360 pts.
Portable Multi Op
1st G1NUS/P 405020 pts.
2nd G4SLH/P 249900 pts.

QRP

Mobile Section
1st G4LAB/M 4950 pts.
144MHz Fixed Station Single Op
1st G6XVV 73025 pts.
2nd G6YEP 45 100 pts.
Portable Single Op
1st G6CSY/P 51840 pts.
2nd G1PEY/P 32400 pts.
Portable Multi Op
1st G1NUS/P 106335 pts.
2nd G1POD/P 56610 pts.

The 2nd placed operator in the 144MHz single Op QRO contest was only aged 14 too!

Transverters

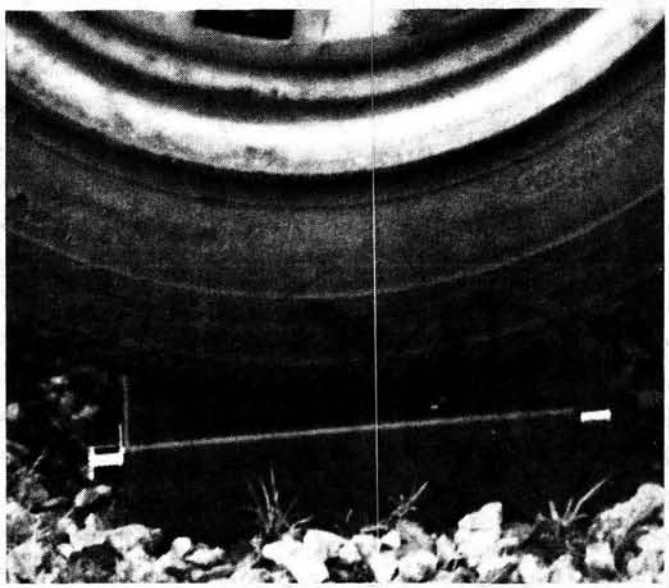
The recently introduced Noddfa Transverters are available in two models claimed to be suitable for converting a 500mW r.f. output 144MHz transceiver into a 2.5W rig for the 50 or 70MHz bands.

The manufacturer's press release stated that the prototype withstood immersion in a fish-pond for 48 hours without any sign of water getting in past the seals. All loose r.f. coil cores are locked in position to prevent loosening during mobile operation.

The special p.c.b. mounting technique which absorbs shock and spreads the load out over the entire side of the p.c.b. is claimed to be unique. The makers believe that the transverter will survive any possible mal-treatment that an amateur could subject his gear to. To prove their confidence they will even replace, free of charge, any Noddfa transverter which fails to work after being blown from the top of an antenna mast in a gale!

The cost of the transverter is around £200 including the r.f. filtered power supply. An s.a.e. will secure further information from

Noddfa,
Lower Road,
Harlech,
Gwynedd LL46 2UB.



Special Event Stations

GB2CCP: The Mid Lanark ARS are putting on this special event station at Chatelherault, Hamilton to commemorate the restoration and re-opening of the Duke of Hamilton's Hunting Lodge. The QSL card will depict workmen building the original lodge from stone obtained from a quarry nearby. They will be using 3.5 to 28MHz and 144MHz on October 10/11.

GB4CPU: The South Devon Radio Club are taking part in Computercations '87 on November 1. It is being jointly arranged by Torbay Computer Association and the Radio Club. Admission is 50p with children, OAPs and UB40s 25p. The emphasis of the show is the use of micro computers and processor devices in radio communications. They will be using "various modes".

Can You Help?

R. Stoner has an His Masters Voice Radiogram with exchangeable stylus heads, it also has two large speakers. The radio works reasonably well but the record player needs attention. Does anyone know of someone in the Lancing area who could help Mr Stoner out?

If there is a firm or interested collector who could restore the unit to a fully working radiogram, please let Mr Stoner know. His address is 62 Tower Road, Lancing, Sussex BN15 9HT.

J. Worthington is looking for information on fitting a Vic 20 or similar type keyboard to the MM40001KB RTTY transceiver (Microwave Modules). If you can help then write to, Penrhyn Bach, Bwlch Tocyn, Abersoch, Pwllheli, Gwynedd.

Charles Elvin has bought a Lafayette Guardian 6600 and would like to find an instruction manual for the unit. He would like to fit a b.f.o. to it and so any information would be useful. Please write to 39 Kintillo Place, Bridge of Earn, Perth PH2 9AS.

Mr W. E. Stedman has 55 pre-war HMV and Marconi service manuals covering 105 models, he also has 45 duplicate manuals. He is looking for an Avo Valve Characteristic Meter or Avo Valve Tester. If you think you can help him, then write to W. E. Stedman, 133b Lynton Road, Bermondsey, London SE1 5QX.

Does anyone know where you can obtain a projector lamp rated 100W at 30V for a Specto 9.5mm projector? Failing that, any information regarding a substitute lamp. If so, please write to 6 Hamford Close, Walton-on-Naze, Essex CO14 8JD.

Toroidal Mains Transformers

New production methods and materials have enabled Cotswold Electronics to supply their well-known Budget Range of toroidal transformers with an alternative double insulation which meets BS5850 at no increase in cost. With a thermal cut-out fitted these transformers would also meet all the requirements of BS415.

The VA ratings remain the same at 30, 60, 100, 160, 230, 330 and 530VA, and as well as the original standard primary voltage of 120 + 120V, single primary voltages of 240, 110 and 220V are now available.

An interwinding metal screen can also be provided. Windings are terminated in pvc insulated leads 150mm long.

Recent developments and improvements in production methods have resulted in the gradual reduction in cost of toroidal types so that now there is virtual parity in cost for 30VA and over.

Further details on these transformers as well as other products in their range is available from

Cotswold Electronics Ltd,
Unit T1, Kingsville Road,
Kingsditch Trading Estate,
Cheltenham GL51 9NX.
Tel: (0242) 41313.

GaAs Microwave Power Amps

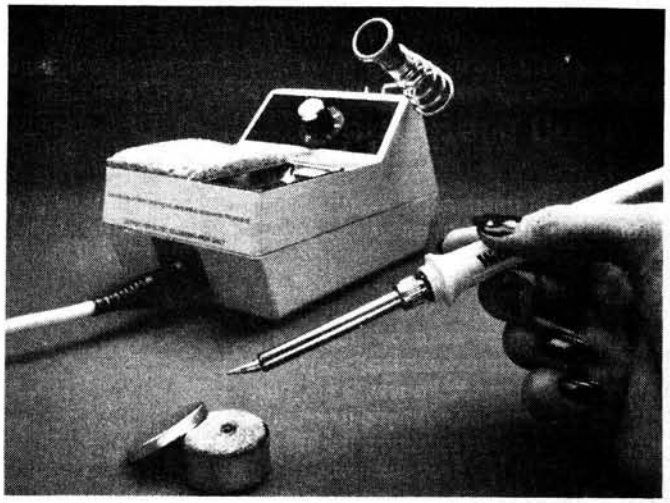
The 6000 series GaAs power amplifiers from MED offer frequency coverage from 2.7 to 6.4GHz in bandwidths of 500MHz with saturated c.w. output powers of 1, 5 or 10W. Excellent linearity is claimed at low power levels and it is reckoned to be possible to reduce quiescent power consumption to almost zero using some innovative bias circuits.

For even higher power operation the MED 7000 series amplifiers use silicon transistors for peak outputs of 25, 50 and 100W.

Input and output are both isolated with v.s.w.r.s of typically 1.5:1. Input power for all types is standardised at 10mW.

Further details are available from

Anglia Microwaves Ltd,
Radford Business Centre,
Radford Way,
Billericay,
Essex CM12 0BZ.
Tel: (0277) 630000.



New Life for Old Tips

Multicore have just introduced a new tip tinner and cleaner, TTC 1, to provide a fast and effective method of restoring de-wetted soldering iron tips to a virtually good-as-new condition.

Contained in a small metal container with lid and self-adhesive pad for fixing it to working surfaces, this soldering aid is a compacted block of chemically activated, electronics grade, solder powder which cleans, wets and re-tins soldering iron tips with a single wipe.

TTC 1 is claimed to remove even the stubborn tin/iron intermetallic layer that forms on iron-plated tips and resists resin-based fluxes. At the same time the chemicals employed are stated to be non-corrosive and have a low evaporation temperature so that nothing other than solder remains on the tip after tinning.

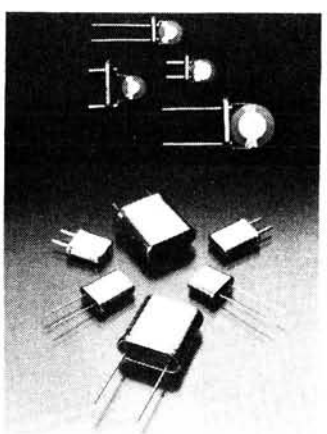
For further information

Cirkit Holdings PLC,
Park Lane,
Broxbourne,
Herts EN10 7NQ.
Tel: (0992) 444111.

Targa Electronics

Targa Electronics have moved, their new address is:
3 Renishaw Road,
Mastin Moor,
Chesterfield,
Derbyshire
S43 3DW.

For details of their products, you should refer to their advertisement in this issue.



3-day Crystals

Piezo Products Ltd have an express manufacturing service for when you need that crystal yesterday. Well not quite, they have a 3-day service as well as a 24-hour service if you are really in a hurry.

The service is available for crystals working in the 1 to 70MHz frequency range. Devices are supplied in a variety of packages (HC-6, 18, 25 or 33/U styles) according to frequency.

Typical frequency tolerance figures are ±0.001 per cent (at 25°C), with a frequency/temperature tolerance of ±0.001 per cent over either −10 to +60 or −30 to +80°C ranges.

For more details you should contact:

Piezo Products Ltd.,
Millstream Trading Estate,
Christchurch Road,
Ringwood,
Hants. BH24 3SD.
Tel: 0425 479337.

Practically Yours

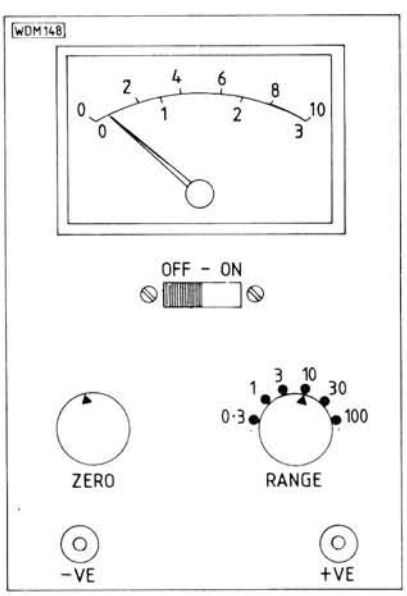
by Glen Ross G8MWR

This month we change direction a little and present a simple constructional article which is well within the scope of the novice builder and which will provide him with something more than just a gimmick end product.

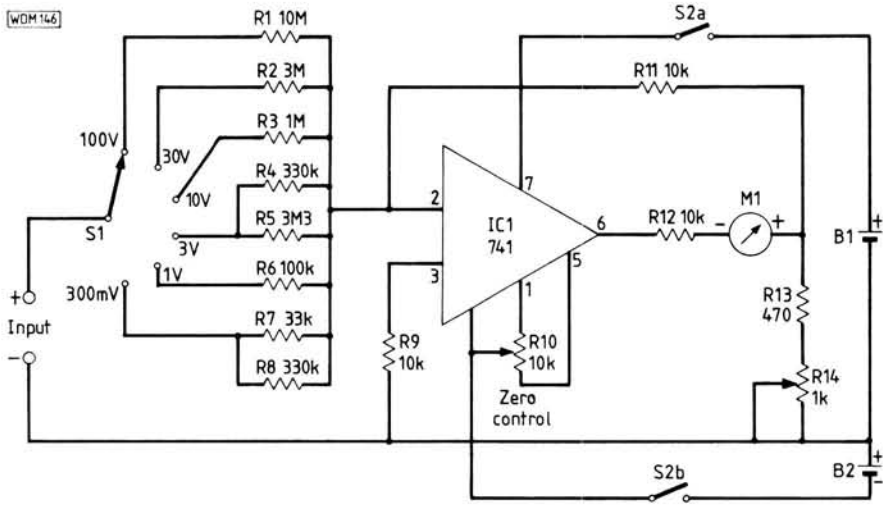
Although many amateurs are no longer able to do full repair work on modern rigs, due to the increasing complexity of them, the ability to take a few voltage measurements can clear up many simple problems. There are many multimeters on the market but a good high impedance type will set you back £20 or so and you will still end up with a unit that is not useful at much below one volt full scale deflection (f.s.d.). The unit to be described will work with good accuracy down to 3 millivolts. It has a sensitivity of 100kΩ per volt and so imposes very little loading on the circuit being measured.

Meter and Driver

The circuit consists essentially of two parts, the meter driver and the range switching. The indications are shown on a 100μA meter and the driver is a 741 i.c. running on a dual rail power supply. The meter should be of a type where you can get at the scale plate to add a second scale marked 0 to 3, the main scale being marked 0 to 10 or 0 to 100. A meter of 60–75mm size will give good open readings and can be picked up cheaply at the rallies. The meter is driven by the 741, both inputs of which are tied to ground by approximately 10kΩ, under these static conditions the output at pin 6 is zero and the meter shows no reading. If a voltage is now applied to pin 2 the 741 becomes unbalanced and a voltage proportional to the input appears at pin 6 and is shown on the meter. The 741 includes facilities to ensure that the initial balance is correct and this is achieved by use of R10. This control should be mounted on the front panel so that the zeroing can be reset as required.



The front of the multimeter, showing the necessary panel markings



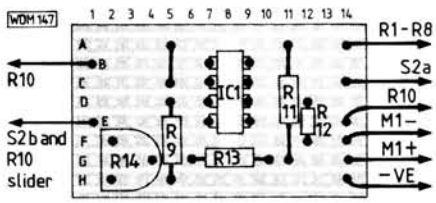
The circuit diagram of the home-brew multimeter

Switching

Range switching is usually obtained by using a string of resistors in series across the input terminals and switching the input of the 741 to the correct tapping point for the range required. This system entails using very non-standard resistance values. In the present design, advantage is taken of the fact that the input resistance of the 741 is 10kΩ and this is made part of the divider network, suitable resistors being switched in series with it to give the desired ranges.

This still leaves the problem of obtaining values such as 300kΩ. If a resistor is paralleled with another one of ten times its own value then the resulting combination has a value ten per cent lower than the smaller resistor. To get the value 300kΩ we simply

32 ▶



The Veroboard layout of the multimeter

SHOPPING LIST

Resistors

0.25W 5% Carbon film

470Ω	1	R13
10kΩ	3	R9,11,12
33kΩ	1	R7
100kΩ	1	R6
330kΩ	2	R4, 8
1MΩ	1	R3
3MΩ	1	R2
3.3MΩ	1	R5
10MΩ	1	R1

Horizontal skeleton preset

1kΩ	1	R14

Linear potentiometer

10kΩ	1	R10

Integrated Circuit

741	1	IC1

Miscellaneous

1 pole, 6-way rotary switch (S1); d.p.s.t. toggle switch (S2); 100μA meter; PP3 battery (2 off); Veroboard.

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B £29.95

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22-220 ..... **£34.95**

B **43-Range Multitester.** 50,000 ohms per volt DC sensitivity. Fuse and overload protected. Measures to 1000 volts DC in 12 ranges and 1000 volts AC in 8 ranges. DC current to 10 amps, resistance to 20 megohms. Decibles: −20 to +62 dB. Requires one 9v and one "AA" battery. Measures: 6 11/16 x 4 7/8 x 2 3/8".
22-214 ..... **£29.95**

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PW REVIEW

Are you interested in RTTY, AMTOR, CW, FAX and Packet? If so this, the AEA PK-232, could be the unit for you, says Mike Richards G4WNC.

The AEA PK-232 multi-mode terminal unit has been around for some time now, but during its life it has undergone continuous upgrades and improvements.

The PK-232 is a very powerful unit which is capable of sending and receiving in five different modes, the versatility of the unit means that it is fairly complicated both in construction and in operation.

In order to utilise the PK-232 you will need a good quality transceiver and a terminal or computer with an RS-232 type serial interface. If the FAX option is to be used then an Epson compatible printer will also be required. The computer will also need suitable software to drive the serial port. Although a simple communications program will suffice, due to the complexity of the commands, operation is greatly simplified if dedicated PK-232 driver software is used. ICS Electronics can supply a range of dedicated programs to suit most popular computers.

The PK-232 has been designed to interface easily with most modern transceivers and includes a bargraph tuning display to simplify tuning. Having obtained all the essential components, all that is required is to familiarise yourself with the command set and start operating!

Connecting-up

Starting with the computer interface, the PK-232 uses a form of RS-232C on the serial port with the minimum number of connections being 3 wires when using software flow control. Full hardware flow control can also be implemented, if this is supported by the computer software. The voltage levels used on the serial interface conform to the RS-232 standard, so if you have a computer with t.t.l. levels, i.e. Commodore VIC-20 or C-64 etc., you will need a suitable level converter. The manual contains details of interface connections and software requirements for a number of computers but this is of limited use as the information covers computers freely available on the American market with no mention of BBCs or Sinclairs, etc. When fitted with the FAX option, the serial connection comprises a Y lead with 25-way D connectors for the computer and PK-232 and a 36-way connector for the Centronics parallel port on the printer.

Before the computer can communicate with the PK-232 the speed and data format must be set-up. The PK-232 can operate with the following standard baud rates on the serial interface: 110, 150, 200, 300, 600, 1200, 2400, 4800 and 9600, the initial default rate being 1200 baud and even parity. If your software does not support 1200 baud then the PK-232 has a very useful auto-baud routine which, if you type a * every second will alter the PK-232's baud rate to match your computer, all very clever. The auto-baud routine cannot select the three lowest baud rates or 600 baud, but this should not be a serious limitation.

Once the computer connection has been established the manual describes a few simple tests to verify that all is well. It's well worth noting these tests as they can be very useful for fault location in the event of a problem with the PK-232.

The transceiver interface is a lot simpler to handle thanks to the ready made leads and the clear instructions in the manual. The two radio ports, either of which can be used for h.f. or v.h.f., have five connections to handle audio in/out, ground, p.t.t. and an optional squelch input. The selection of radio port is achieved by a push button on the front panel. The supplied screened leads had the correct 5-way plug on one end and were left free at the other for connection to the transceiver. Appendix K in the manual gave very comprehensive details of the pin connections for most of the popular amateur transceivers including base station and portable units. The PK-232 can be set to accept either positive or negative p.t.t. lines and the two ports can be set differently if required. The audio output from the PK-232 can be adjusted between about 5 and 100mV, although as there is only one adjustment both ports must be set to the same level which may present a few problems.

The transceiver may be modulated in two ways, either by audio tones generated in the PK-232 or by direct f.s.k. (frequency shift keying). Although direct f.s.k. is generally the preferred method, it is probably simpler to use the audio tones, at least to begin with. If you want to use f.s.k. then a socket on the rear panel provides connection for either positive or negative keying.

Operation

Starting with the simplest mode first, when the command is issued to put the PK-232 into Morse the appropriate l.e.d. on the front panel lights to confirm the mode selection. The tuning display and signal filters are also optimised for the reception of an 800Hz tone from the transceiver. The choice of 800Hz is a good one as this is the standard beat frequency used by most transceivers. Once in this mode the PK-232 monitors the incoming signal and automatically tracks the received Morse. Once clean copy is being received it is possible to lock the speed in order to stop the auto-track routine trying to decode any QRM that may be present. The tuning display indicates the optimum tuning point when the extreme left-hand l.e.d. is illuminated and under no signal or noise conditions the centre l.e.d. is lit. When procedural signals are received they are displayed either in lower case i.e. sk or as the appropriate punctuation.

When sending Morse the transceiver can either be keyed in the normal way via the key jack or alternatively by using the keyed 1200Hz tone output of the PK-232. When using the tone

output you will have to select u.s.b. and use the r.i.t. to tune the signal to compensate for sending a 1200Hz tone but receiving a 800Hz tone. The default setting for the send speed is 20 w.p.m. but this can easily be altered to any value between 5 and 99 w.p.m. One nice point is that when sending at speeds below 15 w.p.m. Farnsworth spacing is used, i.e. the character is sent at 15 w.p.m. but the inter-character spacing is increased to slow the overall rate. All the common procedural signals can be sent by typing the equivalent punctuation, the odd one or two which do not have direct equivalents are sent by typing some specially allocated punctuation symbols.

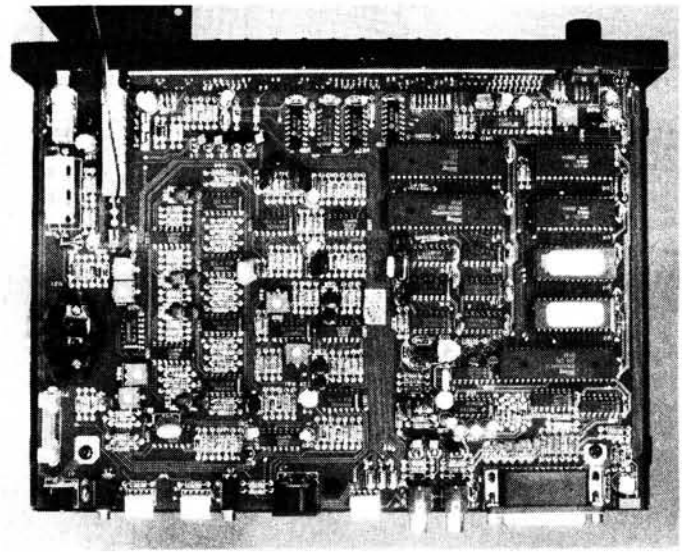
When using the RTTY and ASCII modes the baud rate can be set to any one of the following rates: 45, 50, 57, 75, 100, 110, 150, 200 or 300 baud. The facility also exists to step through these baud rates sequentially up or down. One common problem encountered in RTTY and ASCII is the reception of inverted signals, this is catered for in the PK-232 with two commands one of which turns the inversion on or off while the other toggles the inversion. The standard facilities to force a letter shift and to set un-shift on space are also included in the command set. The un-shift on space function forces a letter shift after receiving a space which can be useful to minimise the printing of rubbish under poor signal conditions.

The receive section of the PK-232 can accept all the standard shifts up to a maximum of about 1100Hz. When receiving signals with a shift greater than 200Hz the wideshift option is switched in to optimise the bargraph tuning indicator range and the decoder pass-band. When set for narrow shift the tuning indicator range is about 1240Hz to 1480Hz whilst in wideshift the range is 1100Hz to 2200Hz. When used for normal amateur RTTY and ASCII then the default setting of narrow shift is correct.

For those of you who are interested in monitoring non-amateur RTTY stations there are several useful features included. The PK-232 can be set to resolve up to 6 different codes or alphabets. The codes available are:

International
US Teleprinter.
Cyrillic.
Transliterated Cyrillic.
Katakana.
Transliterated Katakana.

The actual interpretation of the displayed output is rather complicated involving the use of punctuation symbols to represent phonetic sounds.



With the wide range of different signals on the air it can often be very difficult to decide the correct baud rate and code. The PK-232 has a solution in the form of a facility called SIAM (Signal Identification and Acquisition Mode). When SIAM is enabled the PK-232 scans the received signal and attempts to establish the baud rate, mode and signal polarity. The whole process takes a maximum of about 25 seconds and the result is displayed as a number between 0.1 and 0.99 representing the confidence factor followed by a description of the type of signal. If you are happy with the result then typing OK puts the PK-232 into the selected mode. One final feature that may appeal to the listener is the ability to invert selected bits of the received data, this can be used to decode certain types of encoded transmission.

When transmitting in RTTY or ASCII the transceiver can be modulated with the audio tones from the PK-232 or alternatively direct f.s.k. can be used. Although f.s.k. generally gives the best results tone modulation is the simplest to use, at least to begin with.

At the end of an over the PK-232 will send your call in c.w. if required. There are no facilities for a type-ahead buffer or for sending pre-set messages as these features are best handled by the driver software in the computer. The layout of the transmitted test can also be customised by adjusting the line length and the number of carriage returns if required.

AMTOR operation is fixed at 100 baud and complies with the well established protocols for this mode of operation. The front panel l.e.d.s indicate the status of the AMTOR link and are sign written with the normal text i.e. error, idle, phase, standby, RQ, traffic and over. The display of transmitted text can either be as typed or only after acknowledgement by the distant station. The second option is a very effective way of demonstrating the quality of the link, as a poor link will give a very slow and erratic display of text. The standard facility to break-in when the other station is sending has been implemented in software along with mode L which allows the monitoring of an AMTOR QSO. The actual implementation of mode L has one particularly good feature in that any complete block that is repeated between the two stations is not redisplayed on the screen. This is very useful when monitoring a poor link as it filters out a lot of unnecessary text. When using AMTOR with any terminal unit the transmit to receive switching time of the transceiver becomes very important. A particularly slow transceiver can mean that the first part of the transmit data is lost. If your transceiver has a slow changeover the PK-232 has a command which allows adjustment of the internal delay to suit the slowest of transceivers.

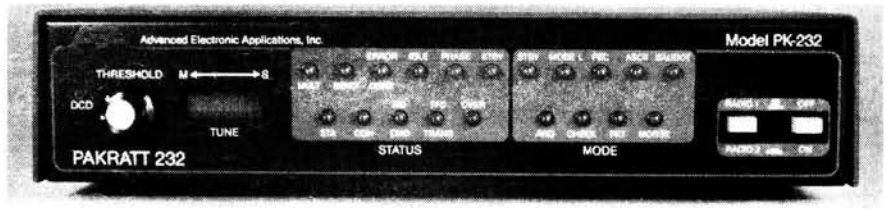
When tuning an AMTOR signal the bargraph display works slightly differently in that once the correct tuning point has been reached the display will pulse in time with the AMTOR signal. Once accustomed to this feature it is actually quite effective.

The other mode closely associated with AMTOR is FEC (Forward Error Correction), this is normally used for calling CQ and is supported by the PK-232. From the operator's point of view the commands are very similar to RTTY except that the alphabet is ITA No2 and the baud rate is fixed at 100 baud.

A new mode for the PK-232 is FAX and the review model was fitted with this option. To receive FAX, in addition to the modified software a special serial interface lead is supplied which has three connectors, one for the PK-232, one for the computer and one for the parallel port on the printer. The

printer used should be Epson compatible which should present very few problems as most dot matrix printers conform to this standard. When receiving FAX signals there are two important parameters which need setting, the drum speed and the IOC (Index Of Co-operation). The PK-232 uses slightly different terminology so the drum speed is called FSPEED and the IOC is called ASPECT. The drum speed can be set to 60, 90, 120, 180 or 240 r.p.m. whilst the IOC can be set to 183, 220, 275, 367, 550 or 1100. The drum speeds align with standard settings but the IOCs are all non-standard. Despite this the most common IOC for weather charts and most pictures is 576 and the PK-232's IOC of 550 is close enough for amateur use. Once the IOC and drum speed have been set the PK-232 monitors the incoming signal for synchronising pulses, after receipt of these it will automatically start printing the FAX chart. There are commands included to enable manual starting and stopping of printing as well as centring and inversion of the received image. Instead of being displayed on a printer the FAX image can be sent to the terminal or computer for storage and later retrieval. This stored image can also be re-transmitted which, with suitable driver software means that the PK-232 could become a very useful FAX transmitter.

Finally but by no means least, the PK-232 is capable of working as a full blown AX-25 Lev 2 version 2 packet radio TNC (Terminal Node Controller). Included in this is a 10-channel multi-connect feature which is a great way of finding out how many things you can do at once! The radio modem can be software configured for h.f. or v.h.f. and radio selection is achieved by using the push button on the front panel. All the standard commands are supported along with comprehensive selective monitoring. The number and complexity of the commands means that it would be inappropriate to discuss them here, suffice it to say that the command summary takes up 110 pages in the manual!



Performance

In an attempt to ensure that the review focused on the PK-232 and not a sophisticated driver program, the PK-232 was used with a basic communications package throughout the review period. The actual equipment used was as follows:

Icom IC-720A h.f. transceiver
Icom IC-02E v.h.f. transceiver
BBC B computer

With the massive command set of the PK-232 this was very much the hard way to run a station. I would strongly recommend that any prospective purchasers obtain a dedicated driver program in order to get the most from the PK-232.

The supplied manual was very comprehensive and covered all aspects from initial connection through to advanced operation. There is even a section on AMTOR operation by G3PLX which is very useful. A circuit diagram and components list is included but it is only suitable for those with good eyesight! To be fair though any serious work on a complicated piece of equipment like the PK-232 is best left to engineers familiar with digital fault-finding techniques.

When used for c.w. I found that the decoder was able to easily resolve good Morse up to about 35 w.p.m. Above this speed the results were a little unpredictable. The PK-232's ability to resolve c.w. was greatly enhanced by switching in a narrow i.f. filter in the transceiver. The quality of the transmitted Morse was quite acceptable and easy to resolve by ear. The RTTY and ASCII modes also worked very well with the bargraph tuning indicator being a great help.

With the increasing use of different speeds and modes on the h.f. bands the SIAM feature proved to be very useful. It did not always select the correct parameters when receiving weak or noisy signals but was very effective with strong signals. One point to watch is that SIAM may tell you that the baud rate is for example 47 baud but when you type OK to accept this the PK-232 will actually select the nearest pre-set rate as described earlier.

The AMTOR facility seemed to be very well sorted and all the features operated as expected. I found the pulsing tuning indicator a little confusing at first but I soon discovered that it was really rather effective.

Of the recently added features the FAX option is the most interesting and the results I obtained were very good indeed. Once the drum speed and IOC has been set-up and the receiver tuned to a suitable station, the PK-232 could be left unattended and would produce correctly aligned charts with no problems. The potential to transmit FAX was particularly fascinating though there was not time during the review to experiment. The non-standard IOCs did not present any problems as they were close enough to the correct settings to make very little difference.

When used as a Packet TNC the PK-232 performed very well but with its wide range of commands, a dedicated driver program is almost essential.

One feature not yet mentioned is the calibrate mode which as well as the usual function of allowing the modulation levels to be adjusted also incorporates a software frequency counter. This frequency counter allows the user to accurately adjust the transmit tones without having to connect an external frequency counter.

The AEA PK-232 costs £269.95 + VAT from ICS Electronics, PO Box 2, Arundel, W. Sussex BN18 0NX, with printer cable and FAX option.

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connect a 330kΩ and a 3.3MΩ as shown in the circuit diagram. To get good accuracy it is obviously essential to use close tolerance resistors; 5% are fair, 2% are better if you can obtain them.

Construction

The unit should be mounted in a robust box with the on/off switch, range switch, zero control and the input terminals mounted on the front panel. The 741 and its associated components may be mounted on a small piece of Veroboard which is fitted close to the range switch. The various range resistors may be mounted between the switch tags and the Veroboard input pin, or they could be mounted on the Veroboard and wiring taken to the switch. The two PP3 batteries can be mounted in Terry clips or fixed to the box using Sticky Fixers.

Calibration

The meter should be switched to the one volt range and the supply switched on. Adjust the zero control to set the meter to zero, if the meter does not follow the direction of rotation of the control simply transpose the connections to the outside terminals of the zero control. The meter calibration is best set up using a borrowed meter as a reference but if this is not possible then a small mercury battery, as used in cameras, provides a reliable source of 1.35 volts enabling calibration to be completed.

Extension

The ranges can be changed to those more suited to your requirements by simply changing the range resistors, the required value being the full-scale voltage reading required times 100 to give the resistance in kΩ. Current ranges can be added by switching the meter to the lowest voltage range and calculating suitable shunts to give that voltage at the full-scale current reading required. **PW**

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B.N.O.S. ELECTRONICS + CUE DEE

THE ULTIMATE PARTNERSHIP

With the recent surge in interest in the lower VHF bands the average amateur is looking around for new equipment on these bands. In what promises to be the ultimate partnership BNOS have teamed up with Cue Dee of Sweden to offer the highest quality equipment available anywhere.

BNOS, of course, have always offered a five year guarantee on all our linear amplifiers and the 4m/6m range is no exception. The compact LP models for 6 metres incorporate many of our popular features which offer peace of mind to the user. The LPM models for both bands contain all of our user friendly additions including the power meter and our famous overdrive protection circuits.

	LP50-3-50	LP50-10-50	LPM50-10-100	LPM70-10-100
Frequency Range	50-54MHz	50-54MHz	50-54MHz	70-72MHz
Class of Operation	AB1	AB1	AB1	AB1
Minimum input power	500mW	500mW	500mW	500mW
Maximum input power	5W	15W	15W	15W
Recommended input power	3W	10W	10W	10W
Output impedance	50 ohms	50 ohms	50 ohms	50 ohms
Output Power	50W	50W	100W	100W
Power Requirements	13·8V 6A	13·8V 6A	13·8V 12A	13·8V 12A
Pre-Amp gain (typical)	12dB	12dB	12dB	12dB
Noise Figure (Better than)	1·5dB	1·5dB	1·0dB	1·0dB

As is usual with BNOS products the specifications mean what they say. Power is quoted in RMS and harmonic outputs are kept incredibly low.

Many black boxes produce terrible second and third harmonics and at six metres these harmonics are even more troublesome. The second harmonic of 50 MHz is slap bang in the middle of the broadcast FM band. BNOS's range of low pass filters are designed to remove harmonic problems without cutting out the DX too. Fit a BNOS filter and the next time there's a stateside opening on 6, you can rest assured that the bloke next door can still listen to "The Archers".

Cue Dee are the Aerial world's BNOS. They also can offer a five year guarantee on their products because of the superior construction of their antennae. The aerials are made from the finest Aluminium and tested to Sweden's stringent national regulations.

The Cue Dee Duo is a combined yagi with 5 elements on 4 metres and 6 on 6 metres. The Duo incorporates a factory adjusted gamma match so you don't have to mess about tuning up like with other aerials. The boom is strong 28mm tube with a 1.5mm wall. Each element is a big strong 12mm diameter yet the overall effect of tubular section materials is to reduce wind loading by up to 66% over square section aerials.

With a 5 year guarantee, 6db gain over a dipole on each band and a preset gamma match the Cue Dee Duo – like all Cue Dee Aerials – is a fit and forget product.

BNOS and Cue Dee – The Ultimate Partnership.

Model	Band MHz	Insertion Loss dB	Harmonic 2nd	Rejection 3rd	Non Harmonic Rejection	Power Handling	Connectors
F50-L/U	50	Better than 0·5	50dB	75dB	75dB	250W	UHF
F70-L/U	70	Better than 0·5	50dB	75dB	75dB	250W	UHF
F144-L/U	144	Better than 0·5	50dB	75dB	75dB	250W	UHF
F144-L/N	144	Better than 0·5	50dB	75dB	75dB	250W	N
F432-L/N	432	Better than 0·5	50dB	75dB	75dB	250W	N

Note: Rejection Figures are typical and w.r.t. the wanted signal

6 metre Amps

LP50-3-50 Linear/Preamp	175.00
LP50-10-55 Linear/Preamp	175.00
LPM50-10-100 Linear/Preamp	235.00

4 metre Amps

LPM70-10-100 Linear/Preamp	235.00

CUE DEE Duo Antenna 5 elle on 4m & 6 elle on 6m 6dBd on both bands 129.95

Filters

F50-L/U	29.95
F70-L/U	29.95
F144-L/U	29.95
F144-L/N	35.35
F432-L/N	35.35

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Mill Lane, Stebbing, Dunmow, Essex, CM6 3SL.
Tel: 0371-86681 Tix: 817763 BNOS G

RTTY Tuning Indicator

With the advance of time and technology, the oscilloscope type of tuning display has given way to new ideas, such as the l.e.d. bargraph display or even the simple centre-zero meter type. This project by R. A. Penfold proves there's still a lot of mileage left in the simpler type of tuner, particularly with the advent of digital filter devices.

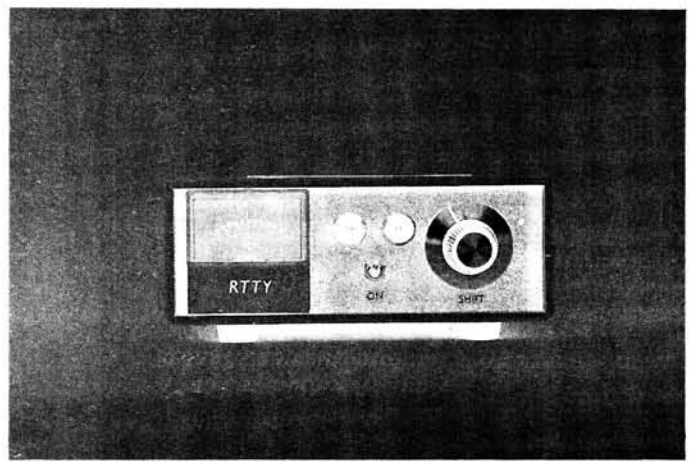
This unit was built initially as an aid to the accurate tuning of RTTY signals when experimenting with a variety of decoder designs. It proved so successful that the unit ended up as the tuning indicator for a full RTTY receiving set up, thus proving the unit is not restricted to experimental use. This indicator in fact works very well as an add-on RTTY tuning aid to any existing decoder.

The design is able to cope with virtually any of the standard frequency shifts, it can also be adjusted to accommodate any likely tones. The unit actually has three switched shift frequencies, and for each of these, both the "mark" and "space" frequencies can be adjusted to anything from about 200Hz to 2kHz. It also lends itself to being modified to give a wider coverage in the unlikely event of this being necessary.

Tuning Methods

Radio Teletype signals must be one of the most difficult signals to receive with regards to accuracy of tuning. The signal from the transmitter is normally an f.s.k. (frequency shift keying) type, where the carrier wave is switched between two frequencies. At the decoder one of these must provide a space output, while the other must be decoded to give a mark signal. The signal is usually received in an s.s.b. mode, and the pitches of the two tones depend on the setting of the receiver's overall tuning control. The difference between the two audio frequencies is always equal to the spacing of the two carrier frequencies though. For amateur RTTY signals a shift of 170Hz is normally used. The same shift is used for some commercial traffic, but in the main 425Hz and 850Hz are more common.

With all the types of RTTY decoders I have encountered it is not merely a rise and fall in frequency that is detected, but a switch from one particular tone to another. A decoder that detects a change in the input frequency rather than requiring particular tones would be perfectly feasible, but would have poor immunity to any interference on the input signal.



A tone-dependent type is much better in this respect, but whether it is based on high *Q* filters or phase locked loops (p.l.l.) having a narrow locking range (or both), accurate tuning is essential. This is especially the case with a narrow shift as utilised in amateur communications. The maximum acceptable tuning error for good results is only about plus or minus 10 percent or so of the shift frequency, which means getting the tones within about 20Hz of the correct figure. Even for someone with a good sense of pitch it is very difficult to accurately tune the warbling sound of a RTTY signal by ear with any degree of accuracy. Some form of visual tuning aid is essential for easy alignment of the receiver's frequency.

The oscilloscope tuning display probably offers the most reliable and accurate method of correctly tuning a RTTY signal. With this type of indicator a correctly tuned signal produces a vertical ellipse during the presence of one tone, and a horizontal ellipse when the other tone is present. This gives a (+) cross type display with a correctly tuned signal. Any tuning error or inaccuracy in the decoder's shift frequency is immediately obvious due to one or both of the ellipses being at the wrong angle.

The main disadvantage of this type of tuning indicator is that it is relatively complex and expensive. Another drawback is that it is rather fatiguing in use, and after a long period of operation you can be left with tuning displays before the eyes for some hours!

The usual alternative to this type of display is some form of twin level indicator, usually having ordinary panel meters or l.e.d. bargraph displays. Most decoders have two audio band-pass filters, one to select the higher tone and one to select the lower. With decoders of this type the two tuning meter circuits are simply driven from the outputs of the two filters, and maximum deflection from the two meters then corresponds to optimum tuning. The same system can be used with non-filter type decoders, but the band-pass filters must be included simply as part of the tuning meter circuit.

Zeroing In

In practice a twin tuning meter arrangement can be difficult to use. It can be awkward trying to concentrate simultaneously on two meters, and there are often other signals present which can tend to give misleading results. The extremely critical tuning accuracy needed for good results does not make things any easier.

There is perhaps no simple solution to really accurate and easy RTTY tuning. I have tried out a number of ideas, including some unconventional phase locked loop and audio analyser type designs. Several circuits gave good results under virtually ideal operating

conditions, but proved useless with even a moderate amount of noise to contend with. The system shown in Fig. 1 is the design that was finally selected. This is uncomplicated but seems to be quite fast and easy to use under real operating conditions.

At the input there are four stages which form a simple automatic level control (a.l.c.) circuit. If the unit is to be fed from a "line" output, or another audio source which is not affected by adjustment of the volume control, then this a.l.c. circuit is of limited value. The a.g.c. circuit of the receiver will then presumably ensure that the unit is fed with a reasonable constant level of audio. If the indicator is fed from a headphone socket, or any other output that is obtained via the volume control, the input level can vary considerably. The a.l.c. circuit is capable of providing a useable signal over a wide range of levels. However, there is a point at which the signal may go below the threshold of the a.l.c. and will not produce sufficient signal to drive the tuning indicator correctly.

The a.l.c. circuit uses a conventional arrangement, with the output signal being rectified and smoothed. The resultant d.c. signal is then amplified, inverted and fed to a voltage controlled amplifier (v.c.a.). The stronger the d.c. signal, the lower the gain of the v.c.a. This gives a negative feedback action which stabilises the output level.

The output of the a.l.c. circuit feeds into a preset attenuator. Although this might seem to be a very minor point, a suitable input level is crucial to the correct operation of the tuning indicator. This control must therefore be accurately set up if the unit is to provide optimum performance.

Ordinary *CR* type filters are less than ideal for this application where both filters need to be tunable over a fairly wide frequency range. A switched capacitor type is much more suitable, and both of the band-pass filters are of this variety. A basic switched capacitor filter is a low-pass type which uses the configuration of Fig. 2(a), and which is analogous in operation to the standard *CR* low-pass circuit of Fig. 2(b). In the *CR* circuit Ra limits the rate at which an input signal can charge and discharge Cb, and therefore limits the ability of the output to track rapid changes in the input voltage.

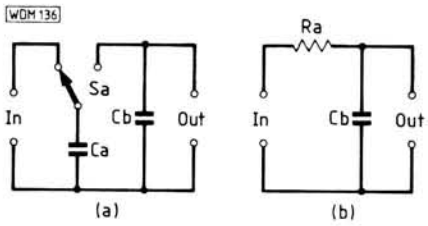


Fig. 2: The switched capacitor filter of (a) is equivalent to the basic *CR* low-pass filter of (b)

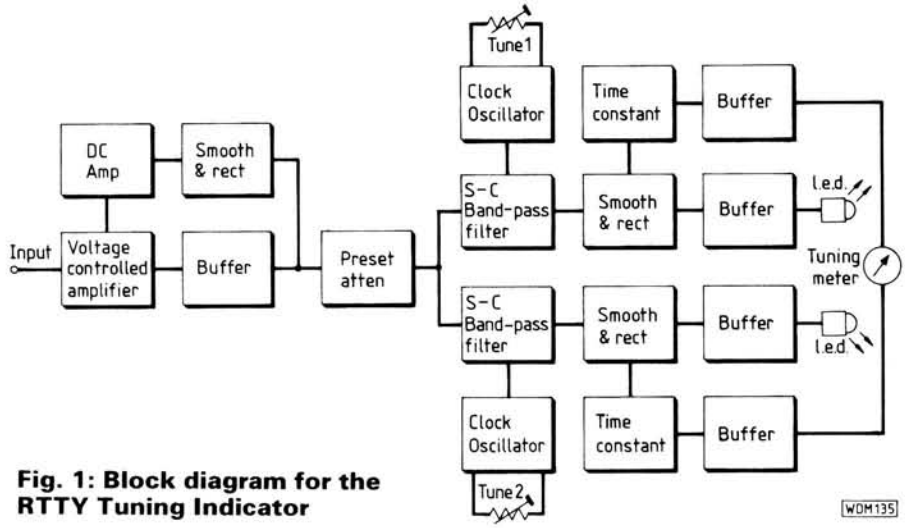


Fig. 1: Block diagram for the RTTY Tuning Indicator

Things are much the same in the switched-capacitor circuit, but here it is switch Sa and charged storage capacitor Ca that provide the coupling from the input to the output. In a practical circuit Sa is an electronic switch which is controlled by a clock oscillator. The effect of the switch and capacitor is to charge up across the input and to discharge into Cb, or *vice versa*, depending on whether the output is lower or higher in voltage than the output. As Sa is repeatedly switched from one position to the other the effect of the circuit is to keep the input and output at the same potential. However, as Ca is made much lower in value than Cb, the clock frequency needs to be many times higher than the maximum input frequency if the output is to accurately track the input signal. In other words, at high frequencies there is an inadequate signal transfer through the circuit, and the normal *CR* 6dB per octave roll-off is obtained.

The important factor here is that how well or otherwise the circuit couples the signal from the input to the output depends on the clock frequency. In fact the cut-off frequency is proportional to the clock frequency. In this design each band-pass filter is formed from two switched capacitor filters plus the appropriate active circuit to give the conversion from low-pass to band-pass operation. The filters have separate *CR* clock oscillators which enable the centre frequencies to be individually adjusted.

Each filter feeds into a rectifier and smoothing circuit, and the d.c. output from these are fed to l.e.d. indicators via buffer amplifiers. When the receiver is correctly tuned there will be a strong d.c. output from both smoothing circuits, and the two l.e.d. indicators will be activated. It is possible to use the brightness of the l.e.d.s to judge the optimum tuning setting, but this is not a particularly easy way of doing things. Instead, the two indicator lights are used merely to confirm that the receiver is tuned to roughly the correct setting, and that there are tones within the pass-bands of the filters.

Fine tuning is carried out with the aid of a centre-zero meter which is driven from both buffered outputs. This meter indicates the difference in the two output voltages, and with the signal correctly tuned this should be zero. Tuning the receiver correctly is therefore just a matter of first adjusting the receiver's tuning control to get both indicator l.e.d.s to light up, and then fine tuning for zero meter deflection.

On the face of it there is a flaw in this arrangement, in that if only one tone is present, there will only be an output signal from one filter. The two signals are not generally present for equal lengths of time overall, with one tone being present for a significantly larger proportion of the time than the other. This could give an optimum tuning point of other than zero, and one which would be unpredictable. This problem could be avoided by using a fast attack and long decay time in the smoothing circuits, so that the d.c. output level from each one is much more a reflection of the peak signal level than an indication of the average level.

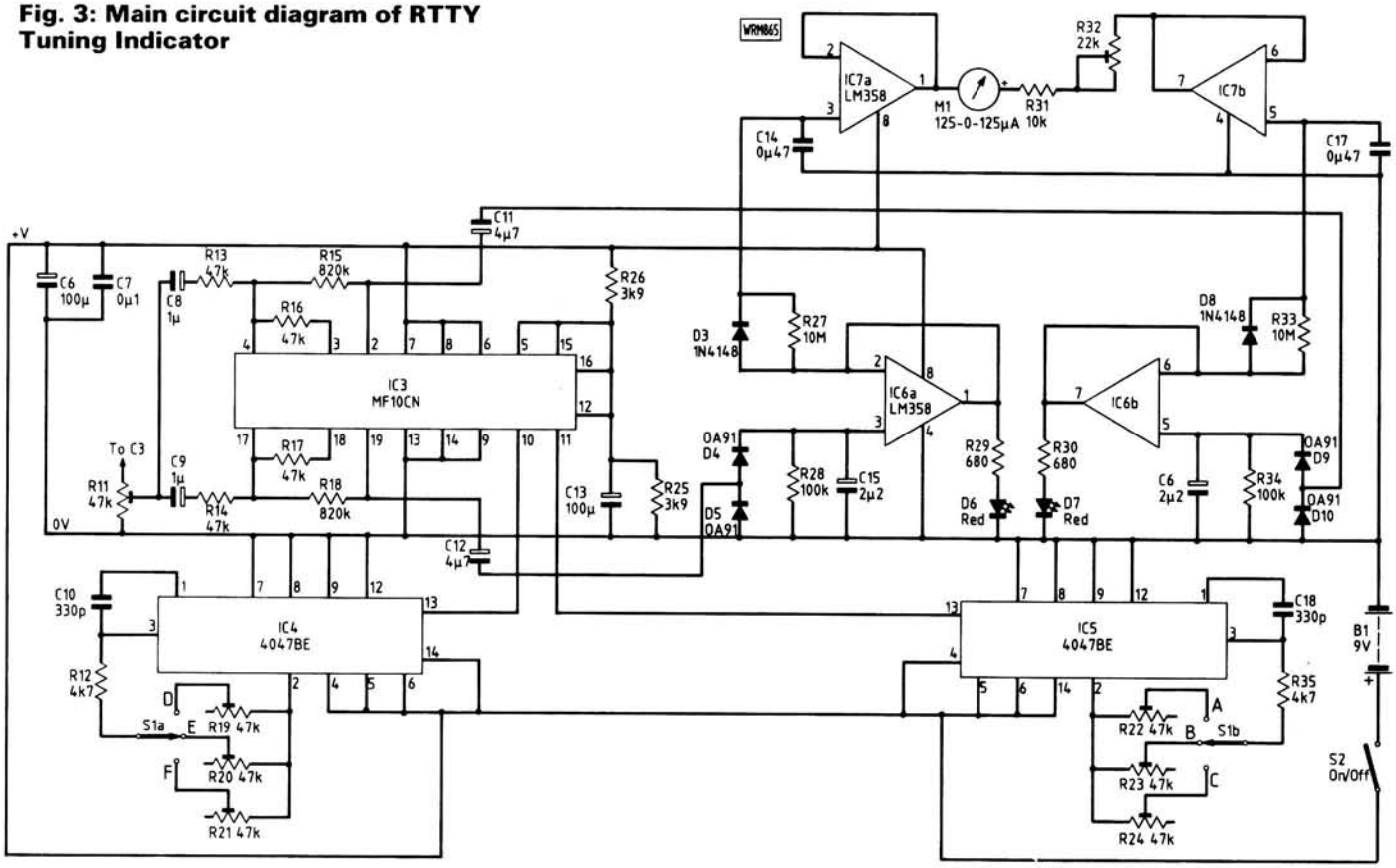
However, this would make initial tuning with the l.e.d. indicators more difficult. In an attempt to get the best of both worlds the l.e.d.s are fed directly from the smoothing circuits which have a fast attack and relatively short decay time. The meter in turn is driven via additional buffer circuits that preserve the fast attack but give a much longer decay time of a few seconds.

The Circuit

The main circuit diagram for the unit appears in Fig. 3, and the circuit for the a.l.c. is shown separately in Fig. 4.

Taking Fig. 3 first, IC3 is a switched-capacitor device, type MF10CN, and is the heart of the unit. It contains two second-order filters plus amplifiers and mixer stages which enable them to operate in a variety of filter modes. In this case the filters are both used in what the MF10CN data sheet refers to as "mode 1a". This provices notch, low-pass, and band-pass outputs, but it is only the latter which is utilised in this circuit. Three resistors set the input impedance and *Q* of the filter, and with the specified values the rele-

Fig. 3: Main circuit diagram of RTTY Tuning Indicator



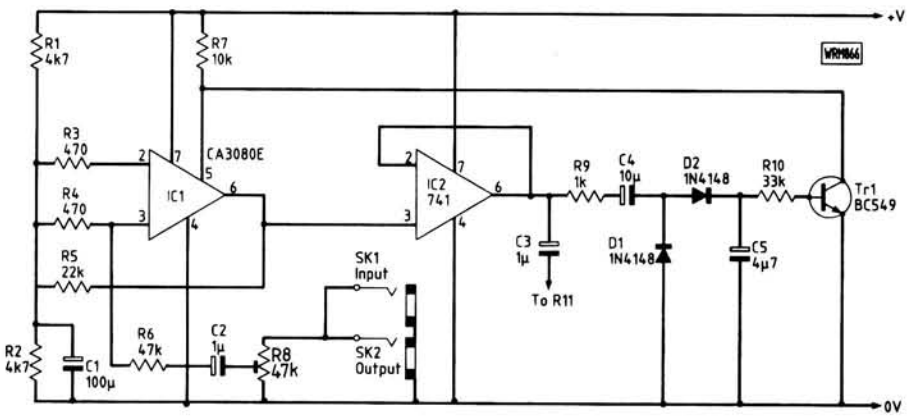


Fig. 4: Automatic level control circuit diagram

SHOPPING LIST

Resistors

0.25W 5% Carbon film

470Ω	2	R3,4
680Ω	2	R29,30
1kΩ	1	R9
3.9kΩ	2	R25,26
4.7kΩ	4	R1,2,12,35
10kΩ	2	R7,31
22kΩ	1	R5
33kΩ	1	R10
47kΩ	5	R6,13,14,16,17
100kΩ	2	R28,34
820kΩ	2	R15,18
10MΩ	2	R27,33

Sub miniature horizontal presets

22kΩ	1	R32
47kΩ	8	R8,11,19–24

Capacitors

Ceramic plate

330pF	2	C10,18

Disc ceramic

0.1µF	1	C7

Polyester Layer

0.47µF	2	C14,17

Electrolytic 10V p.c.b. type

100µF	3	C1,6,13

Electrolytic 25V p.c.b. type

10µF	1	C4

Electrolytic 63V p.c.b. type

1µF	4	C2,3,8,9
2.2µF	2	C15,16
4.7µF	3	C5,11,12

Semiconductors

Diodes

OA91	4	D4,5,9,10
Red l.e.d.	2	D6,7
1N4148	4	D1,2,3,8

Transistors

BC549	1	Tr1

Integrated Circuits

CA3080E	1	IC1
LM358	2	IC6,7
MF10CN	1	IC3
741C	1	IC2
4047BE	2	IC4,5

Miscellaneous

Plastics case 40 × 120 × 170mm (Cirkit 21-06605); p.c.b.; 8 pin d.i.l. i.c. socket (1); 14 pin d.i.l. i.c. socket (2); 20 pin d.i.l. i.c. socket (1); Battery holder; Battery connector; 125-0-125µA meter (Maplin LB79L); 3.5mm jack sockets (2); Rotary switch 3W 4p; Sub miniature s.p.s.t. toggle switch; Knob; Veropins; Nuts; Bolts; Washers; Wire.

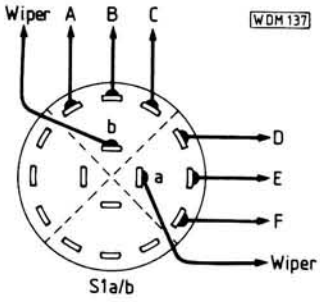


Fig. 5: Wiring diagram of S1 (viewed from the back)

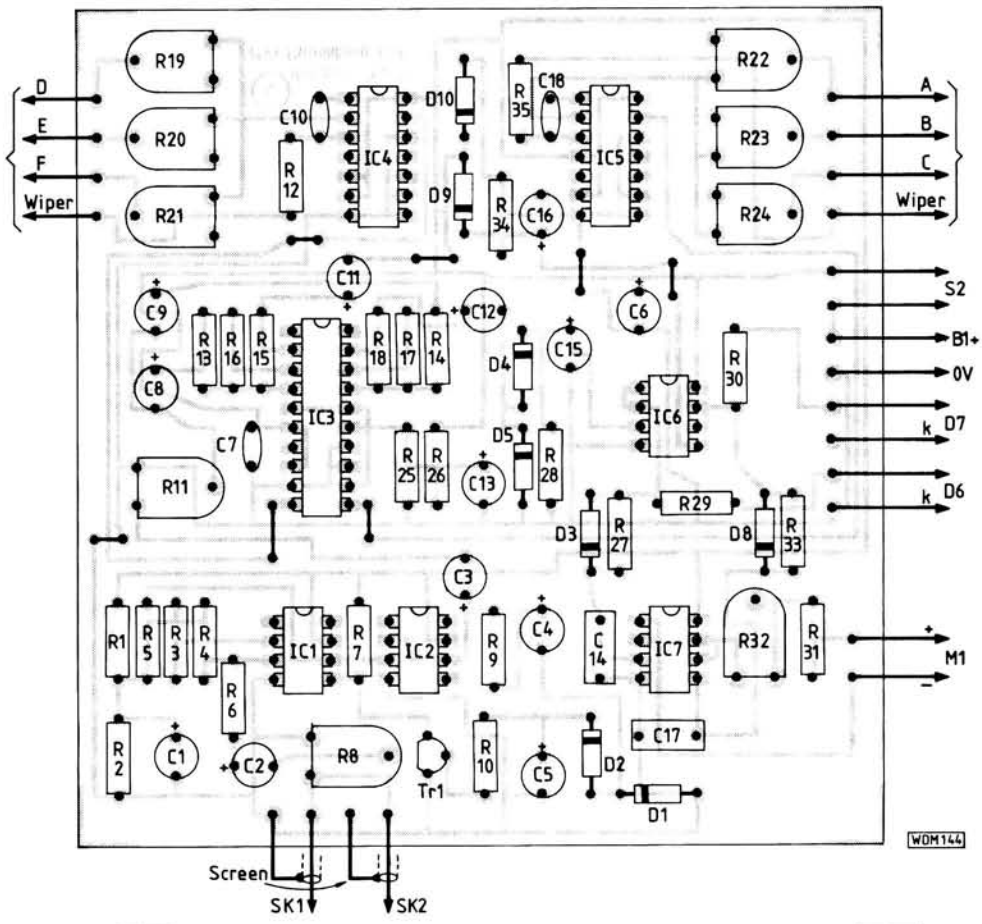
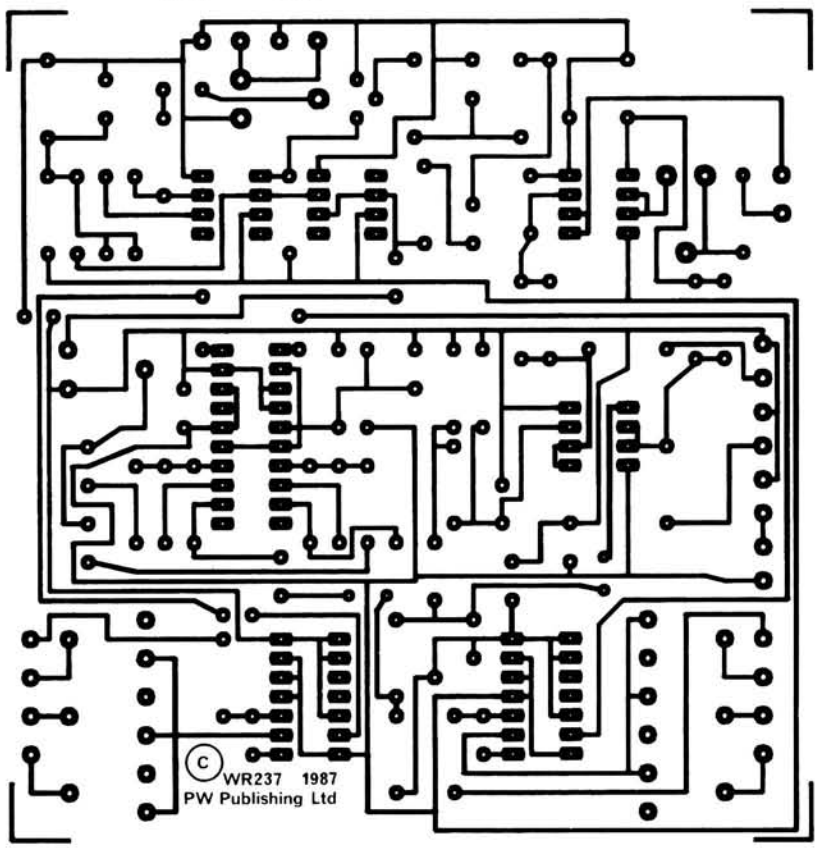


Fig. 6: Single-sided p.c.b. track pattern and component overlay, shown full size



vant figures are 47kΩ and 10 respectively. A high *Q* value is essential in this application where the tone spacing can ber very narrow. A much lower *Q* value would give inadequate discrimination between the two tones with 170Hz tone spacing.

The MF10CN requries a dual balanced supply of between 4 and 5 volts. This is provided by a potential divider network, R25 and R26 connected across the 9 volt supply. This mid-supply point is decoupled by C13, connected across resistor R25. There are various control inputs which are tied to the appropriate voltage to give the required filter operating mode. One of the most important of these is pin 12 which is tied high to set the filter frequency at one fiftieth of the clock frequency, or as in this case, it is tied to the mid-supply rail, setting the filter frequency at one hundredth of the clock rate.

The clock signals are generated by two c.m.o.s. 4047BE monostable oscillators, both of which are set in free-running astable mode. Each oscillator has three switched preset resistors as part of the timing network, these give an approximate output frequency range of 20kHz to 200kHz. This corresponds to a filter frequency range of about 200Hz to 2kHz. It is unlikely that tones outside this range will be used, but if necessary a wider tuning range could be obtained by using a higher value for R19 to R24 and making C10 lower in value. Having three sets of presets enables standard 425 and 850Hz shifts to be obtained in addition to normal 170Hz shift used in amateur band RTTY equipment.

The output signals from the filters are digitised (stepped) waveforms, but this is of no consequence in the present application, and no filtering of the output signals is needed. The output signals from the filters are processed by

simple half-wave rectifier and smoothing circuits, these feed two operational amplifiers configured as voltage followers. Note that the LM358 specified for the IC6 position is a type which is suitable for single supply operation. Most other dual operational amplifiers will not operate properly in this circuit, and would simply leave the l.e.d. indicators (D6 and D7) permanently switched on.

The a.l.c. circuit is based on a transconductance operational amplifier (IC1). Unlike a conventional operational amplifier, devices of this type are current rather than voltage operated, and are often used open-loop. The gain is controlled by a bias current fed to the "amplifier bias" input at pin 5. Resistor R7 normally supplies this with a strong bias. When the output level reaches approximately 1.5 volts peak-to-peak, positive bias produced by the rectifier and smoothing circuit is sufficient to bring Tr1 into conduction. It then diverts some of the bias current for IC1 and reduces the gain of the circuit. Only a marginal increase in the output level is sufficient to turn Tr1 hard on and to virtually switch off IC1. This gives the circuit a reasonable flat response above the threshold level, and enables an enormous dynamic range to be accommodated.

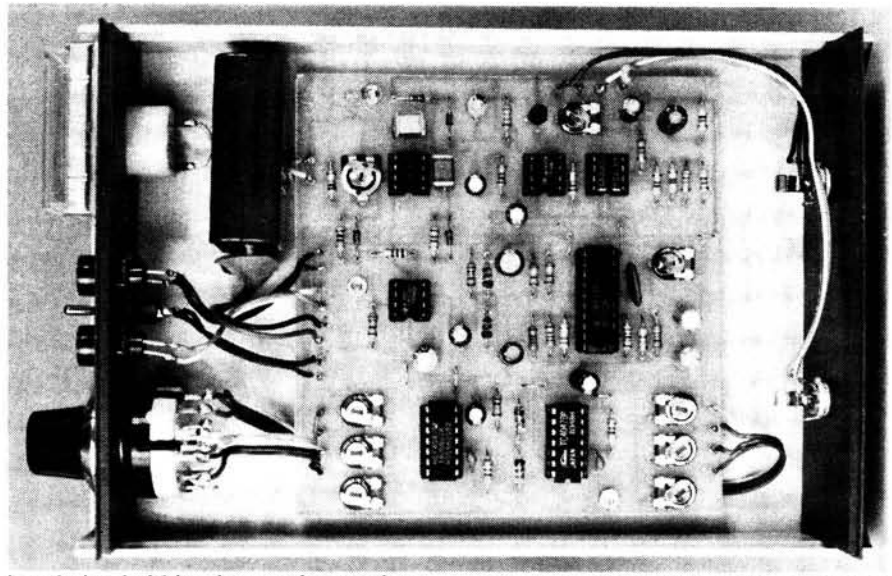
Potentiometer R8 is a volume-control-style preset attenuator. This would normally be set at zero attenuation, and should only be backed-off in the unlikely event of the circuit being overloaded. Sockets SK1 and SK2 are the input and output sockets respectively, and the input signal is simply coupled straight through to the output. The tuning indicator has an input impedance of around 47kΩ, which should ensure that it does not significantly reduce the input signal due to loading effects.

As the current consumption of the unit is in the region of 18mA it is advisable to power it from a reasonably high capacity battery. I used six R6 (HP7) type cells in a plastics battery holder.

Construction

Details of the p.c.b. are provided in Fig. 6. Integrated circuit IC3, 4 and 5 are m.o.s. type devices, and the MF10CN is not a particularly cheap component. The normal anti-static handling precautions should therefore be observed when dealing with these devices, taking extra care when dealing with IC3.

Provided the correct miniature printed circuit mounting capacitors are used there should be little difficulty in assembling the p.c.b. One point worth remembering is that OA91 diodes are a germanium type, and as such are much more vulnerable to heat damage than the more common silicon variety. The use of a heat-shunt when connecting these components is not really necessary, but each soldered joint should be completed with the



iron being held in place no longer than is really necessary. At this stage pins are fitted to the board at the points where connections to off-board components will eventually be made.

I used a case having approximate inside dimensions of 40 × 120 × 170mm, this being adequate to comfortably accommodate all the parts. Sockets SK1 and SK2 are mounted on the rear panel, I used 3.5mm jack sockets to match the connectors on my receiver. However, these can be chosen to suit individual requirement. The meter, l.e.d.s, and switches are mounted on the front panel, the exact layout is not too important, but it is advisable to mount the meter and l.e.d.s side-by-side.

The meter used in the prototype was a Maplin device which has no provision for screw fixing and must therefore be glued into place. A non-circular cutout for the meter must be made in the front panel. This can be achieved by drilling a 10mm hole and then filing it out to the correct size and shape. It is not essential to use this particular meter, and any type of centre-zero meter with the required sensitivity of around 100-0-100 to 200-0-200μA should do. An inexpensive type is perfectly suitable for this application and there is no real advantage in opting for a large and more expensive type.

Once everything has been installed in the case the hard wiring can be added. This is mostly straightforward. The wiring of S1 is the only thing likely to cause any confusion, although reference to Fig. 5 should clarify any problems. Switch S1 is a standard four-pole type with two poles left unused.

Adjustment and Use

The input can be fed from a headphone or external loudspeaker socket, but a LINE or TAPE output is probably better as these give an output level that is unaffected by the volume control setting. Also, using one of these does not automatically switch out the internal loudspeaker. If a headphone or loudspeaker output is used it will probably be necessary to add an extra output socket to the unit, so that an external loudspeaker or headphones can be fed with the output signal from this.

Initially R8 should be set at maximum gain (fully clockwise), and results will almost certainly be satisfactory with it at this setting. However, if any problems with overloading should become evident, it should be backed off sufficiently to avoid these.

In order to adjust R11 an audio tone must be fed to the input of the unit. Probably the easiest way of doing this is to tune the receiver to an a.m. station and then use the b.f.o. to produce a heterodyne. With R11 well advanced, tune the tone for peak brightness from one of the l.e.d. indicators. Potentiometer R11 should be advanced just far enough to give maximum brightness from the l.e.d., and this should be not far short of its fully clockwise setting.

Potentiometer R32 is merely adjusted for lowest resistance commensurate with the meter not being overloaded during normal use. Slight overloads will not damage the meter though, and the exact setting of R32 is not critical.

Preset resistors (R19 to R24) are aligned by feeding an appropriate tone from an audio frequency generator to SK1. Each preset is aligned in turn to give an indicated peak on meter M1.

In use there are a couple of points which need to be kept in mind when using any RTTY tuning indicator. One of these is the odd effect whereby one tone fades out but the other is left almost totally unaffected by the QSB. The other is that some amateur RTTY signals are generated by slow typists and are rather intermittent. In both cases the practical result is a strong bias to one tone or the other, and the ideal tuning point will not be with the meter at the centre zero position. Signals of this type are difficult to deal with when using any type of tuning indicator. The easiest method is to tune the set for maximum signals from the dominant tone, ignoring the other one. If this fails to give a correctly decoded output try peaking the tone on the other channel of the tuning indicator and decoder. **PW**

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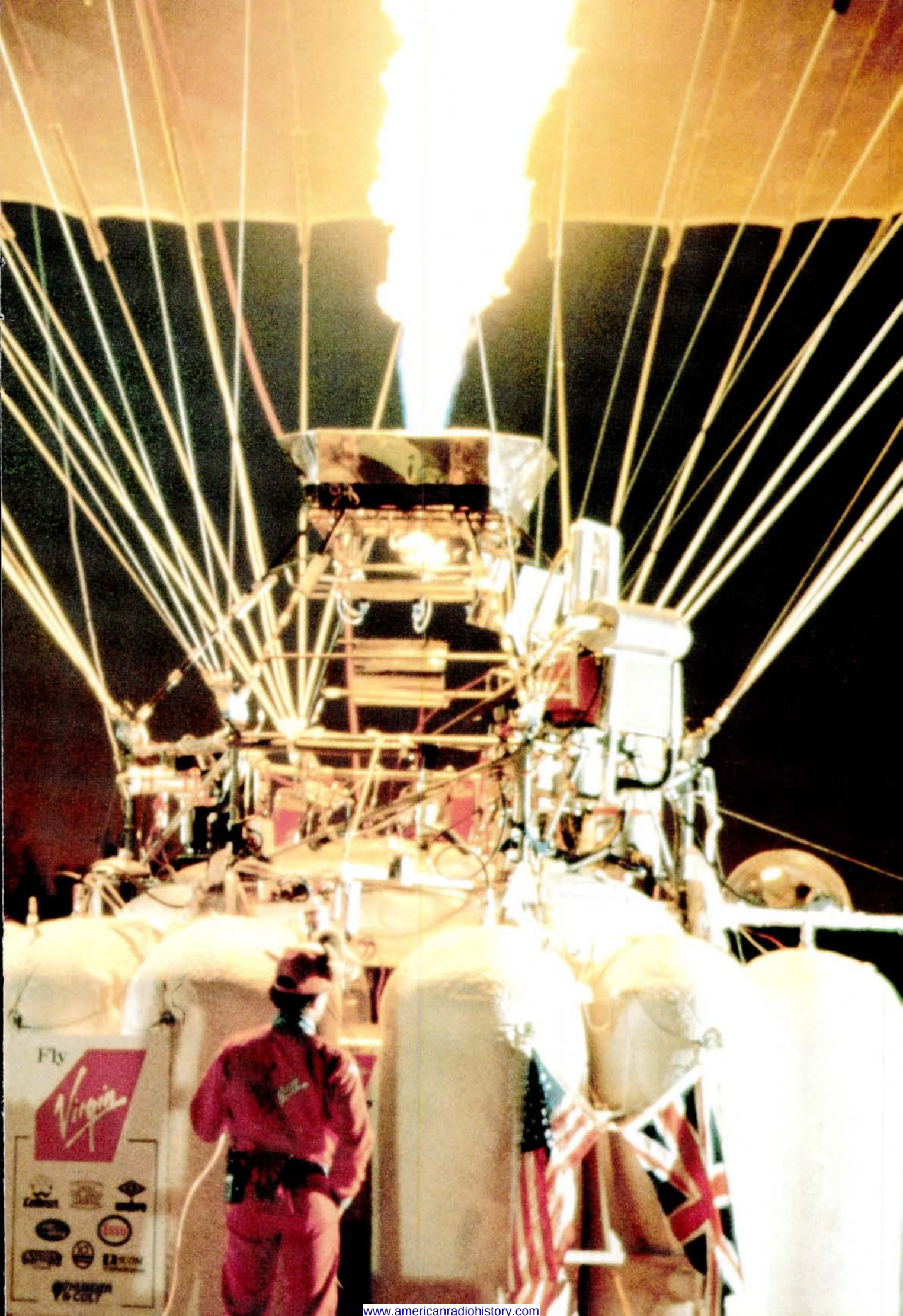

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Feature

Valved Communications Receivers

The Hallicrafters Sky Buddy

This month, Chas. E. Miller turns his attention once again to a receiver from across the Atlantic.

The Hallicrafters Sky Buddy occupies a place in radio history akin to that of the Austin Seven car in motoring lore. Both were inexpensive bottom-of-the-range models which, by virtue of simple but sound design, gave faithful service through many changes of ownership. Both achieved "classic" status whilst their more costly contemporaries are sometimes all but forgotten. They shared the same secret of success in being conceived not as inferior substitutes, but as scaled-down equivalents of expensive originals. They also both received the ultimate accolade of being imitated, as we shall see in the case of the Sky Buddy.

The 1936 model 5T Sky Buddy was described by its makers as "A real junior model communications receiver that's hard to beat in sensitivity and selectivity even when compared with higher priced sets". Certainly the price was astonishingly low—just $29.50 at a time when the exchange rate was $4 to the £. (I'll work it out for you—£7.37). This was for a completely self-contained set with built-in loudspeaker and power-pack, features that were by no means universal at the time.

Frequency coverage is from 554kHz—18.1MHz in three bands, with a mechanical band-spreading device and directly calibrated tuning dial which enabled the advertisements of those days to take a sideways swipe at certain other sets which needed "complicated charts and tables"—no prizes for guessing the subject of this gibe!

Housed in a smart metal cabinet measuring some 430 × 190 × 220mm, the Sky Buddy closely resembles its big brothers such as the Sky Chief. It has the speaker grille to the left of the tuning dial, which it matches in size. Beneath is a row of controls for main tuning, b.f.o. tuning, volume, band change, b.f.o./a.g.c. and power on/off. Sockets are provided for either long-wire or dipole antennas and earth, and for headphones, in this case a switched jack which disconnects the loudspeaker when the 'phones are plugged in. The tuning dial is internally illuminated.

Circuit Description

The antenna input goes to two r.f. transformers (for Bands 1 and 2) connected in parallel. For dipoles the two terminals A1 and A2 provide a balanced input; for long wires, the bottom terminal must be linked to the ground (earth) terminal. The Band 3 antenna coil receives its input inductively from the other coils. Frequency coverage is: Band 1: 545kHz–1680kHz; Band 2: 1680kHz–5.5MHz; Band 3: 5.5MHz–18.1MHz. The r.f. signals are passed to the control grid of a pentagrid frequency-changer (V1, 6A7). The inner grids operate as the local oscillator in conventional manner, producing an i.f. of 465kHz. The i.f. signals are coupled by an iron-dust cored transformer to the grid of the i.f. amplifier valve (the pentode section of V2, a 6F7). A second, air-cored transformer transfers the amplified signals to the demodulator, the strapped diodes of a Type 75 double-diode triode (V3). The diode load is the volume control itself, and simple a.g.c. is derived from the top end of this control. It is applied to the i.f. amplifier and frequency-changer, with an earthing switch to render it inoperative when the b.f.o. is in use. The bottom end of the volume control is returned to the cathode of the 75 to prevent the diodes from being biased off, but the grid is isolated from the control by a capacitor and returned to chassis to permit it to receive bias. Residual i.f. is filtered by a 250pF capacitor across the volume control, and another of the same value from the triode anode to cathode. Conventional resistance-capacitance coupling passes the amplified a.f. on to the pentode output valve (V4, Type 42). The only slightly unusual feature of the output stage is the use of grid bias instead of cathode bias. Standard transformer matching is used for the loudspeaker, the alternative headphones being capacitance coupled to the anode of the 42.

The power pack consists of a mains transformer and full-wave rectifier (V5, Type 80) with smoothing carried out by the loudspeaker field winding and electrolytic capacitors. Negative smoothing is employed, the field being connected to the centre-tap of the h.t. secondary and to chassis, via a 250Ω resistor at the lower end. The voltage occurring at the junction of these components is used to bias the grid of the output valve.

The loudspeaker is fitted with the customary "hum-bucking" coil, a small winding which picks up any residual hum voltages and feeds them in anti-phase to those picked up by the speech coil, thus cancelling them out.

The b.f.o. employs the triode section of V2, the 6F7, in a conventional tuned-grid circuit. Coupling to the pentode section is accomplished by inter-electrode capacitance.

The 1938 Sky Buddy

By 1938 amateurs had opened up the higher frequency bands and to cater for their new needs the Hallicrafters Company started to introduce receivers with extended coverage. The Sky Buddy was no exception, the S-19R model having an extra band going up to 46MHz. It was by no means a 5T with another set of tuning coils, being completely re-designed from antenna to output, as the following circuit description will show. In fact, almost the only similarity between the two sets is the retention in the S-19R of the Type 80 rectifier valve. The rest of the valve line-up is totally different, both in

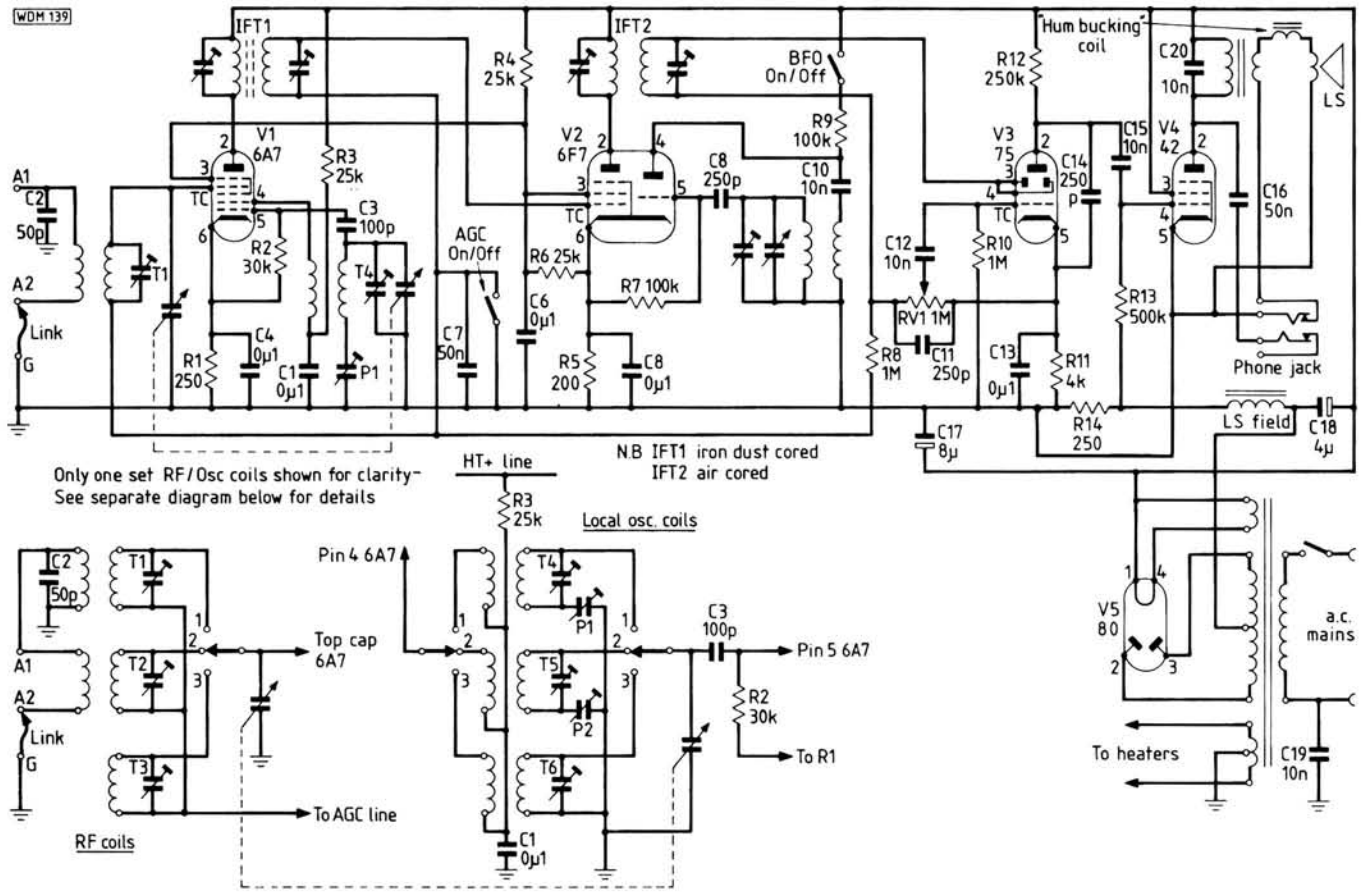
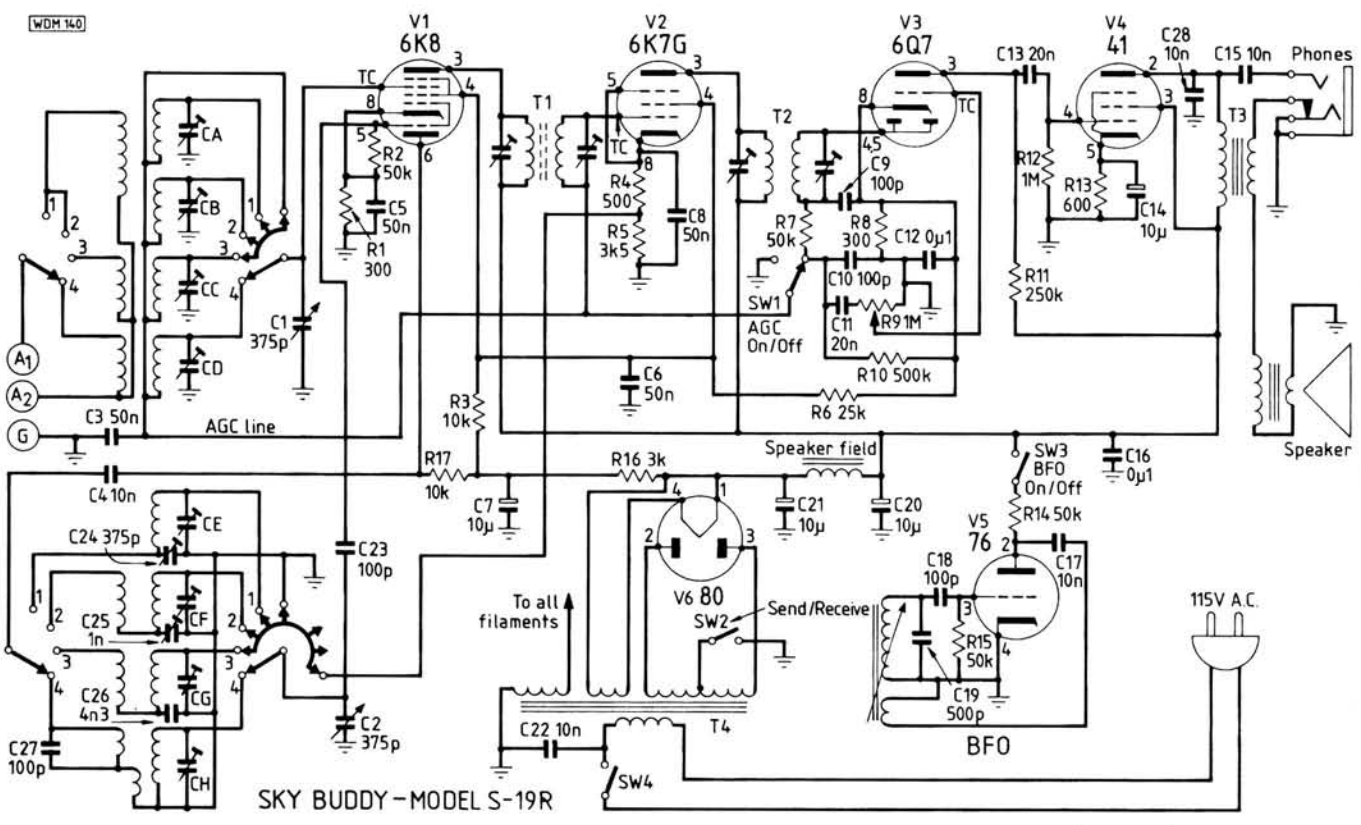


Fig. 1: Circuit diagram of the Sky Buddy 5-T ▲



▼ Fig. 2: Circuit diagram of the Sky Buddy S-19R

types and arrangement. Three of the new complement of six have the then recently introduced octal bases, demonstrating the fact Hallicrafters kept up with the times, even with their most inexpensive model.

The antenna input (again suitable for either long wire or dipole types) is switched to one of three primary windings on the r.f. tuning coils. The first primary serves both the Band 1 and Band 2 secondaries, the other two

being individual to Bands 3 and 4. The coverage is as follows: Band 1, 540kHz–1.7MHz; Band 2, 1.7MHz–5.5MHz; Band 3, 5.5MHz–17MHz; Band 4, 16MHz–46MHz. Extra contacts on the band switch short out the secondary windings not in use. The r.f. signals are taken to the control grid of the hexode section of V1 (6K8G), a triode-hexode frequency changer with a much improved h.f. performance over the previous 6A7. The oscillator section now has a tuned-grid configuration, with, again, the unused windings being shorted out by the band switch. A further pair of contacts on the band switch modify the cathode bias on the i.f. amplifier when Band 4 is selected.

The i.f. signals at 455kHz are passed via a conventional transformer to V2 (6K7G). Its cathode has two bias resistors in series, of 500Ω and 3.5kΩ respectively, the latter being shorted out on Band 4. The screen grids of V1 and V2 are supplied by an h.t. potential divider of rather unusual design. A 3kΩ resistor is connected to the unsmoothed h.t. at the rectifier heater, its lower end being decoupled to chassis by a 10μF capacitor. From this point a 10kΩ resistor feeds the triode anode of V1, and another 10kΩ the two screen grids. A 25kΩ resistor forms the lower half of the screen potential divider, but it is not returned directly to chassis. Instead, it goes to the cathode of V3 (6Q7G), presumably to hold it at a certain voltage. This would be more understandable had delayed a.g.c. been employed, but in the event the simple type is used, taken from the diode load resistor of the demodulator (the strapped diodes of V3). A rather more effective r.f. filter is employed, using a 50kΩ resistor and two 100pF capacitors. An a.g.c. on/off switch connects the a.g.c. line to the bottom of the filter or to earth as required. The a.f. signals are taken to the volume control via a d.c. blocking capacitor that ensures there is no bias applied to the demodulator diodes.

Amplified a.f. signals at V3 anode are coupled to the output valve (V4, Type 41) in conventional manner, and normal cathode bias is employed. The 41 is a good choice, being less demanding on both h.t. and l.t. current as compared with the 42, but still delivering a little more output at a standard 250V h.t. The loudspeaker is again of the energised type, with the headphone jack arranged as before. However, the field winding of the loudspeaker is now placed in the positive h.t. line. The centre tap of the rectifier (V6, Type 80) anode winding on the mains transformer can be isolated from earth to mute the set by a switch ("send/receive") for use in conjunction with a transmitter.

The b.f.o. is now a separate valve (V5, Type 76), a triode with permeability-tuned coils. Limited adjustment of the tuning core is available by a normal knob control on the front panel, and further alteration is easily achieved by a simple pre-setting device. On removal of the control knob a small screw may be seen, set concentrically in the hollow shaft. This is the coarse adjustment control, but before it is altered a locking screw, set just below the shaft, must be released. The approved method is to set the concentric screw, with the shaft in its midway turning position, for zero beat. The locking screw must be re-secured before the control knob is replaced.

I.F. Alignment

The alignment procedure for both 5T and S-19R models is perfectly straightforward and may be accomplished without difficulty, using a reasonably accurate signal generator and an output meter which need be no more than a multimeter set to a low a.c. voltage range and connected across the loudspeaker terminals.

For i.f. alignment, the signal generator should be connected to the top cap of the frequency-changer valve (V1) and chassis. Set the band switch to 2, the tuning dial to 5.5MHz, the a.g.c. switch to "on", and the volume control to maximum. Keeping the generator input as low as possible consistent with usable output meter readings, adjust the trimmers on the two i.f. transformers for maximum, commencing with IFT1. Note that the trimmers on the anode windings are at h.t. potential and suitable precautions must be observed. If a metal screwdriver has to be used instead of the preferred non-metallic type, its blade should be sleeved or wrapped in insulating tape so that only the last couple of millimetres shows. This will prevent accidental shorting of the h.t. to the i.f. can. Note that the i.f. is 465kHz for the 5T, and 455kHz for the S-19R.

R.F. Alignment

For r.f. alignment, Hallicrafters recommend that the generator be connected to the A1 terminal and chassis, with the A2–G link in position, and with a 400Ω resistor in series with the "hot" lead. The positions of the various trimmers and padders are shown on the layout diagrams. Remember to set the mechanical band-spread control to minimum during alignment.

Model 5T:

Band 1. Inject a 600kHz signal and adjust the padder for maximum output at the correct dial setting. If the dial is badly off it may be necessary to adjust the padder a little at a time for maximum as the dial is moved gradually to the correct reading. In this circumstance the oscillator trimmer may well be off adjustment too, and even more cross-checking than usual will be called for. Inject a 1.4MHz signal and with this dial setting adjust the oscillator trimmer, then the antenna trimmer, for maximum. Return to 600kHz and re-adjust the padder if necessary. In some cases the process may have to be repeated several times for optimum accuracy. It may be helpful to "rock" the tuning (i.e., move it slightly about the desired setting) as the adjustments are made.

Band 2. Adjust the padder at 1.8MHz and trimmers at 4MHz. The above remarks apply re adjustment. Note that there is a 1500pF fixed capacitor shunted across the padder, and should it prove impossible to achieve a correct dial setting at 1.8MHz, the value of this capacitor may have changed with age. Replacements should be close tolerance silvered-mica type.

Band 3. There is no adjustable padder. Set the trimmers at 14MHz and check the alignment at 7MHz. Ideally the dial should be accurate within one division, but due allowance must be made, again, for ageing of components.

Model S-19R:

Band 1. As for model 5T.

Band 2. Adjust the padder at 2MHz and trimmers at 4MHz.

Band 3. Fixed padder. Set trimmers at 14MHz and check alignment at 7MHz. The correct padder capacity is 4.3nF.

Band 4. No padder, but note that there is a 100pF shunted across part of the oscillator coil anode winding, and this could affect overall alignment on the band. Adjust the trimmers at 30MHz.

Fault-finding

As with all vintage radio sets, leaky coupling and decoupling capacitors are the main hazard. The set may continue to work reasonably well with leaky decouplers in the screen-grid potential dividers, even though the voltages may be reduced drastically. Disconnection of a suspect component is necessary for a true test to be carried out. Even very slight leakage can have serious effects in a.g.c. decoupling capacitors, and for those used to block d.c. from demodulator diodes. Should the latter inadvertantly receive bias a "squelch" effect will occur, only very strong signals being received.

The grid coupling capacitor for the 42 in the model 5T requires careful checking, since a simple grid to chassis voltage reading may still show a negative grid potential even though a leak is taking place. This is due to the negative biasing system, but the true state of affairs will be indicated by reading the grid voltage with and without the anode of the 75 shorted to chassis. When the bias voltage decreases with normal h.t. applied to the 75, the coupling capacitor is branded as leaking significantly. It is always worthwhile to check the other bias components when a coupling capacitor has been changed; R13 and R14 in the 5T and R12, R13 in the S-19R. The capacitor used to couple the output valve to the headphones must be in absolutely first-class condition. Apart from the danger of shocks, a steady d.c. passing through the headphone coils would eventually ruin the magnets. The mains transformer primary/chassis r.f. by-pass capacitor also has to be

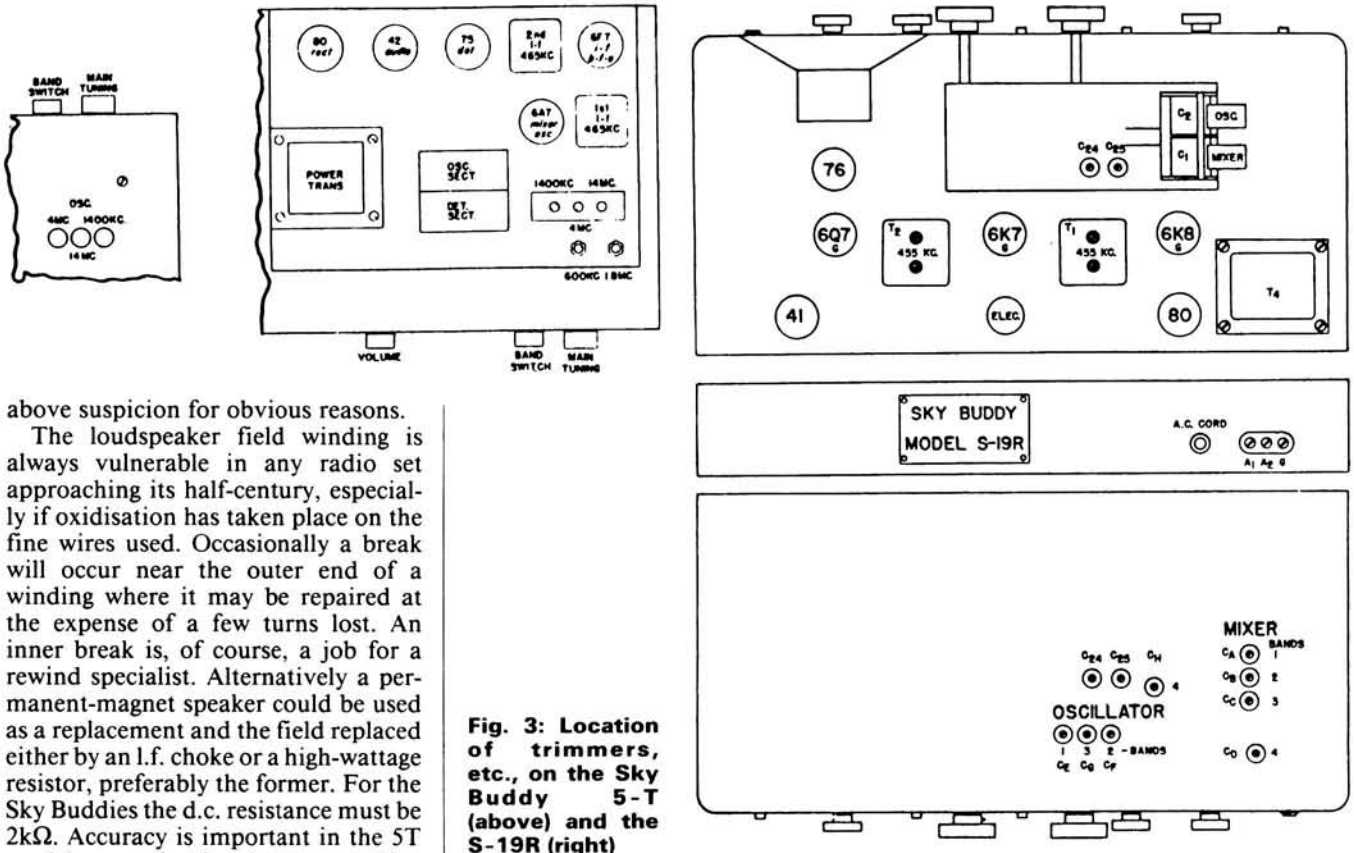


Fig. 3: Location of trimmers, etc., on the Sky Buddy 5-T (above) and the S-19R (right)

above suspicion for obvious reasons.

The loudspeaker field winding is always vulnerable in any radio set approaching its half-century, especially if oxidisation has taken place on the fine wires used. Occasionally a break will occur near the outer end of a winding where it may be repaired at the expense of a few turns lost. An inner break is, of course, a job for a rewind specialist. Alternatively a permanent-magnet speaker could be used as a replacement and the field replaced either by an l.f. choke or a high-wattage resistor, preferably the former. For the Sky Buddies the d.c. resistance must be 2kΩ. Accuracy is important in the 5T model to maintain the correct bias voltage on the output valve.

It is not unknown for a hum-bucking coil to go open circuit and thus mute the set in a way that is very puzzling to persons not used to the ways of mains-energised speakers. Jack sockets can also cause trouble by developing bad contacts on the switching sections, leading to either intermittent or total loss of speaker signals. A rare, but by no means negligible risk exists of the insulation on the field winding breaking down and rendering the speaker chassis live to the rest of the set. The writer experienced just such a fault. When the speaker is mounted on insulating material it is possible for it to continue working without ill-effect, but when the speaker chassis is earthed the rectifier and mains transformer are put at risk.

It is a worthwhile precaution with any vintage radio to fit an h.t. fuse if none already exists. The best position for it is in series with the wire running from the centre-tap of the h.t. winding to earth, or to the smoothing choke as the case may be. This will protect both the rectifier and the mains transformer against overload. The fuse rating for the Sky Buddies should be 100mA.

Following normal practice of the day, only a single-pole mains on/off switch was fitted to the Sky Buddies. If this is not to be replaced with a double-pole type, great care must be taken to ensure that it is the live main that is interrupted, failing which mains voltage will be applied to the transformer primary and the r.f. by-pass capacitor all the time the set is plugged into a live socket. When a good earth connection is used the components just mentioned will be under constant stress. When the set is not earthed its chassis will become live due to the a.c. passing through the by-pass capacitor. This may not give a bad shock, but it will certainly make you jump, especially if you have the earth connection in your other hand!

Brief valve data

Valve	V_a (V)	V_{g2} (V)	$-V_{g1}$ (V)	I_a (mA)	I_{g2} (V)	V_k (V)	R_k (Ω)	r_a (kΩ)	R_a (kΩ)	G_m (mA/V)	P_{out} (W)
6A7	250	170*	—	3.5	4	3†	300	360	—	0.55	—
6F7 (P)	250	100	3	6.5	1.5	—	—	850	—	1.1	—
(T)	100	—	3	3.5	—	—	—	16.2	—	0.525	—
6K7G	250	125	3	10.5	2.6	—	220	600	—	1.65	—
6K8G (H)	250	100	—	2.5	6	3†	300	600	—	0.36	—
(T)	100	—	—	3.8	—	—	—	—	—	—	—
6Q7G (T)	250	—	3	1.1	—	—	—	58	—	1.2	—
41	250	250	18	32′	5.5′	—	500	68	9	2.3	3.4
42	250	250	16.5	34′	6.5′	—	450	80	7	2.5	3.2
75 (T)	250	—	2	0.9	—	—	—	91	—	1.1	—
76	250	—	13.5	5	—	—	—	9.5	—	1.45	—
80	350″	—	—	125	—	—	—	—	—	—	—

Notes:
* $V_{g3} + V_{g5} = 100V$, $I_{g3} + I_{g5} = 2.7mA$.
† g1 is not control grid. V_k = control grid bias.
′ @ zero signal.
″ $V_{r.m.s.}$ per anode.
Valves above have 6.3V, 0.3A heaters except: 41–6.3V, 0.4A; 42–6.3V, 0.7A; 80–5V, 2A.

The Sky Buddy Look-alike

Also in 1938 a firm known as British Television Supplies produced a receiver that was uncannily like an amalgam of the two Sky Buddy sets just described. The "Trophy 5" was a 5-valve, 4-band communications receiver covering 545kHz–1.5MHz; 1.5MHz–4.4MHz; 4.2MHz–11MHz and 11MHz–30MHz. It had a dial and bandspreading system very similar to that of the Sky Buddy. The frequency-changer was a Tunsgram 6TH8, a triode-hexode comparable to the 6K8G, and a 6F7 was used as combined i.f. amplifier/b.f.o. The demodulator/a.f. amplifier was a 6Q7G, in a circuit that was virtually a carbon-copy of that of the 5T. The output valve was a 6F6G, the octal equivalent of the 42. There was an energised loudspeaker with provision for headphones coupled via a capacitor from the 6F6G anode. The power pack consisted of a mains transformer and a 5Z4G rectifier—a valve having an octal base and indirectly heated cathode but otherwise of precisely the same ratings as the 80. Provision was made for either long wire or dipole antennas. The a.g.c. could be switched in or out as required, as could the b.f.o. The price of the set complete was £9. **PW**

Joseph Henry

NAMES from the PAST

by Tony Smith G4FAI

The practical unit of inductance was named the "henry" in 1893, in honour of the work of Professor Joseph Henry, one of the greatest American scientists of the 19th Century.

Born in 1797 to a poor family of Scottish descent, he had an indifferent education followed by an apprenticeship as a watchmaker and silversmith. His main interest in life was the theatre until, by chance, he read a popular book on science—which affected the whole course of his life.

In 1819 he enrolled at Albany Academy to study mathematics and scientific subjects, and only seven years later was appointed Professor of Mathematics at that institute. He proceeded in 1832 to the Chair of Natural Philosophy (physics) at the College of New Jersey (now Princeton University) where, at various times, he also taught chemistry, mineralogy, geology, astronomy and architecture.

Electromagnets

His investigations and discoveries relating to electricity and magnetism were impressive, and he contributed significantly to development in this field. The earliest electromagnets had insulated cores, with bare wires wrapped round them: Henry used insulated wires and multi-layer windings, greatly increasing the power of the magnets and enabling them to be put to practical use for the first time.

He constructed the first electric motor to use electromagnets and a commutator. He and Michael Faraday, working independently, made similar discoveries concerning induction, though Faraday published his findings first. As a result, the discovery of mutual induction was credited to him, with self-induction credited to Henry. Whilst both used an early transformer arrangement for their experiments, Henry found that by varying the number of windings on each coil he could obtain a higher or lower voltage; the laws drawn from this discovery form the basis of the modern transformer.

Other Discoveries

His many other discoveries include non-inductive windings, the relationships of high-order induced currents, electromagnetic shielding, the action of inductance at a distance and the oscillatory nature of an electrical discharge.

He experimented with the propagation and detection of electromagnetic effects over a distance, and reported that a single spark was, "sufficient to disturb perceptibly the electricity of space throughout at least a cube of 400 000 feet capacity". In further experiments he was able to magnetise needles in his study from the effects of lightning occurring 11 to 13km away.

In 1831 he constructed an early form of telegraph which rang a bell at the end of a mile of wire, and he is generally credited with inventing the electromagnetic relay which enabled Samuel Morse's system to become a practical reality over great distances. He suggested that high intensity (i.e. voltage) could be obtained by placing many cells in series; this idea, coupled with his improved electromagnets, resulted in a substantial improvement in telegraph performance. In later years there was bitter controversy between Morse and Henry as to who had actually invented both the telegraph and the relay, and there is disagreement to this day among historians interested in the subject.

Apart from his better-known achievements, Henry also worked on capillarity, phosphorescence, radiation of heat from sun spots, atomicity, the aurora, heat, colour blindness and was interested in anthropology, ethnology and natural history. He headed the US Lighthouse Board's committee on experiments, where his work included studies on light and sound, and was appointed Chairman of the Board in 1871. Henry was one of the original 50 scientists appointed by President Lincoln to form the National Academy of Science in 1863 and served as its president from 1868 to his death 10 years later.

The Smithsonian Institute

When James Smithson, an Englishman, left his fortune to found the Smithsonian Institute in Washington, "for the increase and diffusion of knowledge among men", there was much debate about what that meant. Henry was asked to study the will and plan an organisation to meet its objectives. He was appointed first Secretary and Director of the Smithsonian in 1846 and devoted the remaining 32 years of his life to achieving the aims that he himself had defined, ". . . to assist men of science in making original researches, to publish these in a series of volumes, and to give a copy of these to every first-class library on the face of the earth".

One of his first acts was to organise a system of simultaneous meteorological observations by volunteers throughout the USA, transmitting their data via telegraph and this work eventually led to the creation of the US Weather Service.

Henry held high office in many organisations. His interests and influence were widespread, and there are in existence today some 50-60 000 documents by, or about, him, including correspondence, manuscripts, monographs, pamphlets, books and so on. It is a remarkable record of one man's contribution towards the "increase and diffusion of knowledge among men", which was so important to him for much of his life. **PW**

ERRORS & UPDATES

Passive Bandpass Audio Filters, August 1987

In Fig. 7, the inductor in parallel with the 0.18µF capacitor should be 12mH. In Fig. 9, the capacitor in parallel with the 12mH inductor should be 0.18µF.

Micro Power Pilot Light Practical Power Supplies & December 1978

Resistor R1 in the article on page 37 of Practical Power Supplies should be 27k not 2.7k as shown. Unfortunately the value was covered-up in the components list. Our apologies for this.

PW Review Icom IC751A October 1987

Apologies to our readers, to Icom and to Yaesu, for any confusion caused by a mix-up in our photo library, which resulted in our printing a picture of the internal view of an FRG-9600 instead of the IC-751A in this review.

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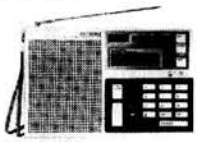

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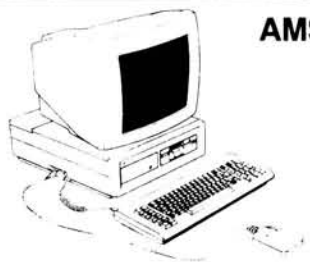

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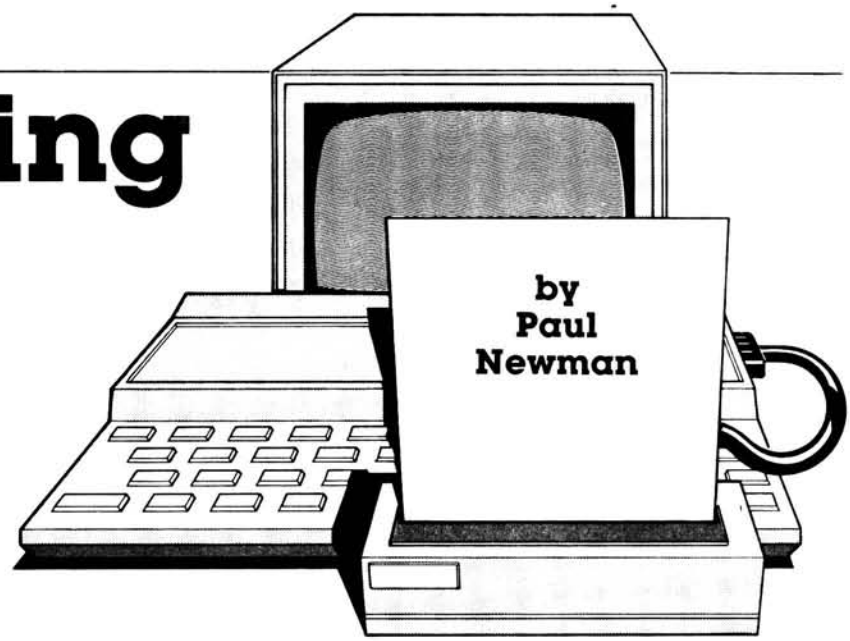


The past few months have been more active in the radio-computing field despite the doldrums of hobby-computing in general. This is a good sign and shows, I think, that users are taking their machines more seriously than before.

My mail has increased following the move of this column from *Short Wave Magazine* and I'm very pleased that so many find it interesting. It seems that many Amstrad CPC users have at last started to find some of the software they need.

PCW8256 and PCW8512 owners at last have some software support in the shape of the Communications Software package for ASCII and RTTY offered by Dave Johnstone. *(For further details see RTTY on page 70—Ed).*

Spectravideo, MSX728 and 738 users might be interested to know that MSX Software Shack[i] do a full RS232 communications package. I cannot find any UK outlet for this system, so contact MSXSS direct for details. If anyone is using this outlet, or knows of any others for these micros then please tell me.

A new version of the highly acclaimed "BETABASIC" is now available for the Spectrum with 128K memory. BetaBasic 4.0 has all the benefits of its predecessors together with some very sophisticated extra features to make maximum use of the 128K memory (over 90K of BASIC and variables!). High-capacity databases (for call-logs for example) are possible without resorting to machine-code. Powerful INSTRING and INARRAY features would find the data very quickly. Disc-users also have full support in BB4.0 since it allows for OPUS, TRL Beta Disc, SPDOS disc and Disciple system. The Spectrum Plus 3 disc will be supported almost certainly. Most common printer-systems are supported. BetaBasic is available from BetaSoft[ii].

Perhaps I should have made clearer in my last article that the ASTRID system can be used with BBC and Amstrad micros (software available) as well as Sinclairs. Since it operates via an RS232 unit, I imagine that almost any micro could read the data. Perhaps anyone using ASTRID with other micros would write in.

Bob G4IAV sent me some information which may have wider interest! Attention all those with ZX-printers. Run out of paper? If so, then see reference[iii]!

Richard GW3RRI, owner of Technical Software[iv], chides me for not mentioning T-S when replying to Manual CT1CO in *PW* (July 1987). Well Richard, no malice intended and I'm happy to say that T-S carry Commodore programs as well as BBC-B/Master, Electron, VIC-20 and Spectrum. I understand from recent reports that the T-S RX-4 multimode receive program is proving successful on all micros supported; it is very popular with s.w.l.s and all find the ability to switch rapidly between modes a great advantage. The AMTOR-mode (ARQ only) gives interesting results.

Exchanging Software

Alan G6HUJ operates on Packet Radio and is interested in exchanging software on-air via the Bulletin Board Service G1DIL being the system-operator. Alan's request for some items from me regretably had to be denied since the software was not in my copyright control. I am trying to set up a list of some software which can be uploaded (or is it downloaded!). If you are interested in this aspect of software exchange (within the normal, legal framework of course), why not contact Alan either via BBS G1DIL-1 or I'll be happy to forward any letters of course. All micros could be catered for, not just the major ones and this seems an ideal way of circulating public domain software. Neither Alan nor I condone piracy by the way.

Amstrad CPC users might find this utility useful. It's a timer routine which can switch the cassette-port "remote" line at a preset time. You could record UOSAT passes or switch the rig on at a preset time, for example. The listing should be suitable for all CPCs although I have no experience of the CPC464 I am fairly certain it will run on this. It will also convert to other BASICs with not too much trouble (see later on this column). Enter the program as given and save to disk or tape as required.

The program asks for the alarm-time as the day-number, the hour and minute. Enter the day as 0 for today, 1 for tomorrow, etc. Enter the remaining hour and minute for alarm all delimited by commas. Then press <return>. Enter the switch-off day and times in the same way. Press <C> to continue or <N> to set up new times. Now give the current time in days (0 normally), followed by the hour minute and second all delimited by commas. Then press <return>.

The on and off-times will be displayed and the current day and time will tick over by the second. At the on-time, the motor-control relay will switch. There will be a short pause, after which the current-time display will catch up—no problem, just a delay built into the ROM routines which we're calling here. The routine will switch off and stop at the off-time.

```
10 CLS
20 INPUT "Day,hour & minute for
alarm ";aday,ahour,amins
30 PRINT "On-time selected was
";aday;ahour;amins
40 INPUT "Off-day,hour & minute
";oday,ohour,omins
50 PRINT "Off-time selected was
";oday;ohour; omins
60 PRINT:PRINT "PRESS — C to
continue, N = new time"
70 keys$=INKEY$:IF keys$="" "
THEN 70
80 IF UPPER$(keys$)="N" THEN 20
90 INPUT "Please give current
DDHHMMSS ";day,hour,mins, sec
100 non=0:noff=0
110 CLS
120 LOCATE 1,5:PRINT "On-time :
";aday ":" ahour ":" amins
130 LOCATE 1,6:PRINT "Off-time:
";oday ":" ohour ":" omins
140 EVERY 50,3 GOSUB 180
150 LOCATE 10, 10:PRINT
day":"hour":"mins":"sec
160 IF noff=1 THEN STOP
170 GOTO 150
180 sec=sec+1
190 IF sec=60 THEN sec=0:mins
=mins+1:IF mins=60 THEN
```

```
hour=hour+1:mins=0
200 IF hour=24 THEN
hour=0:day=day+1
210 IF aday=day AND ahour=hour
AND amins=mins AND non=0 THEN
GOSUB 240
220 IF non=1 AND noff=0 AND oday
=day AND ohour=hour AND
omins=mins THEN GOSUB 280
230 RETURN
240 CALL &BC6E
250 LOCATE 10,15:PRINT "Cassette
switched on"
260 non=1
270 RETURN
280 CALL &BC71
290 LOCATE 10,15:PRINT "Cassette
switched off"
300 noff=1
310 RETURN
```

A number of readers have asked for some information on using "intelligent terminal units" such as the AMT-2[v] used for RTTY, c.w. ASCII and AMTOR. I have had only limited experience with these (the AMT-2) so I hope my findings will prove useful with similar units. The following program will act as a simple controller for the AMT-2 and is programmed on a Sinclair QL.

```
100 REMark AMT-2 TINY
TERMINAL PROGRAM
120 :
150 DEFine PROCedure set_lower_
case
160 POKE 163976,0
170 END DEFine
200 DIM memory$(5,50)
210 memory$(1)="CQ CQ CQ DE
G4INP G4INP G4INP"&CHR$(4)
220 memory$(2)="Memory 2"
230 memory$(3)="memory 3"
240 memory$(4)="memory 4"
250 memory$(5)="memory 5"
260 :
270 BAUD 300
280 OPEN£4,SER1sir:REMark ser1
port, no handshaking
290 CLS:CLS£0
300 AMT_2 : REM note the underscore
310 STOP
320 :
330 DEFine PROCedure amt_2
340 REPeat forever
350 set_lower_case
360 z$=INKEY$(0)
370 z=CODE(z$)
280 SELect on z
390 =217:EXIT forever
400 =232:print £4;CHR$(3);:REMark
F1 =ctrl/c
410 =145:memory 1:REMark
ctrl&number
420 =236:PRINT
£4;CHR$(4);:RE Mark F2=ctrl/d
430 =146:memory 2
440 =240:CLS
450 =147:memory 3
460 =148:memory 4
470 =149:memory 5
480 END SELect
490 PRINT£4;z$;
500 :
510 x$=INKEY$(£4,0):REMark get
incoming data
520 key_code=CODE(x$)
530 SELect ON key_code
540 =10,13:PRINT \
550 =32 to 126:PRINT x$;
560 END SELect
570 END REPeat forever
580 END DEFine
530 :
600 DEFine PROCedure memory(m)
610 m$=memory$(m)
620 PRINT£4;M$
630 END DEFine
```

The line-numbers in this listing are correct. Interpret the pound-symbol as a hash-sign.

This will transmit all <escape> and <control> sequences as they are typed **except** the special case given later. Pressing <escape> would set the AMT-2 into "command-mode"; pressing B50 in sequence would then set a baud-rate of 50, for example.

Received data is decoded by lines 510-550. A simple memory facility is given by pressing <control> and the memory key number. The memory contents can be set by changing the relevant line contents. The length of each memory is set at 50, but if you want more then alter the DIM line to suit. The "&CHR$(4)" in memory 1 permits transmit-to-receive switching on the AMT-2 so ascertain the code required to do this on your unit.

The sequence <control/c> is a special character used by the QL and is never transmitted to the terminal unit. I have programmed F1 to send <control/c> whilst F2 gives <control/d>. On the AMT-2 these control TX/RX switching on RTTY/ASCII and speed control in c.w. mode. F3 is programmed to clear the screen.

Small though the program is, it provided full control of the AMT-2 in c.w. ASCII and RTTY modes (I could not test AMTOR) and will serve as a model for other micros and/or terminal units.

As I finish writing this, a similar program for the Amstrad plus RS232 has arrived and I am trying to get permission to circulate it from the author.

A number of readers have pointed out (thank you!) that the Klingenfuss *Guide to Facsimile Stations* is very useful to all who use this mode. It contains such information as frequencies, schedules and encodings for many kinds of transmissions (including satellites on APT[vi].

Converting BASICs between micros can be made simpler if you have a ready source of information on the "foreign" BASIC in similar form to the BASIC you are converting to. Phoenix Publishing[vii] sell a series of *Computer Crib Cards* which do just this. Buying one for your micro and one for the "foreigner" will give all information presented in identical fashion. I found them a good £1.99's worth on many occasions. Your news, views and software are always welcome—please keep writing[viii]. But don't forget the s.a.e. for a reply. Thanks and 73.

References

(i) MSX Software Shack. 2011 Kensington Flats. Morningside, Durban 4001, Natal, South Africa. (send IRCs to help with postage.)

(ii) BetaSoft, 92 Oxford Road, Moseley, Birmingham B13 9SQ. Send s.a.e. for details stating your Spectrum version.

(iii) Harwood Trading, 10 Elmwood Avenue, Woodlands, Doncaster DN6 7TP. Tel. 0302 722111.

(iv) Technical Software, Fron, Upper Llandwrog, Caernarfon, Gwynedd LL54 7RF (s.a.e. for lists.)

(v) ICS Electronics, PO Box 2, Arundel, West Sussex BN18 0NX.

(vi) Klingenfuss Publications, Hagelloch, D-7400 Tuebingen, F R Germany.

(vii) Phoenix Publishing Associates, 14 Vernon Road, Bushey, Herts. Or via your local bookseller of course.

(viii) Paul Newman G4INP, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.

SWAP SPOT

Have two old mains radios, Ferguson 325A/Cossor Melody Maker (bakelite case), also ZX81 working, Rogers Ravensbourne hi-fi amp 35 + 35W working all in v.g.c. Would exchange for SRX30 or FRG-7 communications RX. G8UUV QTHR. Tel: Holme Hale 440651. *D464*

Have FT-790R with Tokyo 30W linear, total value approximately £350. Would exchange for h.f. transceiver of same value. Also have Eddystone 840C. Would exchange for h.f. transceiver, same value. Martin G6ZHV. Tel: Telford 580573. *D471*

Have compact disc player plus twelve discs, all worth £320. Would exchange for h.f. receiver, FRG-8800, R2000, ICR70, FRG-9600 or similar. P. Jones, 76 Pengwern, Llangollen, Clwyd, North Wales LL20 8AS. *D472*

Have Yaesu FR-101 deluxe receiver, full h.f. coverage plus 50MHz and 144MHz, mint condition, manual. Would exchange for Trio AT230 a.t.u. or similar. Must be in mint condition, or w.h.y? Allan G3GXR. Tel: Standish (Lancs) 422766. *D474*

Have manuals for Telequipment scope D54, Venus SSTV monitor, EMI WM1 scope, Mullard valve tester and adaptors, Cossor 339 scope, Robot 80 camera. Would exchange for w.h.y? J. Brown, 45 Marlborough Avenue, Falmouth, Cornwall TR11 4HS. *D475*

Have excellent electric guitar, Guild M75CS, humbuckers, phase switch, with case. Would exchange for h.f. or 50MHz gear, w.h.y? Lee G4EJB. Tel: 0885 82760. *D488*

144MHz QRP Contest

by Neill Taylor G4HLX

Results

Certificate Winners

Overall Winners	Bug Bashers Contest Group	GW8TFI/P
Runners-up	The Hillbillies	GW4APA/P
3rd, leading English station and single-antenna station	Martyn Wright & Neil Underwood	G4RLF/P
Leading Single Operator	Michael John Ryder	G0CDA/P
Runner-up Single Operator	Tony Wyn Jones	GW4VEQ/P
3rd Placed Single Operator	Chris Partington	G0CLP/P
Leading Fixed Station	R. Noden & others	G4YST
Leading Scottish Station	Civil Aviation Authority RS	GM4CAA/P
Leading Irish Station	Wicklow Contest Group	EI2GF/P

The fifth *PW* 144MHz QRP contest took place on 21 June 1987 ("what a way to spend Fathers' Day", as G1IZB/P commented). 159 entries have been received, of which 115 were from portable stations. As usual, the hilltops were crowded! 100 of the stations entering were multi-operator, many of them highly organised and ambitious groups; just as dedicated were the single operators, right down to those with the simplest of equipment and antennas. In addition to those putting in a serious entry, many other stations came on the band to boost activity, as shown by the leading station's total of 420 contacts.

For the fourth consecutive year, the winners cup goes to the "Bug Bashers" Contest Group, this year operating as GW8TFI/P on the 640m peak in Radnor Forest, mid-Wales. The group comprised Chris Easton G8TFI, Tim Kirby G4VXE, Roger Ward GW5NF and Dave Robinson G4FRE. Close behind them were newcomers to this particular event, the "Hillbillies", GW4APA/P near Wrexham. The leading English station is in third place, Martyn Wright and Neil Underwood as G4RLF/P on Win Green Hill in Wiltshire, from where they also led the G entries in 1983 and 1984. This was also the leading station using a single antenna.

The new *PW Tennamast* trophy goes to the leading Scottish station, the Civil Aviation Authority Radio Society (Prestwick), GM4CAA/P located on Lowther Hill, on the border of Strathclyde and Dumfries & Galloway regions. The top Irish station was, as last year, the Wicklow Contest Group, EI3GF/P near Wicklow Town. The leading single operator station was that of Michael Ryder G0CDA/P (near Leek, Staffordshire), in an impressive 4th place overall, the highest a single operator has ever come in the results. The leading fixed station was a group led by R. Noden G4YST at Eastbourne.

All the above mentioned are certificate winners—see the tables. Also listed are the top ten stations in the multi and single operator categories. If you would like a detailed results list of all 159 entrants, send a large s.a.e. to the *Practical Wireless* offices. The leading station in each locator square also receives a certificate—these are listed in the table.

Single Antennas

The introduction this year of a certificate for the top station using only a single antenna was popular. A typical comment was that of G4OEU/P: "I was pleased to see the introduction of the single antenna certificate which seems to be in keeping with the original spirit of the event". As noted above, the certificate is won by G4RLF/P, who were also the leading English station, and in 3rd place overall, showing what can be done with a straightforward antenna (a 6-element quad). The top ten stations using a single antenna are listed in the table.

The Jodrell Bank contest group, G4NDH/P, also liked the single antenna idea, but warned that "we may try to use our alternative antenna next year—a 76m diameter paraboloid (Jodrell Bank Mk 1A radio telescope)!" Not every group using one Yagi did so by choice, G4NYN/P "intended using 2 x 19-ele. Yagis, but on erection these collapsed . . . we salvaged enough elements to make one Yagi".

Leading Multi-Operator Stations

Pos.	Name	Callsign	Score	QSOs	Squares	Location	Antenna	a.s.l. (m)	TX/RX
1	Bug Bashers Contest Group	GW8TFI/P	14280	420	34	IO82JG	4 x 9Y	640	FT225RD
2	The Hillbillies	GW4APA/P	12441	377	33	IO83KB	4 x 9Y	455	µTek TV
3	Martyn Wright & Neil Underwood	G4RLF/P	8568	252	34	IO80WX	6Ω	275	TS700
5	Sheppey Outcasts Contest Group	G4BVY/P	8288	259	32	IO82LB	3 x 17Y	380	FT225RD
6	North Wakefield Radio Club	G4NOK/P	7904	247	32	IO93BS	2 x 17Y	365	FT225RD
7	Worthing & District ARC	G3WOR/P	7668	284	27	IO90TV	2 x 16Y	220	FT290R
9	Scrounge It All Contest Group	G1RDX/P	7140	210	34	IO91TW	4 x 9Y	185	IC271E
10	L. Parrott & M. Hallsworth	G0AMU/P	6534	242	27	IO83WE	2 x 10Y	405	IC290E
11	Civil Aviation Authority RS	GM4CAA/P	6496	232	28	IO85DI	17Y	725	IC251E
12	North Buxton Radio Club	G0EQU/P	6396	246	26	IO93AG	13Y	535	FT726R

Leading Single-Operator Stations

Pos.	Name	Callsign	Score	QSOs	Squares	Location	Antenna	a.s.l. (m)	TX/RX
4	Michael John Ryder	G0CDA/P	8323	287	29	IO93AD	13Y	465	FT290R
8	Tony Wyn Jones	GW4VEQ/P	7223	233	31	IO73SG	8Ω	35	TR751E
19	Chris Partington	G0CLP/P	5049	187	27	IO84IG	8Y	610	TR7010
25	Tim Raven	G4ARI/P	4301	187	23	IO81XW	2 x 8Y	330	IC202S
28	Adrian Jordan	G0HAS/P	4094	178	23	IO81XG	17Y	230	TR751E
36	Mike Smith	G6YZR/P	3340	167	20	IO93FB	12Z	315	FT290R
40	Dave Evans	GD3YLE/P	3124	142	22	IO74TF	9Y	240	H'brew
42	Colin G. Hides	G1JME/P	3016	104	29	JO03AD	14Y	115	FT290R
48	Terry Bruce	G6IAT	2806	122	23	IO91TV	2 x 17Y	160	FT767GX
49	Tony Crake	G1GVA/P	2641	139	19	IO91GI	13Y	290	TR751E

Weather and Propagation

Many entrants enjoyed the weather that has become customary for this event; "contest day was very hot and sunny" said GM4SUF/P. "Weather, despite the very adverse forecast, was extremely good" at G6IEK/P. Unfortunately, this was far from the universal view, it was "overcast, misty, with occasional heavy rain" at GM0BRS/P, and PE1JVH had "rain, rain and more rain".

As for propagation, GW3POM/P comments "the mediocre weather was matched by the conditions on 2 metres". That may be rather an understatement, words like "terrible!" (GM6FPX/P) or "very poor indeed" (GW8TFI/P) being more commonly used in the reports. G0AFH admits, "conditions during the contest were not good at all, at one stage I went outside to check the antenna was still there!". "Very disappointing conditions" at PI9IRC, too, "after 2¼ hours and 14 contacts I decided it would be better to spend the afternoon cutting the grass."

Despite all this, there were still some good contacts to be made, for example G1JME/P was "very pleased to work LX2GB/P—quite rare." Operators continue to be surprised at what they can achieve with QRP: "We were very suprised what 2.5 watts into a 10-ele. Yagi just 6m off the ground can do—best DX was in IO87 square" say G6ARC/P (in IO92).

Activity

The most commonly repeated remark from entrants concerned the level of activity in Scotland. "A pleasure to hear so many GM stations on the air" said G4NDH/P and many others. "A big plus this year was the activity from GM", comments G4WUS/P, "squares like IO76, 78, 87 and 88 are rare and it is a delight to hear them on the air". Unfortunately this increased activity was not matched by a large increase in the number of GM entries received, 17 compared with 14 in 1986.

A request comes from G4NAV/P: "one item I would like to see in the results is a list of squares activated during the contest". This seemed like a good idea—of course, the table of leading stations shows which squares had contest entrants active, and there are 35 of them. But what other squares were activated by non-contestants? The answer is given by the map; the numbered squares are those which were contacted at some time or other by at least one contest entrant. There are a staggering 66 of them, so if you were beginning to think by mid-afternoon, that you had worked all the available squares, think again! Even the winners only worked just over half of the possible squares.

By the way, for those mystified by the appearance of JO16 on the activity map, in the middle of the North Sea, this was LA1EKO on one of the oil rigs, worked by a select few stations.

The logs submitted as entries were of a generally better standard this year. In this piece last year, the common error of omitting a portable suffix was noted. Several entrants remarked, like G0AZT/P, "the points made about the /P suffix seem to have been understood and most stations seem to have got their act together". On the other hand, GW3UAX/P observes that "many stations were still not adding /P, /A, etc., until we asked for them". Still room for improvement, then, but certainly fewer points have been lost this way than in previous events.

Leading Stations in each Locator Square

Square	Name	Callsign	No. entrants in square
IN79	The Rare Square Group	G1IJQ/P	1
IN89	Dave Hewitt	GJ8ZRE/M	1
IO62	Wicklow Contest Group	EI3GF/P	1
IO63	North Dublin Radio Club	EI0NDR/P	1
IO64	Alex Vize	GI4MBO/P	1
IO67	Calum J. MacPherson	GM0EWX	1
IO70	Cousin Jack Contest Group	G6GWX/P	4
IO71	Roger Stansfield and others	GW3UAX/P	3
IO73	Tony Wyn Jones	GW4VEQ/P	1
IO74	Dave Evans	GD3YLE/P	2
IO75	Mrs. Christine M. Brown	GM4WEW/P	1
IO76	Glasgow VHF Contest Group	GM6FPX/P	1
IO78	Dukes of Sutherland CG	GM4SUF/P	1
IO80	Martyn Wright & Neil Underwood	G4RLF/P	5
IO81	Mr. Bev J. West	GW1SSQ/P	8
IO82	Bug Bashers Contest Group	GW8TFI/P	9
IO83	The Hillbillies	GW4APA/P	11
IO84	Galloway Contest Group	GM0CLN/P	4
IO85	Civil Aviation Authority RS	GM4CAA/P	7
IO86	Alva Contest Group	GM0GDL/P	3
IO87	Allan G. Duncan	GM4ZUK/P	1
IO88	Caithness Radio Amateur Soc.	GM0CRA/P	3
IO90	Worthing & District ARC	G3WOR/P	7
IO91	Scrounge It All Contest Group	G1RDX/P	19
IO92	Atherstone Amateur Radio Club	G6ARC/P	19
IO93	Michael John Ryder	G0CDA/P	22
IO94	W. A. Bingham	G4WUS/P	2
IO95	Mr. Walter Trevor Brown	G1BBY/P	1
JO00	R. Noden & others	G4YST	2
JO01	Meopham Parish Radio Club	G0AFH	9
JO02	East Suffolk Wireless CG	G8TIR/P	4
JO03	Colin G. Hides	G1JME/P	2
JO11	Godfrey Hands	PE1GRL/P	1
JO20	Andy McClelland (G0DKN)	PI9IRC	1
JO22	Jaap Nap	PE1JVH	2

General operating standards in the contest were high, as usual, and "the friendly spirit of the event was just as strong as last year", notes G4ARI/P. Of course, there were the odd exceptions to this, and some problems are almost unavoidable with such a high band occupancy, for example G1GVA/P heard "so many stations calling CQ on exactly the same frequency—on 3 occasions I called one only to be answered by another".

"What a pleasure to operate again—not a bad signal heard" comments G6GWX/P, in common with several others. Complaints about bad signals were very few this year, and no consistent grumbles were levelled at any particular station. As has been stressed before, and noted by G0AMU/P, "with signal strengths well over S9, overload of the receiver can never be out of the question".

There are still a few stations who seem to think that everyone but themselves are cheating with regard to the 3 watt power limit. As has been well covered in this column in previous years, this belief stems from a mistaken expectation that QRP signals should be weak. It is perhaps worth restating the obvious: 3W is only 10dB lower than 30W, and if a signal is "very strong" the difference between, say S9+40dB and S9+50dB is imperceptible (if the receiver a.g.c. is working properly). Indeed, one station who found themselves being accused of running excess power lowered their output by 20dB (to 30mW), and the complainant could not apparently detect the change.

Of course there is no guarantee that any station is operating within the power limit, and we have to rely on trusting entrants in this regard, and ask what pleasure operators would gain from deliberately transgressing this rule. However it is certain that a high power station will never be spotted by how *loud* it sounds—it is only at the weak end of the strength range that power differences can be easily noticed. With this in mind, the adjudicator's station, G4HLX/P (in IO91) has continued to work stations after minimising transmit and receive signals with a switched attenuator. This has led to some quite remarkable contacts on real QRP—a number of the

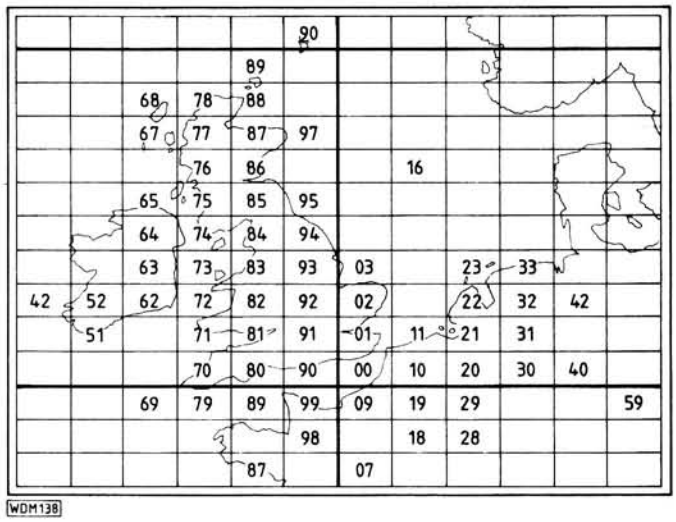


Fig. 1: Map showing the locator squares in which stations were active during the contest

leading stations were worked using less than 5mW (yes milliwatts!) output, lower power than the local oscillator in many receivers!

A similar procedure was tried by G4AGQ, who "thought I would experiment with the attenuator and try some real QRP". His log shows output power in an additional column—four contacts were completed using only 250µW (microwatts!), including one of over 60km, which is equivalent to 150 000 miles per watt (there used to be an award for 1 000 miles per watt!).

Equipment

This being the fifth of these contests held, it seemed an appropriate time to survey the types of equipment in use and to see if there have been any changes since the first contest in 1983. The pie chart shows the distribution of transceiver models used in this year's contest. The FT-290R remains by far the most popular, but represents 46 per cent of the rigs in use this year compared with 57 per cent four years ago. The difference has partly been taken up by increased use of the larger base stations particularly the Yaesu FT-221R and FT-225RD models and the Icom IC-211/251/271E family. Some 19 per cent of transceivers used this time were one of these, compared with 11 per cent in 1983.

It is particularly encouraging to see four stations using home-brew transceivers or transverters this year, G1EHF, G3GHN/P, GD3YLE/P and GI0GDP/P. Of course plenty of other stations were using home-made accessories, particularly speech processors.

Turning to antennas, these are summarised in the bar chart in terms of the total number of elements in an array. Also shown is the distribution of single and multiple antennas. A striking feature of the chart is only one 11-element antenna and a complete lack of any with 15-elements, and similarly no 22- or 30-element arrays corresponding to a pair of Yagis of this size. There was one other array not shown on the chart; one of 51-elements—G4BVY/P with 3 x 17-element Yagis.

Fig. 2: Relative proportion of different transceivers in use by entrants in this year's contest

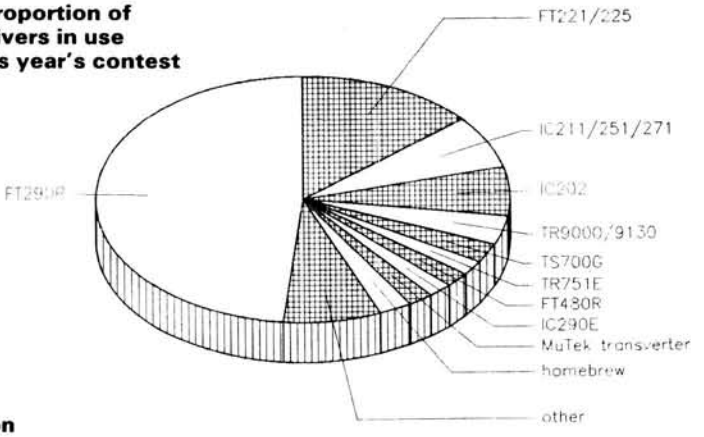
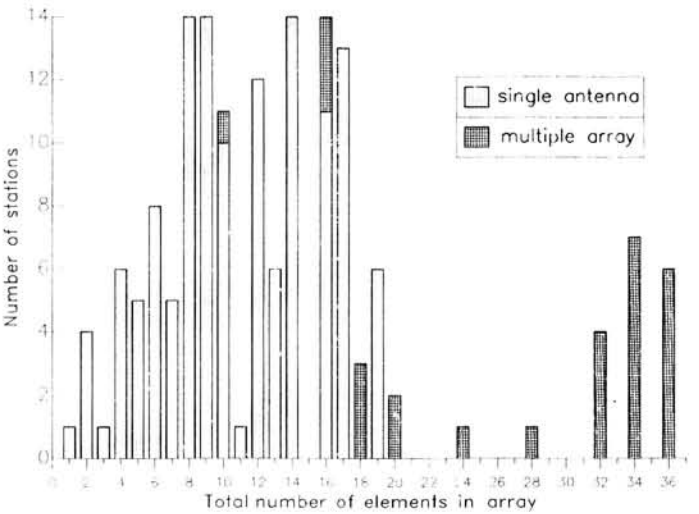


Fig. 3: Distribution of antenna sizes used by contest stations



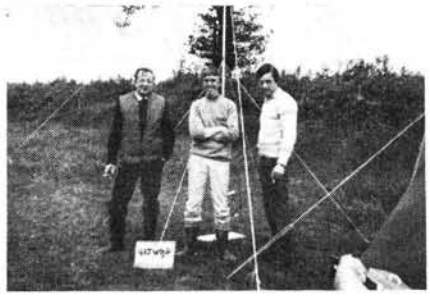
Here and There

Comments from entrants always contain a collection of their experiences. "Highlight of the day" at G0HAS/P "was some rather 'posh' lady enquiring 'Are you monitoring for noise levels across the

Practical Wireless 144MHz QRP Contest 1987

Pos.	Callsign	Points
1	GW8TFI/P	14280
2	GW4APA/P	12441
3	G4RLF/P	8568
4	G0CDA/P	8323
5	G4BVY/P	8288
6	G4NOK/P	7904
7	G3WOR/P	7668
8	GW4VEQ/P	7223
9	G1RDX/P	7140
10	G0AMU/P	6534
11	GM4CAA/P	6496
12	G0EQU/P	6396
13	GM0CLN/P	6384
14	G4NDH/P	6237
15	GW3UAX/P	5600
16	G4ZUN/P	5400
17	G8TIR/P	5160
18	G1TRS/P	5075
19	G0CLP/P	5049
20	GW1SSQ/P	4994
21	G8IUB/P	4888
22	G4SKA/P	4644
23	G1FBH/P	4475
24	G8DDC/P	4393
25	G4ARI/P	4301
26	GW1VHF/P	4234
27	G6GWX/P	4147
28	G0HAS/P	4094
29	G8DDY/P	3916
30	GW1VAR/P	3719
31	G4YST	3650
32	G0FEH/P	3634
33	GW4YPC/P	3624
34	G4GXP/P	3564
35	G6VWH/P	3408
36	G6YZR/P	3340
37	G1NUS/P	3339
38	G0CYB/P	3278
39	EI3GF/P	3276
40	GD3YLE/P	3124
41	G8CAR/P	3021
42	G1JME/P	3016
43	G1ORC/P	2982
44	G6ARC/P	2877
45	G1WPF/P	2869
46	G4UHF/P	2840
47	G6CLX/P	2831
48	G6IAT	2806
49	G1GVA/P	2641
50	GW3POM/P	2541
51	G6LKB/P	2530
52	GM0GDL/P	2508
53	G4WUS/P	2507
54	G1JKX/P	2392
55	G8EVY/A	2373
56	G0BWD/P	2299
57	G3ISO/P	2266
58	G3ERD/P	2176
59	G6SFR	2156
60	G0AFH	2124
61	G4NAV/P	2025
62	G4SLH/P	2006
63	GW3FFE/P	2000
64	G6TKY/P	1976
65	G3BPK/P	1944
66	G1STH/P	1905
67	G0AZT/P	1881
68	G4TSW/P	1862
69	G3GHN/P	1728
70	G1DWI/P	1700
71	G1UUX/P	1695
72	G4PYD/P	1634
73	GM6FPX/P	1632
74	G0AYM/P	1617
75	G0ELA/P	1584
76	G0FEZ	1504
77	G4GTT	1498
78	G4OEU/P	1463
79	G8PPQ	1430
80	G4RES/P	1380
81	G6IEK/P	1365
82	GM1DSK/P	1349
83	G1XRC/P	1314
84	G4UUH/P	1313
85	G1GNC	1278
86	G1RER	1248
87	G3BXF	1248
88	G0BNC/P	1232
89	G1GFZ/P	1230
90	G1VEM	1185
91	G4ZVS	1184
92	GM0BRS/P	1134
93	G6SBR/P	1105
94	G1XCO/P	1105
95	G1SAS/A	1088
96	G3MAE/P	1072
97	GI0GDP/P	1024
98	G3SVC/P	1020
99	G1IZB/P	1008
100	G0GTT/P	1008
101	G8JTD/P	1003
102	G4FUH	980
103	G6KDZ	949
104	EI0NDR/P	936
105	G1LPB	936
106	G1JDP/P	918
107	G0GBI	896
108	G1IMM	884
109	G1STO/P	864
110	G1ONE/P	858
111	GM4DCL/P	848
112	GM0CRA/P	838
113	G6BOB/P	806
114	G1WPJ/P	798
115	GM4WEW/P	780
116	G4YTR	780
117	G1BHR/P	780
118	G1SDF/P	770
119	G1TWK	748
120	GI4MBO/P	736
121	G0ABS/A	720
122	GM4SUF/P	720
123	G3RSC/A	711
124	GM4UYZ/P	676
125	G4SSD	650
126	GM4ZUK/P	624
127	G1TAI	610
128	PE1GRL/P	608
129	G1WRS	605
130	GW1HKY/P	583
131	G1EHF	572
132	G1OGY/P	572
133	G6XPY	550
134	G1JWO/P	531
135	G4FVK	520
136	GJ8ZRE/M	518
137	G1BBY/P	481
138	GM4LAA/P	456
139	G4NYN/P	441
140	G6YLW	400
141	G1URU	350
142	G6LBW	338
143	G1SNG/P	301
144	G6PFN	259
145	PE1JVH	234
146	G1IJQ/P	234
147	GM0HLV/P	176
148	G0FUW/P	176
149	G0HGA	156
150	G4AGQ	126
151	PE1IWS	120
152	G1VNS	96
153	PI9IRC	84
154	GM1GGP	84
155	G6XAL	70
156	G1OPV/P	68
157	G4PTI/A	66
158	GM1JPJ/P	39
159	GM0EWX	28

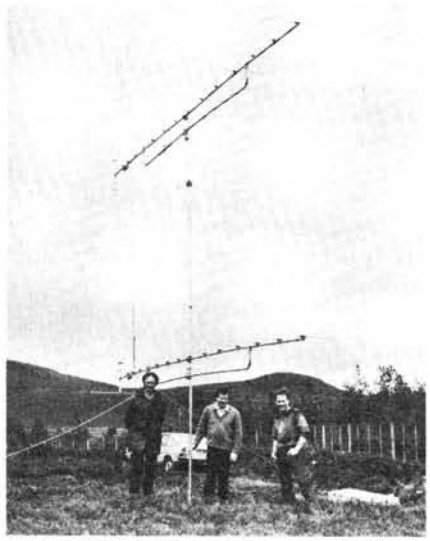
G1EHF/P. The home-brew transceiver of Dave Austin, Stanwell



G1JWO/P. The Alvechurch Group, near Alvechurch

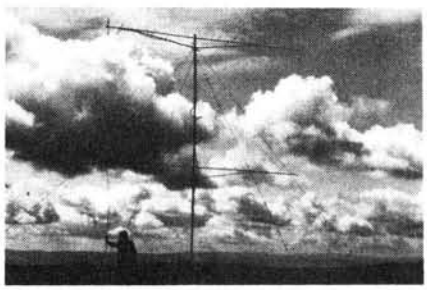
G1FBH/P. Vince Bobin, Howard Stuart-Turner and John Barton near Kinsbridge

GW8TFI/P. The four vertically stacked 9-element Yagis of the overall winners



GM4SUF/P. The Dukes of Sutherland Contest Group, located near Golspie

G8JTD/P. Otley Radio & Electronics Society, located near Ilkley



GM1DSK/P. Steve Keay and Mike Clark on Craig Lea, Logiealmond

G6CLX/P. David and Martin Lloyd on Winter Hill above Bolton

Leading stations using single antennas

Pos.	Name	Callsign
3	Martyn Wright & Neil Underwood	G4RLF/P
4	Michael John Ryder	G0CDA/P
8	Tony Wyn Jones	GW4VEQ/P
11	Civil Aviation Authority RS	GM4CAA/P
12	North Buxton Radio Club	G0EQU/P
14	Jodrell Bank Contest Group	G4NDH/P
16	Colin & Carole, Worksop	G4ZUN/P
17	East Suffolk Wireless CG	G8TIR/P
18	Tenbury Wells Radio Society	G1TRS/P
19	Chris Partington	G0CLP/P

plain?'". G0GTT/P says "if only the antenna attracted signals like it did sheep", and GW1SSQ/P found that "Welsh sheep love UR67 cable". G0BNC/P "had to stop three times to take the cover off the TX to let the spiders out . . . they get in when small and have to be let out once a year on the contest!"

GM4CAA/P was amazed to hear "W stations around 144.4MHz—after recovering from the shock I discovered someone was replaying a tape of the preceding Friday night opening on 50MHz". One station who contacted G0AZT/P "was convinced that we were running a tape loop for the CQ contest call. The truth is that one of our operators was getting carried away—when he gets going he sounds like a robot".

GM6FPX/P found themselves part of "a busy day on the summit". Like several other groups who had set up on the previous day, they shared the peak with "80 brave souls out overnight" for the Summer solstice. On the Sunday there were stations active on 50, 430 and 1296MHz in addition to themselves on 144MHz. Then they were joined by "400 people on a sponsored hill climb/fell run", an event assisted by RAYNET, bringing another six 144MHz stations onto the slopes.

Meeting Old Friends

The contest adjudicator is very grateful to G6DZH and G4ZPP for supplying checklogs, and to all who operated and submitted entries for this contest. Special thanks are due to Tennamast for supplying their trophy. Many groups express thanks to various people for helping their effort, for example to land-owners for granting permission to use portable sites, but there is not space to list all these here. The winners, GW8TFI/P, however, have asked in particular to thank G8VZT for his co-operation and loan of a tent. GW3POM/P has also asked for a correction to be noted: he told several stations who asked for his WAB area that he was in ST08—this should have been ST09.

The final comment comes from G0FUW/P: "It's nice to operate again in this contest, it's like meeting old friends again". The next chance to do so will be in the 1988 *Practical Wireless* 144MHz QRP Contest. This will again be held on a Sunday in June. The exact date will be announced soon in *PW*, once it has been fixed to try to avoid clashes with other events. ***PW***

Confessions of a Radio

There are not many employers who, having had one of their less experienced servants quit them to go abroad, would welcome him back like the Prodigal Son two years later and give him one of their plum jobs. Yet this happened to Roger Lancaster in the spring of 1961 when he rejoined the P&O line on his return from New Zealand.

I was appointed Fourth Radio Officer of P&O's newest and biggest ever liner, the *Canberra*, which was about to sail on her maiden voyage.

A less naive individual would have realised that one of the original radio officers had resigned suddenly and yours truly was the only substitute available. Also there were eight radio officers—Chief, First, two Seconds, two Thirds, and two Fourths—so the rank was the lowest in the radio department. Then there was the workload . . . But ignorance is bliss, and I felt highly honoured.

My watch was the 12 to 4, that is noon to 4pm and midnight to 4am. During these times I was the w.t. watchkeeper, sending and receiving telegrams, receiving weather reports and press broadcasts, all in Morse at between 20 and 30w.p.m. I shared the watch with the Senior Second, who handled the radiotelephone calls, the Tannoy system and the passenger counter during the day. At night, he edited the press and would spend much of the time with the printer, whose printshop was deep in the bowels of the ship.

The Globespan w.t. transmitter was about 300 watts and there were two Atalanta double-superhet communications receivers. There was also a direction-finder, emergency transmitter (100 watts output, 24V battery supply) an autokey which could send out an SOS on either of the transmitters if no skilled operator was available, and an emergency receiver which was permanently on loudspeaker watch and tuned to the international distress frequency (500kHz). For three minutes every half-hour, all w.t. work on this frequency had to stop and during these "silence periods" all ships' operators would listen out particularly intently for possible SOS calls.

All the w.t. gear was Marconi. Transmitting antennas were long wire. Two receiver antennas were whips and the rest suspended wire.

Connecting rooms included the radiotelephone office, which housed one of the first marine s.s.b. transmitters (Marconi), two of the earliest Racal communications receivers and two Redifon v.h.f. radio-telephone sets. Also adjacent was the Tannoy system room, with two tape recorders, two broadcast receivers and racks of amplifiers serving every public room, deck space and the crew quarters. From here piped music on two channels was directed to all cabins throughout the day.

The air-conditioning fought a losing battle against hundreds of valves which glowed continually in these rooms (nothing was transistorised) and conditions were uncomfortably hot in the tropics.

The radio office windows overlooked the Sun Deck and the first class swimming pool, providing some very interesting scenery for the watchkeeper in the occasional quiet periods of the day.

During the night we had many pages of press to receive—three hours of US news from San Francisco, two from Sydney and ninety minutes of British news from Portishead. It was quite a privilege to be the first on board to hear of some of the happenings in the outside world, but much of it was rather tedious and any errors could be very embarrassing when the daily newspaper appeared.

"You've got a ten-year-old gelding running in the Derby!" an irate unofficial ship's bookie would yell into the telephone, and an incorrectly-placed decimal point in the share prices would prompt a stockholding passenger to throw an expensive celebration party only to find the next day that he had lost rather than made money.

I never did attain the prowess of the "old hands", who not only received press without error when the signal was the weakest of three on the same frequency, but could type it direct on the typewriter, edit it, stir and drink a cup of tea and fill in a football coupon all at the same time.

Working hours did not end with the watch. From 10am to noon I did certain maintenance work, perhaps charge the lifeboat batteries, fix a faulty microphone or repair the crew antenna system. The latter comprised a long wire antenna which fed all the crew cabins via a wideband amplifier and miles of coaxial cable which had to be tested daily. Short-circuit coaxial cable was common: crew members trying to get some sleep in their bunks being disturbed by their neighbours' radios would push a drawing pin through the cable. With a crew of nearly 1000, such faults took some time to trace.

Then there was TV duty. The *Canberra* was fitted with an extensive television network. From a control room just aft of the bridge, programmes were relayed by coaxial cable to many public rooms, crew lounges and some first class cabins. All receivers were 525-line (US) system but broadcasts could be received using any of the world's systems and these converted in the TV room (more hundreds of valves). This was fine in port, but at sea the programmes were all from films carried on board. The radio officers

Officer

had to operate the projectors and cameras for children's programmes between 5 and 6pm and adult programmes from 7 to 10pm. I had to do about an hour of this a day.

There were free periods, though. After 4pm there was time for deck games or sunbathing, and after dinner junior officers could join in passenger entertainments until 10.30pm when we had to disappear from public view. This led to cabin parties which sadly had to be left just before midnight when the watch began again.

The more senior radio officers, outside of their watches, had to maintain the cinema, TV and Tannoy gear and all the electronic navigation aids on the bridge. These included two Kelvin Hughes radars, one of them a pre-production photographic radar which kept a record on film of all the ship's movements, a Decca navigator, two echo-sounders and Tannoy and v.h.f. terminals.

Once a week we had emergency boat drill. My boat station was on the bridge where I operated the boat order system, through which instructions could be broadcast to the lifeboat embarkation points. In the event of a genuine abandon ship situation I was to remain on the bridge until all the boats had gone, then I could proceed to my own designated boat which was way down at the stern and would take fifteen minutes to reach from the bridge even under perfect conditions. Nobody was ever able to explain to me the logic of this arrangement. I couldn't swim. I spent many worried hours on the bridge at boat stations.

Two of the motor lifeboats had built-in radio cabins, with transmitter, receiver and autokey.

Full uniform had to be worn at all times in public—even when climbing into a lifeboat in a force ten gale. In the evenings, special mess was worn—a penguin-like outfit.

One function we were **obliged** to attend if not on watch was the Captain's cocktail party. We had to make conversation with the guests and a close eye was kept on junior officers to ensure they circulated—and woe betide any who spent too long chatting up the younger female passengers.

In port, when we were off watch, we could go ashore and see the sights. We sailed from Southampton and called at Gibraltar, Naples, Suez, Aden, Colombo, Fremantle and Melbourne before arriving in Sydney. The ship stayed four days in Sydney, but spent only about 12 hours in most ports. From Australia we went on to Auckland, Honolulu, Vancouver, San Francisco, Los Angeles, then all the way home again, visiting the same places as on the outward voyage, except that we called at Wellington instead of Auckland.

The ship received a very warm reception at all ports of call, but particularly in Vancouver, where the whole town seemed to come to a standstill. The ship was met by tugs playing their fire hoses high into the air and we were the subject of continuous radio programmes all day.

I served aboard the *Canberra* for twelve months, then left to sail on other vessels. But I returned to her in the late 'sixties when I was a Second Radio Officer, responsible at first for the television and later for the cinema and navigation equipment. It was during this period that I met on board the girl who was to become my wife—the result of a blatant breach of the Captain's cocktail party circulating rule.

I left the *Canberra* and the P&O Company finally in 1968, but we were lucky enough to be able to visit the ship in Southampton in 1980 and show her to our four children. The TV system had been removed, the w.t. equipment had been replaced by more modern gear and there were newer radars on the bridge.

The ship was now one-class and the original lounges and ballrooms all seemed to have been converted to night club-type rooms. The officers, even the Captain, were wandering around in their shirt sleeves—previously this would have been a very serious offence.

It was sad to see the old ship converted for use in the Falklands War and I felt sorry for the radio officers whose view from their office was now a helicopter pad instead of a swimming pool. I was horrified to see her some weeks later on television, anchored in San Carlos Water, a great big white sitting duck with bombs dropping all around. Her survival could only be interpreted as an answer to prayer. Then her triumphant return to Southampton, rust-stained but intact, brought the tears to my eyes.

For a ship, she is now elderly, and her radio equipment is, I suspect, rather out of date. But when she finally goes to the scrapyard a part of my life will disappear too. **PW**

SWAP SPOT

Got a camera, want a receiver? Got a v.h.f. rig, want some h.f. gear to go with your new G-zero? In fact, have you got anything to trade radio-wise?

If so, why not advertise it FREE here. Send details, including what equipment you're looking for, to "SWAP SPOT", *Practical Wireless*, Enefco House, The Quay, Poole, Dorset BH15 1PP, for inclusion in the first available issues of the magazine.

A FEW SIMPLE RULES: Your ad. should follow the format of those appearing below, it must be typed or written in block letters, it must be not more than 40 words long including name and address/telephone number. Swaps only—no items for sale—and one of the items MUST be radio related. Adverts for ILLEGAL CB equipment will not be accepted.

The appropriate licence must be held by anyone installing or operating a radio transmitter.

Have Konica TC-X s.l.r. f1.8/50, case, twinflash, gold tripod (unwanted gifts). Would exchange for short wave/world radio, mini cassette, PRO Walkman or small multi standard TV. Mr Michaels. Room 5, YMCA, Charter Place, Watford WD1 2RT. Tel: 33034. *D376*

Have Sharp SG400E 70WT Dolby stereo music centre, brand new, has been used only a few times (cost £550). Would exchange for Sony CRF330K, ICF PRO80, Panasonic RF-B600 or RF9000RX. Amoroso, 60 Highfield Road, Salford, Lancs. M6 5LA. Tel: 061-743 1570. *D395*

Have 27MHz York 896 home base rig and various other CB items value £95. Would exchange for any working Bearcat scanner or ICF 7600D. D. Anderson, 14 Torrington Gardens, Loughton, Essex IG10 3TB. Tel: 01-502 2340. *D402*

Have Adana London, model No. 2HS, printing machine, with lots of type, needs two inking rollers. Would exchange for commercial made keyer with or without paddle. L. Wood, 61 Denison Street, Beeston, Notts. Tel: 256389. *D411*

Have communications receiver type PCR made by Philips Ltd., prior to 1950. Receiver is without cabinet, a.c. power unit requires attention—set not operated for many years. Would exchange for receiver to obtain BBC World Service 3.955-12.095MHz. M. Painting, Midacre, Yattendon, Newbury, Berks RG16 0XD. *D412*

Have FRG-9600 RX 40MHz to 960MHz continuous, mobile mount, video board, as new. Would exchange for 144MHz 25W multimode, Trio 9130 or similar. Must be as new and unmodified. G0CXF. 19b Heron Street, Oldham, Lancs OL8 4LP. *D420*

Have engineering tools, micrometers, gauges, dial clocks, cutter, etc., many items books value well over £1500. Would exchange for h.f. rig, 144MHz, 430MHz multimode. Goodwin. Tel: 0454 414516 for list. *D435*

Have Eddystone 770R, 19MHz to 165MHz, Hammarlund HQ170, 1.8MHz to 54MHz, R208 10MHz to 60MHz, Microdot c.w. RTTY, ASCII, SMC monitor scope, mobile charger and stands for 2500. Would exchange for HD rotator, 430MHz equipment, h.f. linear, w.h.y? McCallum G4VNG. Tel: 0733 231639. *D441*

Have 1920s crystal set, working, with original cats whisker and Browns "A" period headphones. Would exchange for good s.l.r. camera. G4FFO. Tel: Cambridge 860150. *D445*

Have Practical Wireless 1950-1980 plus other radio books. Would exchange for anything h.f. Also have WWII aerial survey cameras F24 and K20s. Would exchange for 144MHz handheld or Sony 2001, 2001D, ICF7600D. Tel: 0875 610858 after 6pm. *D449*

Have modulator amp simple conversion linear, 100-1000kHz Hallicrafters standard unit, SCR522TX 144MHz 832 p.a., 400V 200mA unit, cabinet unit 350V. Would exchange for older 144MHz handheld. Orr. 021-743 5068. *D456*

Have compressed air breathing set, ex-fire brigade, fully reconditioned with cylinder test certificate. Would exchange for h.f. or v.h.f. RX or w.h.y? for s.w.l. Would make cash adjustment if necessary. Newby. Tel: 0482 813439. *D460*

Have TR-9000 144MHz multimode, Canon T70 s.l.r. camera, zoom lens, etc., complete 8mm cine outfit. Would exchange for modern h.f. rig (digital), Belcom LS102L, or w.h.y? Many items considered. Dave. Tel: Ely 722704 (daytimes). *D462*

Kitchen Konstruktion

In this occasional series Richard Q. Marris G2BZQ hopes to dispel some of the fears harboured by people about the difficulties of constructing electronic equipment in the home.

We all must have read constructional articles in which an aluminium chassis of one size or another has been specified.

Now this is fine, except that probably the majority of home constructors do not have access to sheet metal working facilities. A similar number have no workbench and only limited use of the kitchen table, as this is shared with other inhabitants of the house. These tend to have a nasty habit of breathing heavily and threateningly into one's left ear; while firmly grasping the Hoover in the right hand to clear up the mess. Then there's the inevitable protest at the constructional noises issuing forth from the kitchen.

Yet it is all so simple and speedy. Advertisers such as Radio Component Specialists, and many local sheet metal suppliers that are often listed in the Yellow Pages under aluminium stockholders, will supply you with aluminium angle and plate of various sizes. Your local d.i.y. shop could be another source of aluminium angle of various sizes, mainly for secondary glazing purposes. The only problem with most d.i.y. shops is they seem to be "semi-metricated". Thus recently a 2 metre length of $\frac{3}{4}$in aluminium angle was purchased from the local shop (size in inches and length in metres!). This, it will gently be explained, is because we are in the EEC! They are not alone—after all some of our coinage is still stamped in Shillings and our road signs are still marked in m.p.h. No wonder that mainland Europeans think that we are mad!

Construction of the chassis is simple, and can be done with a Junior Hacksaw and wheelbrace. Some simple constructional ideas for chassis are shown in Fig. 1.

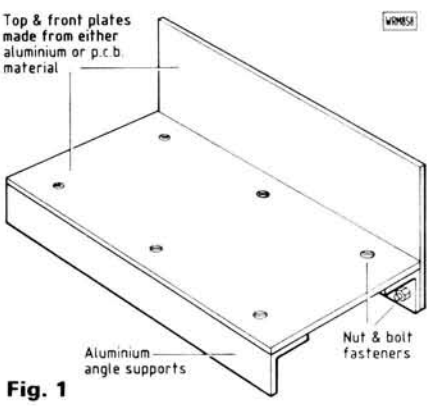
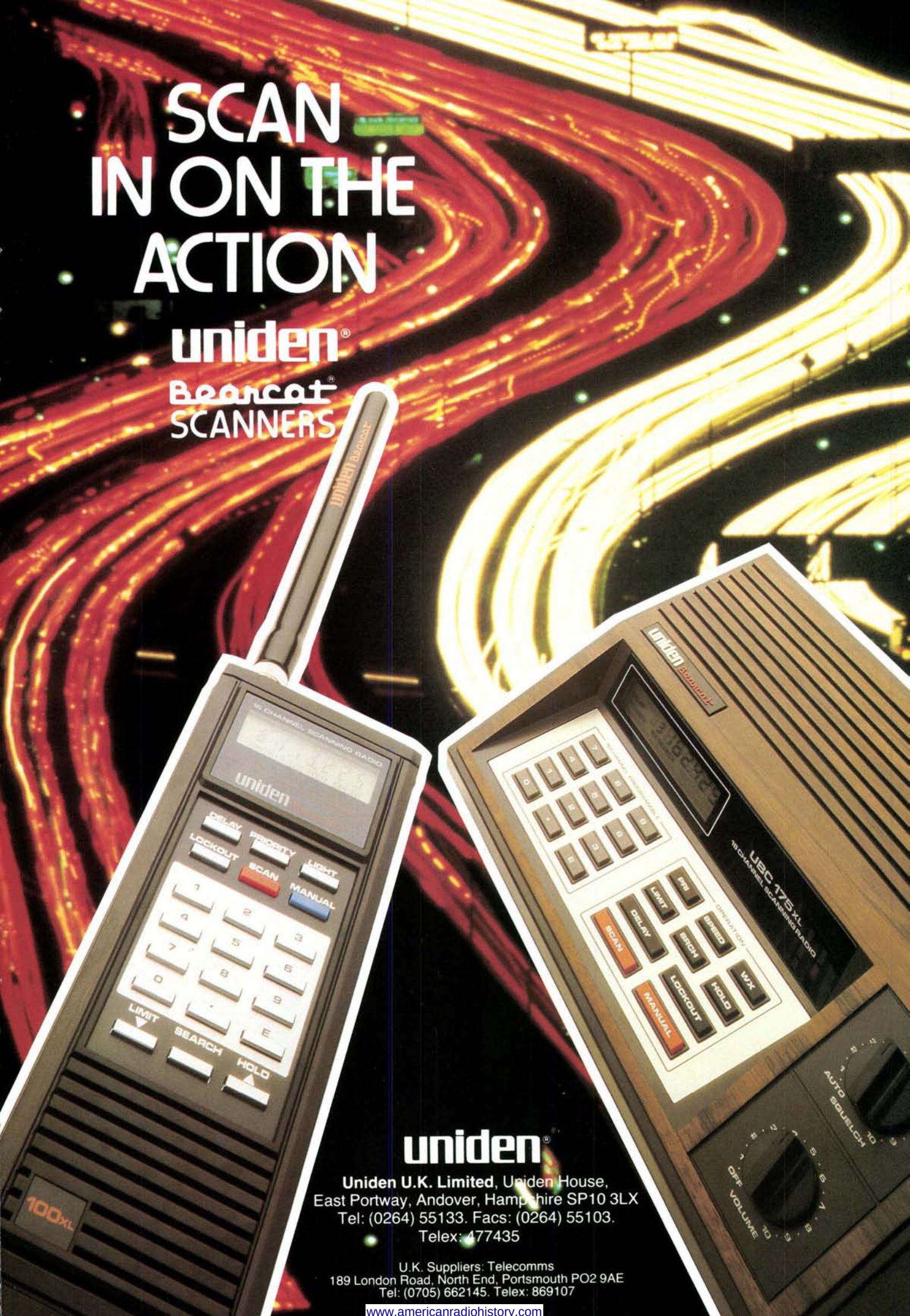


Fig. 1

The chassis plate can be made from aluminium, glass fibre or s.r.b.p., this includes copper-clad p.c.b. material. It can be fixed together with small nuts and bolts, as shown, or with Superglue. If Superglue is used then it will be necessary to fix "shorting links" between chassis plate and angle sides. Larger chassis will also require a strip of angle at the ends, particularly if the chassis is to bear any weight. In this case all side walls should be reinforced with a short length of angle at each corner.

The results look more professional than the usual home fabricated chassis and it is much easier to drill holes assemble components and do wiring on a flat chassis plate than in the innards of a complete chassis.

(Another good source of aluminium angle and plate is a local scrap yard. That is if you're not too fussy about dimensions and cleanliness of the material. Aluminium from this source is generally very cheap, scrap prices in fact!—Ed.)



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On The Air
On The HF Bands

Reports to Paul Essery G3KFE
Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP

After the perking up of conditions earlier, things fell back again somewhat—though to be fair, I suspect that on 14MHz there might have been some long-distance signals lurking in there under the summer static and noise which have been such a pain. However, it left me a little spare time from operating and listening. Thus it was that the idea of a change of sky-wire was born, or, rather an addition to the antenna farm. Thanks to someone else's gambling instinct, I gathered together the raw materials, made the whole works, hung it up and pruned it, against the clock to give acceptable v.s.w.r. across the chosen band of 14MHz. I then worked all continents on it. Total time to make it and put it up, twenty minutes, single-handed, that time excluding turfing the makings out of the junk box, but including pruning to give best s.w.r. at mid-band. Time for the WAC, total around two hours, minus a period when the dog took me for his exercise. Who needs to go commercial?

The Bands

Seriously though, the bands at one stage were so plastered with noise and some of it sounded so horribly man-made, that the experiment of an extra wire was considered well worth while; at least it saved me a fruitless exercise of looking for the QRM locally. At this low ebb in the sunspot cycle, small changes can make a mighty lot of difference and a few sunspots a change in geomagnetic conditions, or a load of static can quickly change the whole picture.

The 28MHz Band

Essentially a tired band after its midsummer madness, lying down to slumber amid a noise of distant frying eggs.

G3BSN had a listen-round while at the alternative address near Bournemouth. From the mobile he managed to QSO F/PA0GAM, HG7JBN, DJ2RE, EA7DRK and DH1NAF/M. On return from the break, Phil worked CX4GL, CX4AAL and LU1CJN. One station kept on sending his c.w. and each time the signal got past PY6W? he dipped too low to copy. Unusually enough, this chap was sending his QTH as Bahia, which is generally known as Salvador, for some reason of his own.

The absence of **G3NOF** last month was explained by the fact that the new mast was not erected; now it is up and the TET HB33SP beam on top is at 17m instead of 13m, which has made considerable improvement to the Pacific, plus quicker replies in the pile-ups. Don noted short-skip on 28MHz between 0700–midnight and in addition he was told that others had worked both South America and Africa. His s.s.b. went out to CE3GDN, CE4JZS, PY1SIW and ZP5FGS.

Our other reporter on this band is **G4EAN** (Nottingham), returned to the fold after several years silence. Ian has got back on with an FT-757GX on s.s.b., but is aiming to get back on to c.w. and RTTY in the near future. On 28MHz, therefore, G4EAN raised SM4SET around noon and at 2015, HB0/DL3MBH—who gave his QSL address as DL3MBH.

The 3.5MHz Band

The c.w. end has always been the haunt of the QRP types, around 3.56MHz. I have always believed that QRP has a lot going for it and that c.w. is the correct way to go. The many signals around the QRP frequency seem to bear me out. One of the fascinations is the way it seems to intrigue the full-power ops when they can answer a station on QRP and complete a full-length natter QSO. No wonder the G-QRP Club is one of the biggest in the country. And, of course, the real DX is always to be found too, particularly in the bottom 5kHz. Up at the h.f. end there is also some DX to be worked, although this month at least has seen a total lack of reports.

In the rest of the phone band, one can find all sorts of things. Today, for instance, our local net was "broken" by an ex-member from Southampton, running just ten watts peak and putting a fully-readable signal into every station in the net—a hop of over 480km on a Sunday morning. At least one of the stations giving R5 was using a Best Bent Wire arrangement in which the top rises to 4.5m and the rest is at around 1m high!

G0HGA plied her QRP c.w. on this band and managed to hook HB9PR and the DH7ABD, the former for a nice long ragchew with QRP both ways.

The 1.8MHz Band

First, a letter from **VE3INQ** (Toronto) who is the editor of the *Top Band Annual News Digest*, which is a non-profit newsletter for all Top Band enthusiasts. Ivan will send a copy to all who wish it, on receipt of either a $4\frac{1}{4} \times 9\frac{1}{2}$ in self-addressed envelope stamped with $1.8, or a similar but unstamped envelope and four IRCs. If you send more than one envelope, they will be kept on file for future issues. In addition, you can send your news to Ivan Payne VE3INQ, PO Box 146, Stn. "E", Toronto, Ont., Canada, M6H, 4E1, to arrive by December 31 for inclusion in the next issue.

On a different tack, VE3INQ passes on some news of Stew Perry W1BB, doyen of all Top Band operators. Stew's house and his "museum" have all been disposed of; the latter to a radio museum. Stew himself is unable to take telephone calls and has difficulty reading. His wife Marguerite has indicated he should not be bothered by too many messages. Thus all we can do from this end is to hope and pray that W1BB will in due course return to the band.

VE3INQ himself notes that he has now reached WAC, WAS, DXCC 121/108 and WAZ28 on Top Band, even though he has not been on this summer due to work QRM. However, he does note the presence of KN4BPL/KH3 (Johnston Is.), DK7PE/CE0A (Easter Is.) and KH9AC, Wake Is. as being around until the end of the year or thereabouts.

G3BDQ (Hastings) has laid another 18sq.m. of chicken-wire ground mat down, to bring the total to 93sq.m. On August 20, G3BDQ tried a CQ DX call at UK sunset time, around 1930Z and got a 599 back from UA9CBO, which augurs well for the forthcoming season. No significant DX was chased, though a DL was heard giving a 229 report to an inaudible P29. A couple of operating sessions yielded c.w. contacts with UQ2GQB, UO50GB, UV6ACU, UB5s, UA1DZ, 3A2GL, UP2BAV, UC2OS, UG6GAW, UR2RGN and RA4CLZ. Finally, John says he has a promise from 9Q5DA (ex-G3MFE) to come up on Top Band this season.

The 14MHz Band

Nice to have G3NOF (Yeovil) back on the band again; Don found the morning long path to VK around 0700 was not too good, with most signals from VK5, VK6 and VK7. An interesting point was the way the band dipped out and then seemed to recover around 0800 with signals over the North Pole from ZK2, T2, KH6, KH3, KH4, C2, 4W1 and so forth. The short path to Asia has been good between noon and 1800Z, particularly to JA and YB. Some VKs were noted in this period too. On several days around 1000–1100Z there were openings to VE5, VE6, VE7 and W7. East Coast Ws were to be found between noon and midnight and later, on occasion, Africans appeared for a while around 1800Z. Don made a lot of s.s.b. contacts, notably to A4XJZ, A92BE, AL7HK, AP2ARS/40, AP2FI/40, AP2IZ/40, AP2KD/40, AP2MQ/40, AP2UR/40, AP5HQ/40, C2/WB6GFJ, C3IUA, DU7GJ, FJ5AB, FS/PA0CRA, FY7AN, G3AYO/TF, HB0/DL3MBH, HB0/YT3AM, YHC2DZ, HI8AOM, HL1WP, HS0B, HZ1HA, I2DMK/ID9, IK2FCZ/IG9 (Lampedusa Is.), IK3BPN/IL3 (Santo Spirito Is.), IK8GGQ/ID8 (Chirella Is.), IT9KZW/IF9 (Formia Is.), JAs assorted, JT1BT, KA2CC/JD1, KD7XC (Idaho), KE7V, KH6IJ, KH6JEB/KH7, KP2A, KP4GY, KU0E (Colorado), OF0MA, OX3KM, OX/F6GBH, SJ9WL, SP5EXA/JW, SU1ER, T20AA, TI8CBT, TK/HB9TL, U&H8HCB, UM9M-WA/UM5P, V47NXX (Nevis Is.), V85GA, VE5FN, VE6ADI, VE7ETY, VK6RU, VK8AV, VP2EPJ, VU2AU, VU2QQ, VU2RCK, VU2XX, W87PAX (Pan-American Games), WH6BLQ/KH3, WY5L/KH3, XE1RK, XU1SS, XX9TTT, YB5NOF, YB6HD, YB0HZL, YB0ZZ, YI1BGD, ZB2IB, ZK2DD, ZS3TW, 3V8CX, 4U1UN, 5H3BH, 5H3RB, 5N8KBM, 5N0GAA, 6Y25DA, 9M2FO, 9M2PL and 9YA4AT—after which, Don was doubtless ready to believe the new beam was indeed doing its thing!

For G4EAN, there seems to be a difficulty in hearing the fifth call area, so he was doubly pleased to find KA5RYJ on s.s.b., not to mention W1VZR and W0NIM. On the "heard" list were various EU stations, YV4RZ and ZP5PX.

The deadlines for the next three issues are: October 23, November 25 and December 24.

As for me, the problem of inability to radiate to the west continues to be a plague, despite many attempts to resolve the problem. However, out to the east is no problem at all and every foray on the band if things are at all open yields hordes of UA9 and UA0 signals, even when beaming west! If this continues, we shall end up spending money—ugh!

Next we come to G0HGA (Stevenage) who has problems with the rig and can only get about one watt out on 14MHz. Hence, VK6HQ, RA1AR, I2DMF/ID9 all got away, but Angie did manage to raise 4NOUNI.

G3BDQ used s.s.b. on JY5EA, A4XRS, VK6WC and c.w. to VU2AJ, BV2DA, 6W7FZ, UM8NAC, OH2BDA/OH0, KL7Y (who said he would NOT be able to appear on top band this winter), TA1F, KC7UU/5B4, OH0/DK4AS, W87PAX, 9Y4BA, UA1OT (Franz Josef) and 9Q5DA who is ex-G3MFE.

G0FUS (Eastleigh) has recently graduated from a Howes ten-watt rig and v.f.o., to an FT-200. On the Howes rig, Paul made 102 QSOs in four months, including such as W4VGL, W9AND, W1BFT, N8HTJ, IK0ADY, RO5OU, RV3AC and small fry; since the FT-200 has been powering the dipole at 4.5 m, Paul has raised 4X6TA, K1TEY, KW3Z, KP2BG, KA3HVU/M, KB1QK, VE3GUA, OF0MA, JE4LPH, C30LEM, PY5LG, 4X1KT, 4N2M, V85GA, SV7ACB, VK6ZE, UA9CGL and UZ9SWR.

Events

Information input, apart from the Mark One ears, thanks to W1WY, *Canadian Amateur, DX News Sheet* and *The DX Bulletin*.

QRP addicts will be interested in the QRP ARCI Contest on c.w., running from 1200Z October 17 to 2359 on October 18. Participants can only use 24 hours of the 36. Five points for working a member, two for a non-member on your own continent, four if he is on another continent. Power output bonus is x2 if you have 4-5 watts, while 3-4 watts rates x4. 2-3 watts gets a x6 bonus and 1-2 watts x8. Below one watt rates x10, but over five watts is a check-log only. Further bonuses are available: x2 for solar or wind power and x1.5 for battery power for the duration of the contest in each case. If you use home-brew gear, you get a 200 bonus for a transmitter, 300 for a receiver and 500 points for a transceiver. The Multiplier is each USA state, VE province and DX country worked on each band. Final score then equals total QSO points on all bands, times (status + provinces + countries) times power bonus times power type bonus plus home-brew bonus. Frequencies 1.810, 3.560, 14.060, 21.060, 28.060, 50.060MHz and Novice frequencies 3.710, 7.110, 21.110 and 28.110MHz. Use separate log sheet for each band, plus summary sheet to show scoring, equipment description and other essential information and send it to Gene Smith, KA5NLY, PO Box 55010, Little Rock, AR 72225—0010, USA.

The following weekend see the CQ WW DX Contest Phone Leg, the Rules for which have not changed for many years now. Enough to say the report to give is RS plus your CQ Zone which is of course 014 for we UK types. Logs postmarked no later than December 1, addressed to CQ Magazine, 76 North Broadway, Hicksville, NY 11801, USA.

October 11, 0700–0900UTC is the period of the RSGB's 21/28MHz contest; exchange RST plus serial number starting from 001. *Radio Communication* has already carried the full rules for this one and we commend to you the idea that unmarked dupe contacts will be penalised by ten times the points claimed, while more than five unmarked dupes will result in disqualification.

Jamboree-on-the-Air this year will fall on October 17–18. Notice the preferred calling frequencies: for c.w., 3.590, 7.030, 14.070, 21.140, 28.190MHz, while on phone they are: 3.740, 3.940, 7.090, 7.290, 14.290, 21.360 and 28.990MHz; QSY after establishing the contact of course.

So much for the October contest and things. Now to the DX events. Sad news for those yearning for Zone 23 is that the BY0AA licence has not been renewed and they will be QRT for some time. However, there are other Chinese stations around, including for instance BY1PK, BY1SK, BY1QH, BY1CKJ all Beijing; BY4AA, BY4AOM, BY4AY, BY4ALC all in Shanghai; BY4SZ Suzhou; BY4RN Nanjing; BY4RB Zhenjiang; BY5RA, BY5RF, BY5OA all in Fuzhou; BY5NC Nanchang; BY7KT Guangzhou; BY7HL Changsha; BY8AA and BY8AC both in Chengdu and BY9GA Lanzhou. However, these are Zone 24.

ZL1AMO and others are planning an expedition to ZL9 (Auckland, Campbell Is.) for a couple of weeks next February, but donations are urgently needed to meet the budgeted costs—Ron Wright ZL1AMO, 28 Chorley Avenue, Auckland 8, New Zealand is the address. Operation will be c.w. and s.s.b. on all bands—and we could comment that Ron is noted for producing the goods.

Looking for Liechtenstein? Frank HB9NL will be /HB0 on all bands, including the WARC ones, until October 26.

Another addition to the BYs; the YLs operate BY5RT, around 14.0235MHz and 1200UTC.

New Bands

Not many reports this time: in fact, just G3BSN, who hasn't been active on the band as he has no 10MHz band at the holiday spot. However, late in the evening, Phil was tuning around the Standard Frequency signal at 10MHz while realigning a receiver and to his surprise the Chinese BPM signal was on with a crashing 59+ signal. Also noted was an American station giving a local weather report near the bottom of the amateur band.

The 7MHz Band

Our only reporter here this time is G0HGA, who raised YT7KF, PA3CAZ and GI4PMP, all on just two watts. However, that wasn't enough to break through the heap atop OH0MA.

The 21MHz Band

G0HGA is able to get a mite more power out on 21MHz, but she gets a bit despondent at times for the want of some more power—don't we all!!! Seriously, though, 21MHz is certainly her best band and stations worked with the QRP include such as LZ1KOZ, HB9NE, I2DXI, 4N0UNI, IK4DSW, K1SHR (four watts, a kilowatts at t'other end!), UA9QCQ, UA9XAB, UZ9WWS, UA9FM, UZ9CWB and W2FYT/4X. The Gotaway list included JH7WKQ, HZ1HZ and JA3YK.

G4EAN only made the one s.s.b. QSO on the band, but it pleased him no end —OF0MA, Market Reef, who came back to the first call.

G3NOF's analysis of the band shows that there were a few long-path openings to JA around 0800Z, but nothing from VK/ZL or the Pacific. The short path to Asia was good from around 1000 till 1700, with JAs noted until 1500 and YB/YC throughout. No VK short path signals were noted. Africans were noted in morning and afternoon sessions and the East Coast Ws were noted around 1400 and 2200Z. South Americans came in most days from 2100 and one evening ZL4BO was S9 at 2200 on the long path. QSOs using s.s.b. were booked with AP2AB/40, CE6EJZ, CP7GA, CP8CB, FR5BT, J28EO, J4ODX, HC1KN, HK6GBJ, HK6ISX, J73LC, KP2A, JA0RUG, JR6CSY, JY5EA, OA4SR, PJ8UF, TI2LTA, V2ACH, V44KQ, VE8RCS, VU2RCK, VU40ZAP, W0IVJ/CE8, XQ5CFR (=CE), YC3HBN, YC5ODQ, YC9VGJ, YC0MFP, YC0MNQ, YC0NII, YC0HML, YC0RBG, YC0SQT, YN3AG, ZL4BO, ZP450A/Q, 6Y525DA, 7P8DP, 9J2EZ, 9N1MM and 9Q5NW.

VHF Up

Reports to Norman Filch G3FPK
40 Eskdale Gardens, Purley, Surrey CR2 1EZ

August saw the return of Auroral activity on v.h.f. and a couple of periods of fine tropospheric propagation. These events feature largely in readers' reports in this issue.

DXpedition Update

In the June issue details were given of proposed operation from a DFDS ferry crossing the North Sea by G4MJC, G4XNL, G4MDZ and G6VYH. **Jan Alblas G4XNL** has now advised that the operations have been brought forward by one day to the period October 8–10.

To recap, the callsign will be OZ1EVA/MM—which belongs to Flemming Jul-Christensen G4MJC—and the bands will be 144 and 432MHz with operation on decimal 240. Times suggested are from 2100 on the 8th through 0600 and on the return trip from 2100 on the 9th through 0600. The ship will travel through BM, BN, CN, CO, DO and DP squares although the time spent in some will be limited.

Repeater News

Geoff Brown GJ4ICD reports that the Jersey v.h.f. repeater GB3GJ is now operational on 145.650MHz or R2 channel. Located near the centre of the island it requires an initial 400ms toneburst plus at least five seconds of speech, time-out being 90 secs.

The TX, RX logic, power supply and antennas have been constructed by GJs 8KNV, 8PCY, 6FTU, 4ICD and 1TJP with the help of donations from 3AME, 0FTZ and 6TMM. The group has incurred a cost of nearly £300 to install the relay so donations to offset this and to keep GB3GJ going would be welcome. These should be sent to Geoff Brown at 1

Belmont Gardens, St Helier, Jersey and he will issue a receipt.

At the end of August the DTI gave the go-ahead for eight new packet radio "digipeaters" on 144.650MHz. These were GB3EA/Bury St Edmunds; GB3GP/St Peter Port, (GUR); GB3LP/Llandudno; GB3NP/Norwich; GB3PX/Cambridge; GB3RA/Reading with mailbox facility; GB3TA/Swindon and GB3WA/Chester.

The Awards Program

Congratulations to **Jerry Russell G4SEU** from Nuneaton (WKS) who was elected number 15 of the 70MHz VHF Century Club on Aug 17. All contacts were made from his previous QTH between 15 July 1984 and 15 Feb 1987. The present station consists of a Yaesu FT-77 transeiver with FTV-707 module and transverter. The p.a. is a BNOS LPM 70-10-100 and the antenna an interlaced 50/70MHz Yagi with 6-ele on 70MHz and 5-ele on 50MHz. The old QTH was 91m a.s.l. with the antenna at 10.5m.

For details of the *PW* v.h.f./u.h.f. awards send an s.a.e. to PW Publishing Ltd, Enefco House, The Quay, Poole, Dorset BH15 1PP and marked "Awards" in the top left corner. All claims are checked by G3FPK, usually by return, but the certificates are prepared at and mailed from Poole.

Contest Information

The 430MHz Cumulatives start on publication day, Oct 8, with further sessions on the 24th and Nov 9. The clock times for these are 2030-2300.

The 1.3/2.3GHz Cumulatives begin on Oct 16, the next one being on Nov 1. Again the clock time is 2030-2300 and both events are for Fixed and All-other categories with a normalised scoring system.

Oct 25 is the date of the 70MHz Fixed Contest which is from 1000 to 1500UTC (GMT). This is a two section affair for single-op and multi-op stations. Entries and check logs go to G8TFI at Highlands, Townsend, Nympsfield, Glos.

50MHz fans can participate in a contest on Oct 18 from 0900-1300UTC. This is for fixed stations only and will be in two sections, single-op and multi-op. Usual exchanges including QTH information, e.g. 15 kilometres south of Guildford. Entries to to G4WAD at Tanglewood, Bridge Street, Lower Moor, Pershore, Worcs.

On offer for c.w. addicts on Nov 7/8, 1400-1400-UTC, is the Marconi Memorial Contest on 144MHz, another with single-op and multi-op categories. Buried within this on the 8th, 0800-1400, is the RSGB's c.w. event and entries for these clashes go to G3FZL at 11 Liphook Crescent, London SE23 3BN.

Worked All Britain

In the winter months v.h.f. activity frequently drops to a low level for a variety of reasons. In the summer months, and often in the autumn, there are opportunities to work long distances and new locator squares via Es and tropo modes.

Competitively minded operators increasingly take part in WAB activities to offset the winter doldrums. There are very many awards to achieve and these are neatly set out in the WAB Awards Record Book, a complimentary copy of which I was given at the Brighton Mobile Rally by Committee member Laurie Segal G6XLL.

They publish a newsletter and circulars reporting recent news of importance. One such lately received states that Paul Brockett G1LSB (LCN) has received the first 432MHz Islands Award for working ten islands, for example. Details of WAB awards can be obtained from G4KSQ at 22 Burdell Road, Sandhills Estate, Oxford OX3 8ED on receipt of an s.a.e. General information about the WAB group can be obtained from the same source.

Annual v.h.f./u.h.f. table January to December 1987

Station	70MHz Counties	70MHz Countries	144MHz Counties	144MHz Countries	430MHz Counties	430MHz Countries	1296MHz Counties	1296MHz Countries	Total Points
G1KDF	—	—	94	14	68	8	28	6	218
G6HKM	—	—	73	26	53	13	26	7	198
G4NBS	43	6	59	12	50	12	*38*	*8*	182
G1SWH	—	—	92	9	56	7	—	—	164
G1LSB	—	—	68	22	56	16	—	—	162
G6XVV	—	—	70	13	50	8	—	—	155
G1EHJ	—	—	58	12	53	9	—	—	132
G8LHT	—	—	66	22	29	10	3	1	131
G1GEY	—	—	65	15	41	8	—	—	129
G4SEU	58	6	43	16	3	1	—	—	127
G4DEZ	—	—	34	10	42	11	13	5	115
G6AJE	—	—	50	12	37	7	7	2	115
G4MUT	26	1	45	14	19	3	*7*	*2*	108
GW6VZW	—	—	68	24	9	2	—	—	103
G4VOZ	59	5	—	—	32	7	—	—	103
GW4FRX	—	—	75	27	—	—	—	—	102
ON1CAK	—	—	66	31	—	—	—	—	97
G3FPK	—	—	74	21	—	—	—	—	95
G4WJR	—	—	78	10	—	—	—	—	88
G4TGK	—	—	66	19	—	—	—	—	85
G8XTJ	—	—	62	16	—	—	—	—	78
G6MXL	10	2	35	10	15	5	*7*	*2*	77
G4AGQ	13	1	31	12	13	4	*1*	*1*	74
G4YIR	—	—	58	13	—	—	—	—	71
G1CRH	—	—	61	9	—	—	—	—	70
G4ZTR	12	2	22	5	21	4	*2*	*1*	66
G0HDZ	—	—	53	11	—	—	—	—	64
G6MGL	—	—	25	6	25	2	1	3	62
GW4HBK	48	7	—	—	—	—	—	—	55
G0HGA	—	—	40	8	—	—	—	—	48
G1VTR	—	—	16	2	22	5	—	—	45
G2DHV	11	2	21	5	3	1	—	—	43
G3EKP	13	3	12	3	7	3	—	—	41
GM4CXP	—	—	27	8	3	3	—	—	41
G4WND	25	4	—	—	—	—	—	—	29
G6XRK	—	—	8	6	—	—	—	—	14

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

The 50MHz Band

The RSGB's VHF Committee has recommended that an f.m. calling frequency be established on 51.510MHz and that f.m. channels be identified therefrom at 20kHz intervals up to 51.590MHz and down to 51.410MHz using a peak deviation of 5kHz. This plan ". . conforms to the standards already in use in the Americas," to quote from the Sept 6 GB2RS news broadcast.

As far as can be deduced from readers' reports E-layer propagation fizzled out by mid-August though Band I TV signals were still being seen later in the month, often between 1600 and 1800UTC. On July 26 **Colin Mister G0DAZ** (HRW) worked CT4PI (IM59) at 2150 on f.m. mode.

John Heys G3BDQ (SXE) uses an Icom IC-271E with MuTek transverter and "front end" which brought QSOs with some W1s on July 21. He wishes the DX would spread out more during openings as there seem to be 50 Gs for every W on the band. He does not like the suggestion of Packet radio operation below 51MHz. Does anyone know what frequencies they use in the USA for Packet?

Phillip Stanley G3BSN (LDN) has become very interested in the band and has been using a CB set modified and loaned by G8APV. He has visited Angus McKenzie G3OSS (LDN) and heard recordings made by Angus of m.s. reception of the GB3RMK beacon on 50.060MHz at 2130 on Aug 11, one burst lasting for two minutes. The next day, at the peak of the Perseids shower, Phillip copied pings from GB3RMK, GB3SIX and CT0WW.

Tony Collett G4NBS (CBE) has missed all the good openings, his only noteworthy contacts being with GB4GD (IOM) on Aug 12 and 14 and GB4XN (GDD) on the 20th. **Martyn Jones G4TIF** (WKS) also worked GB4GD on Aug 9 and on the 30th GB2FI on Flatholm Is, while E-layer brought CT1LN on the 4th.

Mike Johnson G6AJE (LEC) has now made a close-spaced 2-ele Yagi which, although only roughly tuned, shows an improvement over the previous single quad loop. He is contemplating buying a *PW* "Meon" kit to get going on the band quicker than by building his own transverter from scratch.

Keith Hewitt G6DER (YSS) is equipped for the band but does not like the h.f. bands type of operating when a DX opening occurs. I find it just the same on 144MHz with people ignoring the DX station's requests for replies from particular squares or countries.

Julie Yates G8MKD (WMD) made some cross-band QSOs to D, HB and OE on July 26 and on Aug 5 at 1713 she worked LA3EQ (CS) on f.m. using just 2.5W to a loft dipole. **Steve Damon G8PYP** (DOR) lists a few cross-band QSOs to D on July 30 and Aug 5 and to EA2 on Aug 4. CT1LN was worked on Aug 4 and 11 via E-layer and on the 16th he contacted the first GW on the band, GW1PDN (YL).

GJ4ICD sent along copies of QSLs received from CT3BX worked on July 4 and 18 in IM12NP. In his covering letter, Hernani requested information for a 50MHz p.a.; he has a circuit for a 144MHz p.a. but did not say whether he has a solid state or valved design in mind. He is going to make a second 5-ele Yagi too.

On Aug 4 GJ4ICD worked GM3JIJ (WS) and GM4BYF (YP). On the 5th Geoff worked LA3EQ, GM3JIJ, LA1BEA, LA5UBA, GM4UPL and GM4YWQ (YQ)—all the LAs in CS square. The period was 1530–1656. In the Perseids, very long bursts of up to four minutes duration

were copied from GB3RMK around noon for an hour and GM stations were heard in local QSOs on the 11th. Tropo, Es and Ar propagation was heard in Jersey on Aug 31.

As to band occupancy, Geoff took a random section from his log and of 89 different stations, 67 (73.3 percent) were A licensees and 35 of those were G3/GM3/GW3s; "an interesting percentage" as he remarks.

Dave Lewis GW4HBK (GWT) found GB4GD on Aug 10 for a new country and on the 13th m.s. mode brought GM0FRT and GI8YDZ. GB4XN in Anglesey was worked on 20th and Dave now has 21 countries on the band. In an Aurora on the 25th he heard GM3WOJ at 1845 and GM4DGT at 1930UTC.

The 70MHz Band

Bill Somerville-Large EI9FK (Wicklow) sent a very comprehensive account of August portable operation from VL and UL squares, the first session of which was the 9th to 12th. On the 9th from IO51FN m.s. QSOs were made with G4SEU and G4WND and tropo ones with GW4HBK, G3EKP and G3IKR.

On the 11th, from IO41XP, m.s. contacts were completed with G4WND, G3EDD and G3RSI. In better reflections on the 12th, Bill completed with G4MKF, GW4HBK, G4AFJ, GB4GD, G4TGB, G4SEU, G3IKR and G4NBS. He suspects his RX was a bit deaf as he was being consistently well heard but found it difficult to copy complete information from calling stations.

The second portable session from IO51FN was August 23 and 25 in "dismal" tropo conditions. QSOs were made with G3EKP, GB4XN, G3APY, G4APA and EI4DQ. On the 25th, Bill had assistance from GB4XN who identified calling stations.

With high pressure building up by the 27th, he went over to IO41XP again enjoying a spectacular view from the hill on the Beara peninsula. QSOs were made with G3EDD/A (CNL), G3APY, G3UVR, G4APA, G3RSI, G3EKP, G4SEU, G4AFJ, GW3MHW, GW4HBK, EI4DQ and EI9ED.

Bill's 70MHz station comprised a Yaesu FT-707 and FTV-707 module with BNOS amplifier, the antenna being a wide spaced Yagi made from the remains of old TV antennas and supported on the side of the car on a 4.5m pole. He remarks at not hearing one Class B licensee yet so hopes some will be encouraged to use the band.

G4NBS had the RIS engineers check out his station in July and they gave Tony a clean bill of health. GB4GD and GB4XN were worked on Aug 10 and 21 respectively. After completing with EI9FK/P on m.s. on the 12th he listened for another hour and worked G4SEU in a long back scatter m.s. burst. Tony uses a Kenwood TS-660 on 50MHz, transverting to 28MHz then up to 70MHz with an SEM Europa.

Jerry Russell G4SEU (WKS) lists G4APA/M on a local canal on Aug 20 and GB4XN; GU2FRO (SRK) on the 29th; GU2HML (GUR), GB4GD, G6BDF (YSS) who was running 0.5W to a wire dipole, and the two EI expeditions on the 30th. G8GRT (GBE) with 2.5W to a loft dipole was a new station on the 31st.

On Aug 23 Jerry operated portable from NLD, TWR and CVE making 24 QSOs with 17 stations in 13 counties and three countries. This involved a 780km journey in 15½ hours.

David Meadows G4TGB (NOT) worked EI9FK/P (UL) via m.s. on Aug 12 while on tropo he contacted GB4GD on the 10th and GB4XN on the 19th. On the 5th he worked six stations on s.s.b. while driving to Manchester Airport. He mentions 11 new stations on s.s.b. and 12 on f.m. and that G3ZIG (NOR) is back on the band after a year.

John Jennings G4VOZ (LEC) comments that most of the class B licensees now QRV are G8s who are experienced operators. He has not noticed any great rush of Bs to get on the band as yet.

John is very pleased with his 1987 achievements and reckons he has never worked so many countries, counties and squares so early in a year before. Thanks to G4SEU/P he ticked off his last English county (CVE) on Aug 23. He lists the following newcomers worked: G1RZR (NOT), G1DOX (CBA) running QRP to an indoor antenna, G4OVK (WMD), G1JRU (HPH).

Other notable QSOs included EI4VBM/P on c.w. on Aug 6, GB4GD on the 9th worked on s.s.b. and f.m., G3JRL (DOR) on s.s.b. on the 12th helped by m.s. reflexions, G8ECI (LCN) on the 14th, G4PCB (DVN) on the 15th, G3JOC (NOR) on the 17th and club station G3SSO (GLR) on the 18th and which was a new call to John.

GW4HBK reports good activity and between Aug 2 and 24 Dave worked G3MPN, G3JOC and G3ZIG (NOR), GB6ZMN (GNS), EI4VBM/P (VL), G8EGI (AN), EI9FK/P, GB4GD, GB4XN and G4BWW (LNH).

The 144MHz Band

First the m.s. scene and the conclusion seems to be that the Perseids shower peaked in the early hours of August 13 although **Tom Cocking EI4DQ** (Co. Cork) found reflections best between 0900 and 1500. His station comprises a Yaesu FT-290R with MuTek board, 4CX250B amplifier, a 16-ele Yagi and 8-ele quad with masthead pre-amp and 12mm Heliax feeder. His site is 90m a.s.l.

In the period Aug 2–14 Tom lists 23 QSOs with CT, D, F, I, OK, OZ, PA, SP6 and Y stations in squares CL, DH, DK, DL, EI, EL, EN, EP, EQ, FE, FI, GE, GI, GM, GP, HK, IJ, IL and WB, using both c.w. and s.s.b. Bursts up to 55 seconds were recorded with some contacts completed in three minutes. EI4DQ is in VL square which should make him very popular with the European m.s. addicts.

G0DAZ completed some choice QSOs in the Perseids period including OH0NC/OJ0 (JP90) Market Reef, on Aug 9; UR1RWX (KO29) on the 11th, UP2BKH (KO05) on the 12th and HB0/HB9QQ (JN57) on the 15th, well past the shower.

Peter Atkins G4DOL (DOR) did not think the shower was very impressive. On random s.s.b. on the 12th he completed with OZ4VV (EQ) at 0816 and I0CUT (GB) at 1039.

Dave Dibley G4RGK (BKS) though conditions were very good on the 12/13th and he completed with OE3JPC (II), SP6AZT/4 (LO), HG4KYB (JH), SP3MFI (JL), IW5AVM (FC), EA3MD (AC), SM4DHN (GU) and SP4ARE/4 (LN). He reckons the reflections were better than those of the last 3/4 years.

Don Hooper G4RNL (CHS) completed some fine QSOs in the Aug 7–19 period including on c.w. HG1S (IH), UR1RWX, SM6MKH (GS), I3YXQ (FF), SK3SN (IU), SM4POB (HU), I3MEK/P (FG), YU2CKL (HD), IW2CSM (EF), SM3PXO (GX), SP5EFO (KM), OH5LK (NU), HB0/HB9QQ, HG4KYB and SM2CEW (LZ). Using s.s.b. he found I4BXN (FE) twice at random, EA5HM (YZ) and OY9JD (WV).

Ray Baker G4SFY (NOR) completed with IW5BPE (FC) on s.s.b. in 35 mins on Aug 10. The next day in 48 mins with IK4GNG (GE) on s.s.b. On the 12th with HG6NQ in one burst on s.s.b. at 1231. On the 13th, IK2JKI (EF) in 19 mins and HA4KYD (JH) in 24 mins during the only burst—no pings at all—and which lasted 24 secs.

John Palfrey G4XEN (NMH) lists SM3BIU (JP73) for a new square on Aug 3. He also worked the OJ0, HG4KYB and I3YXQ on c.w. On s.s.b. IK4GNG was another new square. G6DER worked ". . nine assorted I, OE, YU and OKs via m.s. on Aug 12/13."

John Nelson GW4FRX (PWS) made his first ever m.s. contact on s.s.b. with OE8HWQ (HG15g), a sked set up for him by G0DAZ as the OE had never worked Wales. It came off in 43 mins from 1800 on Aug 13 with 26/38 reports.

Now to the Es events which ought to be the last for 1987, but remember that surprise event on Sept 20 last year? **Johan Vande Velde ON1CAK** (Liedekerke) worked EA5NY and EA5EMM (IM99) and EA5DFY (JM08) between 1632 and 1638 on Aug 5 but his best DX was UB5XQS (KN67PT) at 2124km at 1355 on the 16th.

G0DAZ could not hear the EA5s on Aug 5 but did work YU1EN (JN94) and YU3HEJ (JN76) around 1900 on July 26. **Antony Wayland G1HJW** (ESX) heard continentals working some Es on Aug 5 but did not work anyone until 1615 when he got EA3BTZ in JN01. He later worked EA3CNX (JN11) and EA6QB (JM08).

Geoff Grayer G3NAQ (BRK) worked IC8ECJ (JN70), IK0BZY (JN61), IW8BLR (JN71) and 9H1FL (JM75) on July 27 between 1714 and 1740. At 0757 on Aug 5 G4DOL worked CT1LN (WX) for a new square while on July 30 G4IGO nearly worked HG7JZS (JN97) at 1815.

The Aug 5 brief opening brought HG1YI/MM (BB) for both G4RGK and **Ian Harwood G8LHT** (YSS). Ian also worked EA3BTZ as did **John Wimble G4TGK** (KNT) and **Ron Reynolds G6WEM** (ESX). G4XEN worked this station plus EB3CNX and EA3AKG (BB).

Next to the welcome return of some Auroral activity, the first session of which was on Aug 25. In the southern part of England, it probably started around 1850. G4SFY worked on c.w. LA9FY (EU), GM4OGM (YP) and GM4IPK (YP). GM4IPK worked 104 stations in this event which was quite obviously favouring Scotland. Only the two GMs were worked from G3FPK the QTE (beam heading) being 20° and the Doppler shift about 1kHz h.f.

GW4FRX telephoned me at 1830 about this one after he had worked into UP and UQ countries. It fizzled out about 1910 and apparently started around 1440 in Scotland. On the 27th another Ar was in progress around 1600 till 1653 but I only heard a couple of very weak GMs on c.w.

The third event was on the 31st during the excellent tropo. G4SFY noticed it at 1628 with GMs and LAs heard. **G4IGO** worked GM4IPK at 1620 and GM4JJJ (FFE) at 1644 at QTEs 20° and 30° respectively. Ken wonders where all the northern Gs were. GW4FRX worked SM1BSA (JN9HF) in this Ar but at G3FPK signals were weak and it was easier to work the same countries on tropo.

All of which leads conveniently to the tropo reports, starting with those from outside mainland UK. **John McGowan EI2FN** operated -/P from Slieve Anieren

(Co. Leitrim) on July 29 and worked 21 stations, 7 EIs, 8 Gs, 2 GIs and 4GWs between 2100 and 2250 local time. On the 31st he operated in Co. Roscommon from Arigna Mountain and made 22 QSOs in 2½ hours from 2000. The breakdown was 5 EIs, 12 Gs, 1 GI and 4 GWs.

John was in Leitrim again the morning of Aug 1 making five contacts and in the afternoon of the 2nd making a further 14 QSOs. Total –/P time was 6h 20m and he plans to activate other rare Irish counties next summer.

He operated from home (IO63WD) on Aug 16 and from 2004 made 126 contacts in four hours to F, G. ON and PA of which 31 were continentals. He was using 100W to a 7-ele ZL type antenna. He was on for the big tropo opening on Aug 30 from home working many Gs on s.s.b. The tally of continentals on s.s.b. was 18 Ds, 9 Fs, 1 HB9, 2 LXs, 5 OKs, 7 ONs and 13 PAs. The best DX was OK2KZR/P in JN89DN at 1604km and the foregoing were worked from 1915 to 2300UTC.

EI4DQ caught the southerly tropo on Aug 12 and worked 3 EA1s in VD and XD and 11 Fs in BF, CF, ZE, ZF, ZG, ZH and ZI squares. After his 70MHz –/P operation in UL square on Aug 27, EI9FK came on the band and worked 45 G, GI, GU, GW and EI stations in two hours but Bill will have missed the really big opening as he had to return to Dublin.

Irwin Brown GI1JUS (ATM) worked some good DX on the Aug 29/30 weekend including FC1FAW/P (BF), DL6NAA (FK), OK1IBL (GK), DL0WA (EJ) and best DX at 1457km OK1KRA (HK). For GJ4ICD, Aug 29 brought contacts to GD, GI, GM and many EIs, the most Geoff reckons he has ever heard.

On the 30th he started at 1013 UTC and finished at 1920. During this period Geoff worked many Ds in the D, E and F columns of squares plus OK1IBL, OE5VRL/5 (HI), Y25QM (GL), many OKs and best DX SP3MFI (JL11e) and SP3JBI (JL21a). The 31st brought more D, OE and OK QSOs, assorted GMs and LAs plus GM4DMA/A (AS69e) for square No. 253 on the band.

ON1CAK operated in the so-called QRP contest on Aug 8 and worked over to EI. On the 16th Johan contacted HB0/YT3AM and on the 23rd to Fs in BE and CE. In the period Aug 29–31 he copied the new Irish beacon EI2WRB on 144.920MHz and worked many British Isles stations plus OE, OZ, OK, LA and SM. His total of new squares was 14 and best DX were HG4KYB at 1099km and LA5EBA (CU) at 1056km.

Colin Oakley G0AEA (IOS) had G0HDN visiting him on Aug 12. Gilbert operated the station and worked lots of DX including many Fs, PAs, HB9 and half a page of Italians. Every single square on the French Mediterranean coast from the EA to I borders was worked.

The mainland stations working the August tropo DX included G0DAZ, **David Thickett G0FEH** (DYS), **Angela Sitton G0HGA** (HFD), **Philip Everitt G1GRH** (CBE), **Bob Nixon G1KDF** (LNH), G3NAQ, **Pat Billingham G4AGQ** (SRY), G4DOL, G4IGO, G4RGK, G4RNL, G4SEU, G4SFY, G4TGK, G4TIF, G4XEN, **June Charles G4YIR** (ESX), **Colin Ford G4ZVS** (WMD), G6AJE, G6DER, **Keith Killigrew G6DZH** (HWR), **Ela Martyr G6HKM** (ESX), **G6WEM**, G8LHT, G8MKD, G8PYP, **G8XTJ**, GW4FRX and **Paul Baker GW6VZW** (GWT).

The two English groups that operated from EI were worked by many readers and the Derbyshire Hills folk had the better of the conditions. On offer were VL, VM, VN, UL, UM, UN and UO squares and counties Cork, Kerry, Mayo and Galway at least.

There was some remarkable propagation on Aug 12 to Italy. Widely worked were I1KIX, IW1BLJ and I2BSN (DE), I1NKT and I1TEX (DF), IK1HWG and I2FHW (EE) and I1KTC, I1VEH, I2FAK, IK2DMF, IW2AEN, IW2BHT, IW2BNA and IW2CSM (EF). It seems these stations could be worked up to about the Midlands from about 2040 till well past midnight.

This lift started for G4DOL on the 11th when Peter worked EA2JG/P (YC) but for most everyone else it began in the early evening of the 12th when Spanish stations appeared. These included EA1DAV (WD), EA1EBJ/P, EA1EJH, EA1KC, EA1NV and EA1TH/P in XD and EA2BUF (ZD).

Later on conditions favoured southern France and the stations worked included F1ADT, F6GPT and F6IMH (ZE), FC1LUW/P (ZG), FC1JII (AD), F6HRY (AD), FC1AJE/P, FC1GTU, FC1MOZ, F6ARQ and F6HKA (AF), FC1DBE/P (AG), F6EYM/P (BE), F1CJG/P, F1FAW/P, and F1GPL (BF), FC1BLL/P, F6BVF and F6EPE (CD), FC1CPW and FC1JRX (CF), FC1CCC, FC1FDW, FC1FLA, FD1HLL, F6BSJ, F6GYH, F6HYE and F8OP (CG), FC1DDA/P (DE) and FC1FKS and F6HYG (DG). Many other Fs in more northerly squares were worked, and there were several HB9s in DG, DH and EH squares too.

On the 16th conditions to France were again quite good and G4DOL worked F1HAR/P (AE), F6HTJ/P (BC) and FC1JRX (CF). On the 21st, Peter worked seven stations in ZD and ZF including EA2FUN.

An even more spectacular opening took place on Aug 29–31 and it was puzzling to know where to aim the beam with stations coming in from EI, through F, HB, central Europe and later Scandinavia. To set the scene in some perspective, GW4FRX ended up with a tally of 31 OKs, 17 Ys, 3 SPs and two each HB9, LX and OE stations.

There just is not the space to list all the many DX stations that were worked so I will just mention a few such as HG4KYB (JH), OK2KZR/P (IJ), OK3CQF (II), SP6GWB/6 (IK), SP6GZZ (IL) and SP9EWU (JK).

Throughout the evening and night of the 31st, **Laurence Howell GM4DMA/A** was operating from AS69e and there can be nothing but praise for the way he so efficiently handled the pile-ups. Sometimes he called for particular countries or squares, at other times he would make a list of perhaps half-a-dozen partial callsigns then work them in turn. In this way he must have given hundreds of stations their first QSO with AS square. The moral is, listen to what the DX station is saying and do not call out of turn. If he asks for, say, stations in YK square and you are in ZM, then do not call. Just because you may not hear any reply it does not mean to say he cannot.

The 430MHz Band

G0DAZ worked EI4VCH (IO53) on Aug 5 as did G1KDF for whom Co. Mayo was an all-time new one on the band. On July 31 Bob got EI9ED (Meath) and on Aug 16 EI4EY (Limerick).

The deadlines for the next three issues are: October 28, November 27 and December 30.

The Aug 12/13 tropo extravaganza brought the first Italian QSO for G3NAQ, I2FHW (EE) on c.w. Geoff also contacted F1GPL (BF), FC1JRX (CF), FC1DV and F1EIT/P (BG), FC1AIW (AH), FC1FKS and HB9SNR (DG) and F1EA (DI) all on s.s.b.

G4RGK found only poor activity in this period and Dave worked a few of the above but could not raise I2FHW. However G4XEN did and John also worked IW2BNA (EF) for a new country and two new squares. G6AJE was QRV for the low power contest on Aug 9 but found the conditions very poor but did work GD0FRE/P and hopes for a QSL.

For G6DER, EI4VCH (VN) on Aug 5 and OK1KKH/P (HJ) on the 30th were new squares. G6HKM worked EI5FK (Cork) on Aug 1 and G3ZME/P (CNL). In the 12/13 tropo Ela made a few French QSOs including F6GYH (CI) her 100th square. She was on in the QRP contest but only made 28 QSOs in six hours which says it all. On Aug 31 she found OE3XUA (HH), HB9MIN/P (DH) and LA1YCA (DS).

G8LHT now has 50W on the band from a 2C39A p.a. In the end-of-August tropo Ian had 11 QSOs including OZ1JPT (GO), F6CTW (BI), F1EHN (BI), HB9MIN/P, LA1YCA and DK0NA (FK). Most readers remarked on the very selective nature of the tropo openings.

G4NBS worked GD0FRE/P in the QRP contest. Later in the month Tony worked GB4GD and GB4XN, also GW3JXN/A (XM). On Aug 24 he found good activity with GB4XN, G6OOX (WKS), G4VOZ, G4KUX (DHM), G6DER and G8GXP (YSW). G3BSN mentions G1NRM (LDN) and G1YOU (DVN) as new on the band.

The Microwave Bands

On 1296MHz G1KDF now has a 35W solid state p.a. of USA manufacture and on Aug 5 he worked EI4VCH/P in Co. Mayo for a new square and county. The night of Aug 12/13 G4RGK had his 1296MHz station in operation but no complete QSOs resulted, only a partial one with F6GPL (BF).

G4NBS operated in the 1.3/2.3GHz contest on Aug 23 but Tony only had 26 QSOs on 1296MHz including GW4MGR/P, GW6CMS/P, GW4FRE/P (GWT), GW3JXN/A, GI4OPH and PA0WWM. The next day he worked G6DER and G8GXP.

G6AJE also came on for the contest making eight QSOs. Mike used an LMW transverter with HXTR3645 pre-amp and a Down East Microwave amplifier using NE1320 devices giving 10W p.e.p. His antenna is a 27-ele quad loop. Best DX was G0ALE/P at 199km in diabolical conditions.

G6DER has worked nothing new on 1296MHz but on 2320MHz Keith lists GB4GD (XO) on Aug 10 and G3AQS (YK) on the 30th as new. Although worked on 1296, OK0NA (FK) faded away on 2320MHz during a call to G6DER lasting three minutes.

On 1296MHz G6HKM worked GB4GD on Aug 10 and on the 16th Ela came on for a French contest working into AG, BF and ZH squares. Best DX to date is FD1GYA/P at 692km. On the 30th F6DZK (AI) was another new square. G8LHT has made three contacts on 1296MHz with 1.5W of a.m. during the contest.

Apologies to those readers whose contributions I have not had space to mention but whose figures are in the tables. Sorry, no squares table either due to pressure on space; if September proves to be a quieter month it will re-appear in December.

John Barber G4SKA reports hearing 8R1RPN (Guyana) calling the States on 14MHz. It seems the station got more than it bargained for as a "megawatt" pile-up followed! John has also supplied his usual very comprehensive RTTY log based on his operation in the SARTG contest. Included in this report was TR8DX (Gabon) worked on 3.5MHz, 7.0MHz and 21MHz which is pretty good going, well done John. Other interesting stations worked were, on 14MHz: HK5DUM (Colombia), HL1EJ (Korea), TI2ZW (Costa Rica), YV5KTX (Venezuela), 9Y4DG (Trinidad), VK7AE (Australia) and on 21MHz: HC5K (Ecuador) and 5N0GAA (Nigeria). Altogether a very good selection of RTTY stations which hopefully should give John a good placing in the contest.

On the home front this month, I have had to change-over to a BBC computer after my trusty VIC-20 finally passed away. The new computer has meant some extra work setting-up interfaces and software, etc, to get me back on the air. Fortunately I have some BBC compatible equipment to review so the initial setting-up was not too painful, it does mean that the reviews will be particularly significant as I will be parting with my hard earned cash at the end!

RTTY observations this month have been quite interesting with a number of useful openings. Towards the end of the month there has been a good path to Central and South America, with 559 to 589 RTTY signals heard from Brazil and Argentina on 21.0MHz at around 1600 to 1700UTC. The band is quiet except for these signals so there are very few QRM problems. The beginning of September also saw some late afternoon openings to India, I managed to log VU2NR at 1523UTC on 2 September. For those of you interested in RTTY mailboxes ZS6CDJ (South Africa) has been regularly received in the late afternoon.

Did anyone copy the DXpedition to Fernando de Noronha (ZY0F) that I mentioned last month? So far I have heard nothing, any news would be very welcome.

AMTOR activity seems to have remained fairly stable with the bulk of the stations on either 3.5MHz or 14MHz. The mailboxes in particular are used very extensively and the excellent G3PLX mailbox is always well used.

There appear to be yet more countries active on Packet this month. I have heard that OX3CO (Greenland) and YB5NDG (Indonesia) are both active on 14MHz so keep a sharp lookout for these stations. If you hear anything interesting on Packet or would like to make a comment then please write.

Still no UK activity on h.f. FAX, but the German stations are regularly operational on 14MHz on a Sunday morning. It's worth a listen despite the Packet interference.

RTTY Standards?

Have you noticed a build-up of apparently un-resolvable RTTY signals on 14MHz? It would seem that the spread of multi-mode terminal units has encouraged some amateurs to move away from simple 45.45 baud RTTY and experiment with some of the other modes and speeds. I first noticed the problem when I worked a RTTY mailbox which, after log-on, requested the user to try operation at 75 baud if available. The speed change proved to be quite effective in most cases and obviously speeded up the transfer of data, hence freeing the mailbox for other amateurs. Since that time I have logged many stations using RTTY at 50, 75 and 110 baud with varying degrees of success. If you have a terminal unit capable of working at these higher speeds and you have good signal strengths in both directions then it may well be worth experimenting, after all that is what amateur radio is all about.

As well as using higher baud rates some amateurs are also using ASCII instead of ITA No2 (International Telegraph Alphabet) or Baudot. The generally accepted standard baud rate for ASCII is 110 baud and most amateurs seem to be conforming to this.

If you try using these different baud rates and modes you will soon notice that given the same signal quality the error rate will be higher than with 45.45 baud RTTY. This is because for any given burst of interference the higher the speed, the more characters will be lost. In addition, when using ASCII the error rate will be higher still. This is due to the fact that ASCII requires seven information bits as opposed to the five bits used in the ITA No2 or Baudot. Don't let all this put you off as amateur radio is all about self education which means experimenting. Before you rush out and start calling CQ at 75 baud RTTY spare a thought for your prospective contact. The permutations for resolving a signal are getting extremely large, the baud rate can be anything between about 45 and 300 baud, the signal may be inverted and the code could be ITA No2 or ASCII. If the receiving amateur has to manually select the speed and mode, etc. then you will probably have given up and gone to bed before he or she finds the correct combination! If you want to try these other modes then I would suggest that you call CQ in the normal way using 45.45 baud RTTY, but include a request for operation at the proposed rate in your CQ call. That way you should only attract amateurs with multi-mode terminal units and once contact has been established you can freely experiment with all the modes, using standard RTTY as a fall-back mode in case of confusion. I would be very pleased to hear your results and general comments on the use of non-standard data modes.

Prefix (Country)	Frequency (MHz) 3·5	7	10	14	21	28
A,K,W (USA)		R		PR	R	
CE (Chile)				R		
CT (Portugal)		R		R	R	R
DA,F,J,K,L, (W. Germany)	R			AR	R	
EA,C (Spain)		R		APR	R	R
F (France)				R	R	
G (England)	AR	AR		AR		
GI (N. Ireland)				R		
GM (Scotland)	A			R		
HA (Hungary)	R	R		PR	R	
HB (Switzerland)	R	R	A	R	R	
HC (Ecuador)				R	R	
HK (Colombia)				R		
HL (Korea)				R		
I (Italy)		R		PR	R	R
JA,G (Japan)				R		
LA (Norway)	R	R		PR	R	
LU (Argentina)				R	R	
LZ (Bulgaria)	R	R		R	R	
OD (Lebanon)				R		
OE (Austria)				A		
OH (Finland)		R		APR	R	
OK (Czechoslovakia)	R	R		R	R	R
ON (Belgium)				PR		
OY (Faroe Is.)				R		
OZ (Denmark)	R			R	R	R
PA (Netherlands)	R			R		
PP,Y (Brazil)				R	R	
SG,K,L,M, (Sweden)	R	R		R	R	
SO,P (Poland)	R			R	R	
SV (Greece)				PR		
SV5 (Rhodes)				R		
TI (Costa Rica)				R		
TR8 (Gabon)	R	R		R	R	
UA,V (USSR)	R			R		
UO5 (Moldavia)				R		
UT (Ukraine)				R		
VE (Canada)				PR		
VK (Australia)				R		
VU (India)				R		
Y (East Germany)	R	R		R	R	R
YB (Indonesia)				P		
YO (Romania)	R				R	
YU (Yugoslavia)				R	R	R
YV (Venezuela)				R		
ZS (South Africa)				R	R	
4X (Israel)				R		
5N0 (Nigeria)					R	
9H (Malta)	R	R			R	
9Y4 (Trinidad)				R		

Amstrad PCW RTTY

As promised last month here is the review of the RTTY program by **Dave G4EVS.** The program is supplied on a standard Amstrad disk and operates under CP/M+ on the PCW 8256 or 8512 computer.

As the program uses CP/M this must be loaded in the normal way before the program can run. The supplied disk contained three files comprising the main program, an example message file and the program documentation. As all Amstrad PCWs have a printer it is a fairly safe bet that the user can print his own manual.

Before the program can be used the computer needs to be interfaced with a suitable terminal unit. The first requirement is an Amstrad compatible serial interface, there are several sources of serial interface but the important point is that it must be exactly hardware compatible with the Amstrad unit. Beware of any serial interface that is supplied with software to drive it, it probably won't work on this system. Once you have the interface the connections can be made to the terminal unit. One further point here is that the serial interface uses RS-232 levels and the voltages range from +12 volts to −12 volts so be sure that your terminal unit can handle this. The actual connections are for transmit/receive data and transmit/receive switching. One important point is that during the loading of CP/M the transmit/receive switching line is in the transmit state, so this line should be made switchable.

When the program has been loaded the screen will show the main menu which has nine options available. The system utilises the real time clock facility of CP/M+ so using option F this can be set first. As with most communication programs there are default values for all the parameters, in this case they are 45.45 baud RTTY with 1.5 stop bits. The baud rate can be changed from the main menu and the rate can be set to any one of the following: 45.45, 50, 75, 90.9, 110, 134.5, 150, 181.8, 200, 250, 300, 600, 1200, 1800, 2400, 3600, 4800 or 9600. The number of stop bits is also adjustable to 1, 1.5 or 2 bits. As well as standard RTTY using ITA No2 the program can also use ASCII which is a mode that is coming back into favour. The RTTY baud rate range can also be used for ASCII transmission. When working in

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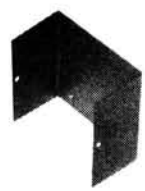

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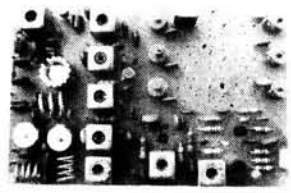

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ASCII an option from the main menu allows a complete ASCII file to be transmitted which can prove useful for sending computer programs or messages over the air. Whilst in receive it is sometimes useful to be able to save received text on disk. This facility is enabled in the form of a capture file which can be turned on and off during reception. The file is opened and named by using an option on the main menu, when data is to be sent to the file you type (, and to stop the process a) is typed. The state of the capture file is shown on the bottom line of the screen which is used as a general status line. When transmitting it is very useful to have a method of automatically sending standard messages and in this program up to eight messages can be stored in a message file. The messages are recalled by typing # followed by the message number. Although only eight messages can be stored in a message file there is no limit to the number of message files, so you could have one file for v.h.f. another for h.f., etc. To change between message files you have to return to the main menu and load the new file.

I found the program very easy to operate and the menu options were well chosen. The most serious problem from the operational point of view was the lack of a type ahead buffer whilst in transmit mode. An additional problem, at least with my set-up, was quite severe QRM from the computer which seems to be coupled via the interface lead. One solution worth thinking about is the use of an opto-isolator in the RS-232 lead.

The program is available from BARTG Components Manager, John Beedie, GW6MOK, Ffynnonlas, Salem, Llandeilo, Wales, SA19 7NP. Tel: 0558 822286. When telephoning try anytime up to 2130, no later please. The price to members is £15 including postage and packing. Membership details can be had from the same address.

That's all for this month, now summer holidays are over perhaps I can get some serious data work done!

Amateur Satellites

Reports to Pat Gowen G3IOR
17 Heath Crescent, Hellesdon, Norwich, Norfolk NR6 6XD

"RS" Satellites

Whilst RS-5 and 7 have continued to be noticeable by their absence (whilst awaiting a command system), the new USSR RS-10 and 11 transponder system has been well used in the past month, with new stations coming onto the satellite daily. Many new countries never heard before are active, thanks to the sensitivity, strong downlink, and new h.f. capability capture of the system. Mode "KA" has been the main activity mode this past period, with some half of the participants uplinking on two metres, the other half on fifteen metres. Star QSO of the month for your author was a QSO with UZ0QWB in Yakutsk, deep in Zone 19.

For those without computers or trackers, we have this month reproduced as Fig. 1, a look-up table for the new satellite. This is based on central England, but will not stray too much when used in most of the UK. The first column gives the EQX, equator crossing of the satellite, which time and degrees west of the Greenwich meridian may be worked out by adding the period to our reference orbits. We then add on the minutes shown in the second column. "AOS(m)" which gives the AOS, or acquisition of the satellite, whilst our third column "AOS(b)" gives the bearing in degrees where it first appears. Our next column gives the time of closest approach in minutes after EQX, and the following the bearing where this occurs. Our column headed "LOS(m)" gives the minutes elapsed from EQX when we lose the satellite to sub-horizon, whilst "LOS(b)" gives the bearing where this happens. Our notes describe the satellite movement, and the best DX possible.

To calculate an example, we can take our figures for R10 from Fig. 2, our set of reference equator crossings for all satellites, as being at 0140UTC at 72 degrees west on Sunday, 11 October. Referring now to Fig. 1, at the nearest, 70 degrees EQX, we get acquisition of signal twenty minutes later, 0200, at a beam heading of 320 degrees. Time of closest approach is EQX 0140 plus (from the TCA(+m) (column) 23 minutes, e.g. 0203, with the satellite now at 340 degrees bearing. We lose the satellite at EQX 0140 plus the 26 minutes add-on given in the LOS(+m) column giving us LOS at 0206 at 360 degrees, due north.

If we wish to take the following orbit, we have to add the 104.9 minutes given under the "Next Orbit + mins" from Fig. 2 to be given reference equator crossing of 0140UTC, and also add the "+inc" of 26.3 to the "Brg.W" to give 0303.3 minutes at 98.3 degrees west, and then go back to Fig. 1 again to work out where and when it will arive.

Under the "Next Day" we get the add-ons for Monday, 12 October, so the equator reference crossing becomes 0140 + 29.5 minutes, e.g. 0209.5UTC at 72 + 9 degrees, e.g. 81 degrees west. The procedure seems complex to explain, but is easy in practice, and will give you an assessment of all passes of RS-10/11 with reasonable accuracy without the cost of additional trackers and computer means, enough to follow the satellite and to start using it.

RS-10/11 Pass times 'Look-up' Chart for the United Kingdom

Fig. 1

EQX	AOS(+m)	AOS(b)	TCA(+m)	TCA(b)	LOS(+m)	LOS(b)	NOTES
0	6	175	16	80	24	15	S to N o/h)
10	7	195	15	270	25	10	. .. .)
20	8	210	16	290	25	10	
30	9	230	17	300	25	10	
40	11	250	18	310	26	10	
50	14	270	20	320	26	10	W/VE AOS)
60	17	300	22	340	26	5	....)
70	20	320	23	340	26	360	
80	24	345	26	360	28	10	Polar DX)
90	26	355	28	10	31	350	VE8/UA0)
100	26	355	31	300	34	50	... ...)
110	26	355	33	45	38	80	UA DX
120	27	355	34	50	40	100	Near East
130	27	355	36	70	42	120	Africa)
140	27	350	36	70	44	140	at LOS)
150	28	350	36	60	45	155	.. ...)
160	28	350	37	270	46	170	N to S o/h
170	28	345	37	270	46	190	
180	29	340	37	280	45	210	E.Af at LOS
190	30	340	37	285	44	230	
200	31	330	36	295	42	255	W/VE1,2,3
210	34	315	36	300	37	290	W8,9,0
ORBITS EMANATING FROM EQX BETWEEN 212 AND 313 DEGREES ARE NOT NORMALLY ACCESSABLE FROM THE UNITED KINGDOM							
320	12	100	16	70	21	30	UA9/0 DX)
330	10	120	16	75	22	30	at LOS)
340	8	140	15	90	23	20	Africa at)
350	7	160	16	90	24	15	AOS)
360	6	175	16	80	24	15	

ALLSATS EQX ON 11/10/87

SAT	UTC EQX	Brg W	Next +min	Orbit +inc	Next Day +min+deg
F12	0122	9	115.7	29.2	64.3 20
R85	0018	178	119.4	30	113.4 30
R87	0004	183	119.1	29.9	108.7 29
Mir	0120	119	91.1	23.1	19.1 11
Sal	0059	336	94	23.8	64.6 22
R81	0141	289	120.3	30.2	3.9 3
U01	0117	94	94.1	23.5	65.9 16
U02	0013	35	98.4	24.6	37.2 9
N09	0138	153	102	25.5	90.2 23
N10	0108	83	101.2	25.3	78.4 20
M13	0125	51	104	26.1	16.6 6
M14	0123	25	104	26.1	16.9 6
M/1	0044	79	109.3	27.4	90.8 25
R10	0140	72	104.9	26.3	29.5 9
ERS	0109	123	89.5	22.6	82.7 25
M15	0110	108	105.6	26.5	38.4 11
Aji	0134	13	115.7	29.2	64.3 20

ALLSATS EQX ON 25/10/87

SAT	UTC EQX	Brg W	Next +min	Orbit +inc	Next Day +min+deg
F12	0045	58	115.7	29.2	64.3 20
R85	0103	211	119.4	30	113.4 30
R87	0147	230	119.1	29.9	108.7 29
Mir	0101	200	91.1	23.1	19.1 11
Sal	0010	46	94	23.8	64.6 22
R81	0045	297	120.3	30.2	3.9 3
U01	0113	92	94.1	23.6	65.9 16
U02	0054	45	98.4	24.6	37.2 9
N09	0047	140	102	25.5	90.2 23
N10	0104	82	101.2	25.3	78.4 20
M13	0017	59	104	26.1	16.6 6
M14	0019	33	104	26.1	16.9 6
M/1	0014	96	109.3	27.4	90.8 25
R10	0144	97	104.9	26.3	29.5 9
ERS	0110	175	89.5	22.6	82.7 25
M15	0132	138	105.6	26.5	38.4 11
Aji	0058	60	115.7	29.2	64.3 20

Fig. 2

Satellite "Pioneer"

A novel special transceiver called the "Pioneer" has been developed in the USSR specially for amateur-radio satellite use, a photograph of which appears as Fig. 3. It is a 27V d.c. powered lightweight assembly measuring 60 x 360 x 300mm, and covers the needs for all of our currently active satellites. It transmits from 21.00 to 21.300MHz, between 145.800 to 146MHz, and also from 435.030 to 435.174MHz. It receives from 29.300 to 29.500MHz, from 145.800 to 146.000MHz, and from 435.350 to 436.160MHz, using l.s.b., u.s.b. and c.w.

Fuji-OSCAR-12

A use schedule has now been finally resolved for FO-12, and as a result use is improving again, with many more stations active than the previous month. The present schedule has days of "off" and "on", the "on" days fluctuating between Mode "JA" analogue and Mode "JD" digital (store and forward packet radio) communications. Unfortunately, due to the power budget limitations, and the constant need to re-assess, the planned operations cannot currently be given for more than one month ahead, too late for the deadline of this column. We can only suggest that you follow the information on the various AMSAT nets for topical schedules.

Fig. 3

UoS & UoSAT

As stated earlier, the UoSAT-OSCAR-9 21MHz beacon is back again in good form, with still no explanation as to why it was missing for so long. It is now transmitting its telemetry at 20 w.p.m. instead of the original lethargic 10 w.p.m. Experiments are underway now with the 100mW beacon that transmits at 12 baud on 2401.5MHz, with a close eye being kept on the spacecraft's power budget. If any station would like special transmissions from this beacon, please do not hesitate to ask the University of Surrey. SHF beacon reception reports would be welcome, as would all reports on the reception of all or any of the UoSAT experiments and signals.

UoSAT-OSCAR-11 has been taking part in particle wave experiments over the Atlantic Ocean, in the hope that a rational explanation can be found for the late evening 50MHz openings that have been taking place to the USA recently. If electron precipitation can be found in this zone, a new theory counteracting the highly unlikely "multi-hop Sporadic-E" mode often postulated will evolve.

Two radiation detector outputs on the "WOD" are being transmitted weekly for the interest of those experimenters who are investigating relationships between h.f. propagation and radiation levels within the F2 layer. The UoS would like to hear from any who have results or conclusions from this study.

Some interesting pictures of earth have been produced from the c.c.d. camera, but it has been difficult to match them up with actual earth land masses. Some problems in the multiplexers of both OSCAR-9 and 10, thought to be due to thermal problems, have caused a failure to switch, and a plain carrier tone only has been transmitted. UoS are working on this, and should have the answer by the time you read this report.

It has been found during gravity gradient experiments that a spin reversal has resulted in improved stability, hence signals should present less QSB problems from now on, as the optimum earth pointing attitude should be maintained.

The Keplerian element file now maintained in the title frames of the DCE is now doubled to 60 seconds per run, as this gives a greater opportunity of capture for those needing this information.

A new 61 page UoSAT spacecraft data booklet giving a detailed description of both UoSAT-1 (OSCAR-9) and UoSAT-2 (OSCAR-11) is now available from the University of Surrey for £3.50 which includes post and packing. Cash or Sterling cheques ONLY should be sent to UoSAT Mission Control Centre, University of Surrey, Guildford, Surrey, UK.

AMSAT Phase III-c

The chances of an ARIANE-IV launch of our next Phase III satellite aboard the V-22 mission in the first quarter of 1988 are looking quite good at this time, with a possibility of it being as early as January according to the European Space Agency. To permit potential users to prepare for this exciting satellite, here follows a listing of all the transponding frequencies and beacons currently planned. "OSCAR-14", as it will probably be termed, will have a more sensitive receiver, a stronger downlink, more access time, and hopefully have an IHU that will last a lot longer than OSCAR-10, which should return to active service in early December following the eclipses.

Phase-III-c Frequencies

The new satellite transponders will have capabilities of Mode "B" (435MHz uplink, 145MHz downlink, with two inputs from the 145MHz band); Mode "JL" (10GHz + 145MHz up, 435MHz down; Mode "S" (435MHz up, 2.4GHz down) and the "RUDAK" (1296MHz up, 435MHz down). The Mode "B" General Beacon will be present on 145.8125MHz, the Engineering Beacon on 145.975MHz. The Mode "JL" General Beacon is on 435.650MHz, the Engineering Beacon on 435.675MHz, and the Mode "S" beacon on 2400.640MHz.

Mode "B"

Uplink (MHz)	Downlink (MHz)	Notes
	145.975	Engineering beacon
435.425	145.975	Upper passband limit
435.435	145.965	
435.445	145.955	
435.455	145.945	
435.465	145.935	
435.475	145.925	
435.485	145.915	
435.495	145.905	
435.505	145.895	Passband centre
435.515	145.885	
435.525	145.875	
435.535	145.865	
435.545	145.855	
435.555	145.845	
435.565	145.835	
435.575	145.9825	Lower passband limit
	145.8135	General beacon

Mode "S"

Uplink (MHz)	Downlink (MHz)	Notes
	2400.640	Beacon
435.610	2400.695	Lower passband limit
435.615	2400.700	
435.620	2400.705	
435.625	2400.710	Passband centre
435.630	2400.715	
435.635	2400.720	
435.640	2400.725	Upper passband limit

RUDAK

(MHz)	(MHz)	
1269.675	435.675	Single channel

Note that the currently planned frequencies supplied are at zero Doppler shift displacement correction.

Wanted—Doppler Trackers

AMSAT are planning an activity using the new Phase III-c satellite next year based on the COSPAS/SARSAT system that AMSAT helped to produce. It involves a competition to find the location of a hidden transmitter by its satellite trans-

Mode "JL"

"L" Uplink	"J1" Uplink	"J2" Uplink	Downlink	Notes
1269.325			435.975	"L" upper limit
1269.330	145.820	144.440	435.970	"J" sub-band limit
1269.340	145.830	144.450	435.960	
1269.350	145.840	144.460	435.950	"J" s/b centre
1269.360	145.850	144.470	435.940	
1269.370	145.860	144.480	435.930	"J" s/b low limit
1269.380			435.920	
1269.390			435.910	
1269.400			435.900	
1269.410			435.890	
1269.420			435.880	
1269.430			435.870	
1269.440			435.860	
1269.450			435.850	"L" p/b centre
1269.460			435.840	
1269.470			435.830	
1269.480			435.820	
1269.490			435.810	
1269.500			435.800	
1269.510			435.790	
1269.520			435.780	
1269.530			435.770	
1269.540			435.760	
1269.550			435.750	
1269.560			435.740	
1269.570			435.730	
1269.575			435.725	"L" p/b lower
			435.675	Eng. beacon
			435.650	Gen. beacon

ponded signal using conventional amateur equipment and standard Doppler techniques. In the meanwhile, to set up the system and to explore interest, Joe Bijou WB5CCJ, would like to start up some experiments in order to determine just how well individuals in the amateur-radio fraternity can cope. If you are keen, or would like further information, write to Joe at WB5CCJ QTHR, call him on the air, or 'phone him on 010-1-713-661-8727.

Shuttle Launches

Plans have now been made for future shuttle launches, with missions hopefully intended as follows:

2 June 1988—Tracking Data and Relay Satellite Launch (TDRS) from *Discovery*.
8 September 1988—Undisclosed Military Satellite launch from *Atlantis*.
November 10 or 1 December 1988—Military satellite via *Columbia*.
2 February 1989—Further TDRS from *Discovery*.
25 April 1989—Magellan Venus Mapper Mission.
1 June 1989—Hubble Radio Telescope (at last—see earlier issues this column).

NASA continue to find problems with the shuttle booster rockets, and further delays to this announced programme are considered highly likely. There is still no news of any future intended "ham in space" activity.

USSR Launches

The Soviet Union launched the largest ever civilian earth resources survey platform at 0855UTC on July 25 from the Baikonur Cosmodrome at Tyuratam into an initial 280 x 168km orbit, later circularised to give a 235km perigee 246km apogee orbit. It has a mass of some 20 metric tonnes, is as big as a bus, and should be a very visible object indeed before dawn and after dusk in clear skies.

As yet, the transmitting frequencies remain undiscovered. Those with scanning receivers might well wish to investigate by monitoring during passes, the Keplerian elements for which are as follows:

Epoch Year:	87
Epoch Day:	214.85702392
Inclination:	71.9329 degrees
RAAN:	99.1022 degrees.
Eccentricity:	0.00114670
Argument of Perigee:	260.9267 degrees
Mean Anomaly:	99.0415 degrees
Mean Motion:	16.08648753 revs. per day
Drag:	0.00061798 rev. per day^2
Rev./Orbit No:	137
Semi-Major Axis:	6628.6 km
Period:	89.52 minutes
Apogee:	258.09 km
Perigee:	242.89 km

This orbit is extremely close to earth, close to that where less heavy satellites start to burn up, but the large mass of the new orbiter overcomes the frictional drag, maintaining the spacecraft in orbit by momentum.

"MIR" has been changed again, so here is the latest set for this manned orbiter, hopefully to be maintained by the time it reaches you in print.

The deadlines for the next three issues are: October 28, November 27 and December 30.

Epoch Year:	87
Epoch Day:	229.81729194
Inclination:	51.6299 degrees
RAAN:	200.3305 degrees.
Eccentricity:	0.0038162
Argument of Perigee:	31.2131 degrees
Mean Anomaly:	329.1326 degrees
Mean Motion:	15.78991210 revs. per day
Decay Rate:	1.1534 E-04 rev. per day^2
Rev./Orbit No:	8576

Most of these massive launches (such as "MIR" and "SALYUT") from the USSR have been accomplished by the 44.3 metre high (sans payload) "PROTON" rocket. A new launch vehicle aptly called *Energia* has now been brought into service that is really enormous, and it is re-useable. It is said to be able to carry a payload of 230 metric tonnes into orbit by the use of a system not dissimilar to the USA Shuttle, less wings, but, instead of a pair of solid fuel boosters, it wisely carries four liquid fuel attached motors that burn kerosene and liquid oxygen. Is it possible that the outer attachments on the main four externals are also additional boosters on the boosters themselves? This new vehicle will virtually halve the cost of launches in the future, and makes the new commercial USSR Glavkosmos launch agency a very attractive proposition, which AMSAT national organisations are now closely studying for future amateur radio satellite possibilities.

RS-10/11 TLM Decoder

Vince Bobin G1FBH, has produced a telemetry decoder program for the Spectrum, for which one just selects the letter prefix alternative, then types in the number sent, to give a read out of all the status and values. From this one can instantly discover the mode, voltages, powers, sensitivities, temperatures, etc., with minimal effort. It is well explained, and very simple to utilise. A print-out of the program from telemetry sent at 1350UTC on 29 August appears in Fig. 4. Enquiries should go to Vince at 13 Homelands Place, Kingsbridge, South Devon TQ7 1UQ, or by telephoning 0548-2543 between 1100 and 1600 local time.

Equator Crossings

The latest available Keplerian elements have been incorporated into our extended GM4IHJ "eqxer" program printed in Fig. 2 to give the updated equator crossings for all satellites. Responding to reader requests, we have added the new COSMOS 1870 Soviet Earth Resources satellite as "ERS", the new METEOR as "M15", and the scintillating "Ajasai" passive laser reflector that follows FO-12 as "Aji". The new Keplerian set will follow next month.

30 years on . . .

This month sees the 30th anniversary of the launch and successful orbiting of the world's first artificial satellite, SPUTNIK-1. Radio-amateurs, including your scribe, were the first to hear, see and track the spacecraft and give valuable data on the brand-new scientific achievement. Fig. 5 shows the QSL sent in acknowledgement of the reports, results and recordings of the 20MHz signal characteristics sent in by the many enthusiasts around the world linking space with our mutual hobby. Since then, the USSR alone have put up some 2000 launches, and a new "space spectacular" could well come about on the anniversary.

```
*********************************
*R510....29/8/1987....1350 UTC.*
*********************************

1A  TELE DATA SOURCE PERIOD      10m
2A  UPLINK RX -20dB ATTN         OUT
3A  UPLINK RX -10dB ATTN         OUT
**  TOTAL RX UPLINK ATTN.      -00dB
4A  15 metre UPLINK              ON
5A  2 metre RECEIVER             ON
6A  SPECIAL COMMAND STA CHN      OFF
7A  OUTPUT PWR OF 10m BEACON      1w
8A  O/P. PWR. 2 metre BEACON      1w
9A  STATUS 1st MEMORY BOARD      ON
10A STATUS 2nd MEMORY BOARD      OFF
11A SPEC CHN MEMORY LOAD         OPEN
12A CODE STORE MEM. STATUS       OPEN
13A O/P. INFO FROM MEMORY.        2m
14A ATTENUATOR 15m ROBOT RX      0dB
15A ATTENUATOR 2m ROBOT RX       0dB
16A SPEC CMD CHN 2m O/P PWR       1w

1N  PWR SUPPLY VOLTS             20.2
2N  PWR 2m TX in WATTS      (N)   00
3N  PWR 10m TX in WATTS           1.9
4N  15m RX VOLTS                   0
5N  2m RX VOLTS                    0
6N  SPEC CHN RX IF VOLTS    (N)   00
7N  CMD STA INDICATOR       (N)  000
8N  CMD STA INDICATOR       (N)  000
9N  10m TX TEMP DEGREES C         36
10N 2m TX TEMP DEGREES C          15
11N 20v PSU TEMP DEGREES C        23
12N 9v PSU TEMP DEGREES C         23
13N RS11 RX VOLTS           (N)   00
14N 15m ROBOT RX VOLTS             0
15N 2m ROBOT RX IF VOLTS           0
16N ROBOT OSO INDICATOR     (N)   00
```

Fig. 4

Fig. 5

Space in Space

Since this launch of SPUTNIK-1 on 4 October 1957, until current, the thirty years of growing international space activity has given rise to a known 2869 launches and 3594 separate payloads placed into space. NASA and NORAD report that by the first quarter of this year 1677 different spacecraft were in orbit around our planet, plus 4999 bits of debris from launches and decayed satellites. Although we are now only too familiar with the disastrous consequences of first stage explosions, third stage failures are far more common, and contribute large amounts of orbiting fragmentation all of which have to be tracked, and where possible avoided. Some of the explosions are induced deliberately, and some are due to the mishaps of accidental detonation, pressure excesses, propellant firing, and the like. Add to these spent rocket bodies, nose cones, fairings, lens covers, etc., with their likely dense mass and high speed impact possibilities, and you have a self producing danger, as any impact can produce even more pieces of debris, this making more collisions likely.

"The sun is an interesting star to observe . . . don't take it for granted, keep observing," wrote **Jim Knight** in the August issue of *CANOPUS,* the monthly newsletter of the Transvaal Centre of the Astronomical Society of South Africa. The group plan to hold another astronomical weekend at Buffelspoort from October 16 to 18, and their committee have invited the Johannesburg branch of the South African Radio League to share it with them. The general aim is for astronomers and radio amateurs to learn more about each other's work and interests. Lectures on both subjects and an operating weather satellite station are on the agenda, so we wish them all good luck for a super event.

Patrick Moore (Selsey) observed individual sunspots and/or groups, almost daily, between July 26 and August 22. The groups, seen in Figs. 1 and 2 were drawn by Patrick at 0915 on the 8th and 0750 on the 18th. A sunspot graph, prepared from the observations made by members of the Transvaal Centre, shows a sharp rise on July 20, a peak on the 24th and a gradual decline to about half the earlier climb by the 31st.

"The monthly mean sunspot number for July was 33, with 10 days on zero, but from the 22nd to 26th it was over 100. However, by the end of the month it was down to 74," wrote **Neil Clarke G0CAS** (Ferrybridge). He also reported that the solar flux units started July in the low 70s, and rose sharply on the 16th to 82. Upward to 91, 93 and 106 for the period 19 to 22, they peaked at 112 on the 23rd and then gradually fell back to 89 by the 31st.

Ted Waring (Bristol) counted 29 sunspots on July 23, 16 on the 28th, 23 on August 7, 15 on the 15th and 14 on the 20th.

From his home in Edinburgh, **Ron Livesey** observed 4 sunspot groups on July 25 and 27 then 2 each on the 29th and 31st. Ron is the auroral co-ordinator for the British Astronomical Association. He said: "Although sunspot activity is rising, auroral and magnetic activity remains low". Ron received reports from John Bordell (New York) and Alastair McBeath (Morpeth) who sighted aurora around 0200 on the 29th and Michael Boschat (Halifax, Nova Scotia) reported a glow and fragmentary auroral arc at intervals between 0152 and 0300 on the 28th. The magnetometer used by Karl Lewis (Saltash) was unsettled for periods on days 25, 30 and 31, very unsettled after 1700 on the 24th and showing storm conditions after 1145 on the 28th and up to 0900 on the 29th.

Len Fennelow G4ODH (Wisbech) heard auroral tones on the signals from the 50 and 144MHz beacons at Potters Bar (GB3NHQ) and Wrotham (GB3VHF) on July 19.

The July issue of *Solar News,* contains a detailed sunspot report for April, May and June, prepared by Bruce Hardie from information supplied by six of their regular observers. It also has a Computing and Printing Sunspot Data program, written in Mallard BASIC, for the Amstrad PCW8256/8512. Annual subscription is £7, and details are available by sending an s.a.e. to the Editor, **Bert Chapman,** 'Brindles', Mill Lane, Hooe, Battle, East Sussex, TN33 9HT.

Your deadlines for the next three issues are: October 28, November 27 and December 28.

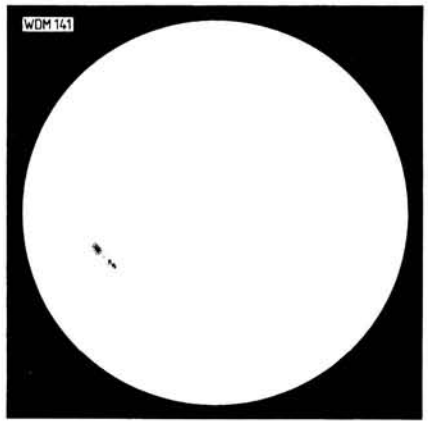


Fig. 1

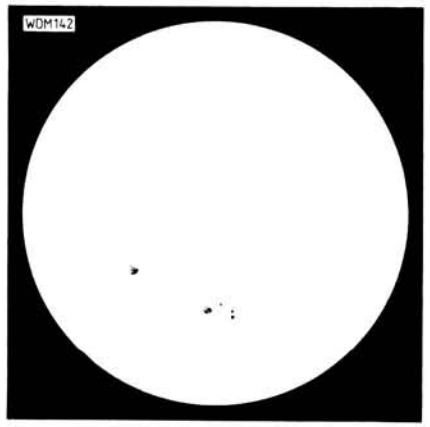


Fig. 2

Fig. 3

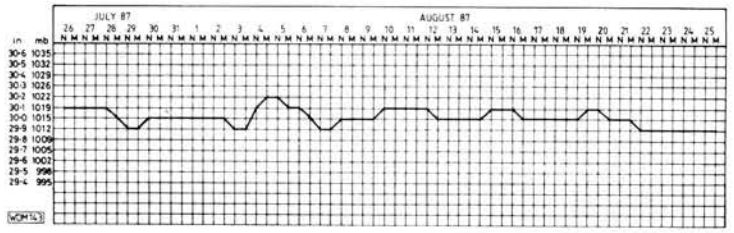


Fig. 4

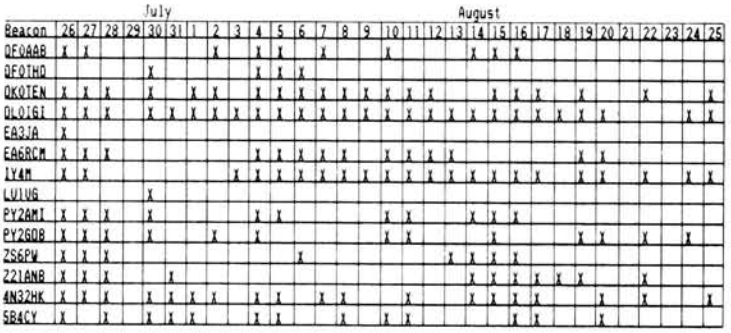
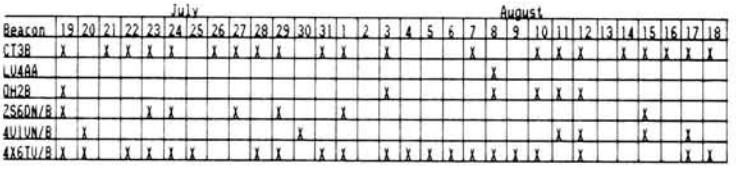


Fig. 5



Sporadic-E

During an intense Sporadic-E disturbance at 1915 on July 26, I counted over 50 very strong f.m. signals from E. European broadcast stations between 66 and 73MHz. I also logged about 12 such stations during similar conditions at 1452 on August 1, at 1855 on the 7th and at 0831 on the 17th.

The 28MHz Band

"I did a lot more listening than talking during the past month," wrote **John Levesley G0HJL** (Bransgore) on August 18. On 19 days between July 17 and August 16 he received signals, on 28MHz, from stations in CT1, DL, EA, EA6, EA8, EA9, F, GI, GM, HA, HB9, I, LA, OE, OK, OY, OZ, PA, SP, SV2, UA, UB, UW, YU, Y22, ZS and 4X4. He also heard signals from Brazil on August 1, Paraguay on the 15th and Ecuador on the 16th.

Fred Pallant (Storrington) had a RS59+ QSO with an SM at 1720 on August 15 and heard several GMs around 1700 on the 16th.

Propagation Beacons

First, my thanks to **Chris van den Berg** (The Hague), Len Fennelow, **Don Hodgkinson G0EZL** (Hanworth), **Norman Hyde G2AIH** (Epsom Downs), **Bill Kelly** (Belfast), **Greg Lovelock G3III** (Shipston-on-Stour), **Ted Owen** (Maldon), Fred Pallant and Ted Waring, for their regular 28MHz beacon logs, used in Fig. 4.

"EA6RCM and 4N3ZHK seem to have settled down as regulars," remarked Ted Owen. "ZL2MHF is alive and well," said

Don Hodgkinson, he spent the latter half of August in New Zealand using a visitor's callsign, ZL0AFW.

Norman Hyde logged early morning signals from the 50MHz beacons in Portugal (CT0WW), Scotland (GB3RMK) and Wales (GB3SIX), via meteor scatter, almost daily between July 26 and August 19. He also heard CT0WW during a Sporadic-E opening on August 2. Len Fennelow copied S9+ signals from this beacon on July 26 and August 4 and S5 from the 144MHz beacon at Angus (GB3ANG) on July 22 and 23 and August 1, 10 and 17. It was S9 on the 8th. "The 14MHz beacons have not shown up very well this month, only the Canaries and Israeli units have been consistent. The S. African ZS6DN appeared quite well toward the end of July, but only once after," said Len Fennelow. His reception of these signals is indicated by the hatched squares in Fig. 5.

Tropospheric

The variations in atmospheric pressure, at noon and midnight, measured at my QTH from July 26 to August 25 are seen in Fig. 3. Ted Owen's barometer in Essex peaked at 1025mb on August 5 and his lowest was 1012mb on the 2nd and 7th. From Bedford, **John Raleigh** reported the high on the 5th and recorded lows of around 1010mb on July 29 and August 7.

Bill Kelly heard stations working through the 144MHz repeaters at Appleby (GB3EV), Berwick-upon-Tweed (GB3BT) and Sligo (EI3SC) all on R4, and Blackhill (GB3CS) on R6 around 0650 on July 23.

934MHz

"Ralph Rowlet GR-587 (Upper Caldecote) had an hour long QSO with UK-892 in Kent and Dora Mills TL-02 (Kempston) worked a station in Chessington at 0645 on August 11," wrote John Raleigh DW-04. John is the secretary of The Four County 32cm Club. At 2100 on the 12th, he made contact with JC-21 in Birmingham and TG-15 in Swindon. At 0745 on the 16th, Ralph Rowlet worked into Brighton.

While the pressure was falling on the 16th, John heard signals from stations in Kent, Nottinghamshire and Yorkshire. He reports that, "Local copy was difficult, because of DX stations on the same channels."

Conditions were right on July 25 and 30 and August 3, 11, 12 and 13th, as well as the 15th to 19th for John Levesley UK-627, using a Cybernet Delta One transceiver and Yagi antenna. He worked stations in Devon, Guernsey, Jersey, Sussex and Wales with distances reaching 200km. Among the specials was a QSO with NG-01/MM on board the m.v. *Ocean Sapphire*, 6km west of St. Catherine's Point at 2115 on July 25.

Broadcast Round-up

Peter Shore

The world of international broadcasting is becoming slightly more competitive, and this means that programmes from Radio Moscow could soon be heard on other stations! Radio Moscow World Service carried an advertisement for its transcription service heard by me on the morning on July 28. Programmes are offered to stations free of charge, so I wonder where we will be first to hear them . . . and will it rival the transcription service of the BBC.

The level of jamming seems to have stabilised of late, although Zambia is planning to construct a short wave transmitting station to counter "hostile South African propaganda", according to Radio Station Peace and Progress from the USSR. Any jamming from this source is likely to be restricted to the region itself, but is likely to be directed against clandestines such as the Voice of Resistance of the Black Cockerel from Angola.

International radio of sorts, will come to the Isle of Man in October. The New Zealand religious broadcaster Radio Rhema will broadcast from 2200 each night on Manx Radio on the island (89MHz f.m. and 1368kHz) in collaboration with the United Christian Broadcasters.

Swiss Radio International continues to search for a suitable site for new transmitters, but public opinion seems to be set against the idea. The latest site suggested for the installation of equipment is in the Berne Canton, but local residents are set to oppose the plan. An interim solution is to use rented transmitters overseas, although this is somewhat expensive.

International Broadcasting News

NOTE: all times are UTC (GMT)

Danish Radio broadcast extracts in English and Danish of Peter Wright's book *Spycatcher* on August 14. The programmes was carried on the 245kHz outlet, and was clearly audible in the south east of England.

Radio Station Macedonia from Thessaloniki in Greece may be heard from 0600 on Sundays and 1000 on weekdays on 11.595 and 9.935MHz until close down of h.f. channels at 2215.

Radio Netherland's English language programmes for mid-October to mid-November include:

VIP Lounge—a new Monday feature running until November 9, with portraits of outstanding Dutch people from different professions and of different ages.

October 12—Andries van Agt, Minister of Justice of the Netherlands during 1977–82 a period which included the abortion controversy.

October 19—Monique van de Ven, screen and stage actress well known for the 1973 film *Turkish Delight*.

October 26—Harry Mulish, novelist, poet and playwright.

November 2—Cees Hamelink, professor of international communications at the University of Amsterdam.

November 9—Bernard Haitink, for many years the Principal Conductor of the renowned Amsterdam Concertgebouw Orchestra.

Meanwhile the Thursday communications magazine looks, on October 15, at "The Chinese Question" and what the European electronics industry is doing there, and why it has taken a different approach to the Japanese. On October 29, there is a "Medium Wave Special", commercial medium wave loops are becoming more popular. What effect has the recent all-night running of Australian medium wave stations had on listening in the Pacific? Whatever happened to stereo a.m?

Radio Netherlands in English:
0730–0825 on 9.715 and 9.630MHz
0830–0925 on 21.485 and 17.575MHz
1030–1125 on 9.650MHz
1130–1225 on 5.955 and 9.715MHz
1430–1525 on 5.955MHz
1630–1725 on 15.570MHz
1830–1925 on 6.020MHz
2030–2125 on 11.740, 9.895, 9.715 and 9.540MHz

Radio Portugal has English programmes on the air:
0030–0100 on 9.680MHz (Tues–Sat)
0300–0330 on 9.705MHz (Tues–Sat)
1600–1630 on 15.300MHz (Mon–Fri)
1900–1930 on 15.250 and 11.915MHz (Mon–Fri)
1930–2000 on 11.740 and 9.605MHz (Mon–Fri)

Radio Sweden International's English programmes to Europe are on the air:
0930–1000 on 9.630MHz
1100–1130 on 6.065 and 9.630MHz (6.065MHz Mon–Fri only)
1600–1630 on 1.179 and 6.065MHz
2100–2130 on 1.179 and 6.065MHz
2300–2330 on 1.179MHz

Radio Yugoslavia has English broadcasts at:
1430–1500 on 15.415, 15.240 and 7.240MHz
1730–1800 on 11.735, 7.240, 6.100 and 5.980MHz
1900–1930 on 9.620, 7.240, 6.100 and 5.980MHz
2115–2130 on 9.620, 7,240, 6.100 and 1.269MHz

On Thursdays, at 2200 there is a programme for seamen in Serbo-Croat taken from domestic programmes. The frequencies are 9.620, 7.240, 6.100 and 1.269MHz.

Radio Yugoslavia has recently commissioned a new high powered transmitter and should now be putting in good signals here in the UK. Doubtless the station will appreciate reception reports from listeners.

Middle East

Nicosia based Cyprus Broadcasting Corporation (CBC) has an evening programme in Greek to the UK on 9.635 and 7.205MHz between 2215 and 2245 on Friday, Saturday and Sunday.

Iran has a new English programme on 11.940MHz at 1345–1445, sandwiched between Pashto and Bengali, presumably all beamed to the Indian sub-continent.

Africa

Radio RAS now uses 11.980, 7.260 and 9.585MHz for the broadcast in English at 2100, whilst the German service at 1700 is carried on 15.240 and 11.810MHz.

Far East

Radio Korea, Seoul has English broadcasts audible in the UK at:
0700–0800 on 13.670 and 7.550MHz
0815–0830 on 13.670 and 9.570MHz
1000–1100 on 15.575MHz
1445–1500 on 9.870 and 7.275MHz
1500–1600 on 9.870MHz
1615–1630 on 9.870MHz
1700–1800 on 15.575MHz
1930–2030 on 15.575, 7.550 and 6.480MHz
1945–2000 on 9.870MHz

The Voice of Vietnam from Hanoi is on the air in English at:
1000–1030 on 15.010 and 9.840MHz
and on the same frequencies at 1300, 1600, 1800, 1900, 2030 and 2330.

That's all for this time around.

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BAKER	MID-RANGE	10in.	100	8	**£30**	£2
WEM	BASS UNIT	10in.	300	8	**£49**	£2
BAKER	DISCO/GROUP	12in.	75	4/8/16	**£24**	£2
BAKER	DISCO/GROUP	12in.	120	8/16	**£34**	£2
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WEM	BASS UNIT	12in.	300	8	**£65**	£2
H+H	DISCO/GROUP	15in.	100	4/8/16	**£54**	£4
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Hello, what's this then? The new Sony Shortwave radio.

Not exactly imposing, is it? What happened to all the knobs and dials... serried ranks of valves, throbbing into the night... dirty great drums of copper wire humming away like there's no tomorrow – it hasn't even got a cats whisker!

Oh, well... better have a look at the old instruction book. 'The Sony Computerised World Band Receiver.' There's never a computer in there!

How peculiar. Right, a quick whizz round the dial for a basin full of the old hum and whistle, just to set the mood.

"Good Evening, this is Radio New Zealand."

Get off the line you great Antipodean fool! I haven't had a good crackle yet.

"Sayonara, and welcome to Japan Today."

Oh, this is hopeless. I ask you. Where's the romance, the adventure? Switch on, tune in and bang, you've got the Kenyan Top 40, clear as a bell. Where's the fun there?

You can keep your phased loop lock, your crystal clear reception and easy tuning.

No, no, no, sorry Sony. Give me a room full of watts, a coat-hanger aerial and a set hot enough to cook your breakfast on. I don't know... oh dear, oh dear...

What else has it got... dual display panel, yes, yes, get on with it... oh, a 15 station memory. Wonder if it remembers where I left me mother-of-pearl cuff-links?

Now then. 'First switch on.' Oh, very droll I'm sure... time for a fag while it warms up... hello, it's going already...

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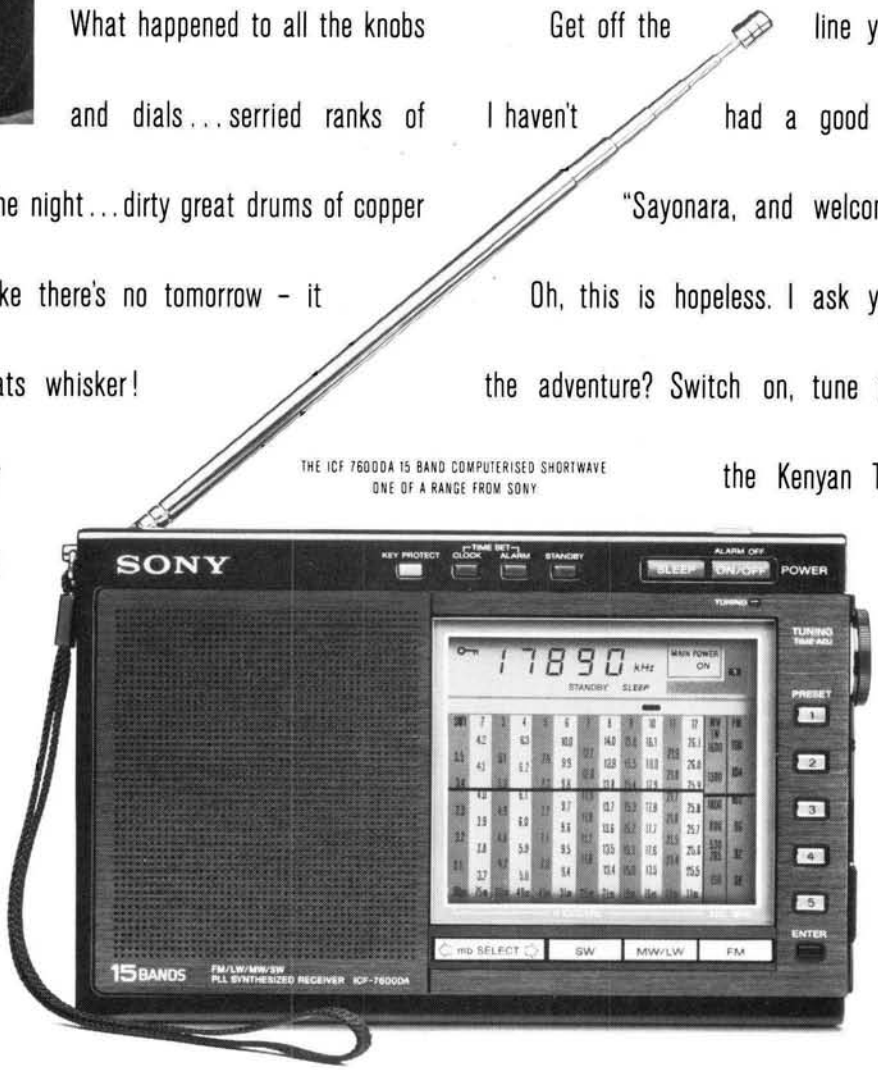

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