

February 1987

RADiO COMmunication

RSGB CLUBS
Where are you?

Journal of the Radio Society of Great Britain



Put Some Punch . . .

AL 84



AL 80 A



AL 1200



AL 1500



**NEW FROM
AMERITRON**

Behind Your Signal!

The advantages of linear amplifiers at H.F. are obvious and with today's crowded bands, **you really do need one!** But, at the end of the day, it's down to price . . . isn't it?

Amcomm have just been appointed Sole European Agent for some beautiful U.S. manufactured amplifiers — at prices you **CAN** afford!

Just look at these specifications and think about putting some real power behind **your** signal.

AL 84:

This superb, compact and economical amplifier from AMERITRON is an excellent low cost addition to any shack. It uses 4 x 6MJ6 tubes to develop a healthy 600W P.E.P. on SSB and 400W on C.W. The passive input network presents an **extremely low SWR** input for solid state exciters. A tank circuit using special tuning capacitors provides optimum network 'Q' for efficient power transfer and harmonic suppression.

AL 80 A:

The AL 84's big brother designed to pack that **extra 'punch'** — over 1 kw P.E.P! (850W C.W.) — utilises heavy duty tank circuit plus the economical 3-500Z in the final stage. The new Pi-L output circuit for 80 metres and 160 metres gives **full band coverage** and exceptionally smooth tuning. The AL 80 A provides a signal output within 1/2 an 'S' point of the most expensive amplifier on the market at a much lower cost (and weight — which is only 52lbs).

AL 1200:

This rugged 2.0 kw P.E.P. (1500W C.W.) amplifier is precision built, utilising some of the latest techniques in linear design. The final stage uses the renowned 3CX 1200 A7 'high-mu' ceramic metal triode in a Class AB 2 grounded grid configuration. The power supply comprises a commercial service rated 32lb hypersil transformer and heavy-duty rectifiers providing 'no-load' and 'full-load' voltages of 3600v and 3300v respectively. Silver plated tank components provide high efficiency operation especially over 20 metres. The Pi-L tank circuit also permits full impedance matching over the entirety of the 160m band.

AL 1500:

This 'Rolls Royce' of linears is designed for total reliability and highest efficiency, giving a very high 1500w '30 minute key-down' using 3CX 1500/8877 tubes in the final stage via a Pi-L output circuit. It also provides a maximum of 2.5kw on P.E.P.

Among the AL 1500's main features are:

- **Time delay starting** — protects tubes and components.
- **Over-current shut-off** — removes drive if mistuned.
- **Full rated airflow** — to maximise tube life.

On all the above models, power supply components are designed to provide optimum smooth operation at maximum working voltages and currents.

Model	AL 84	AL 80 A	AL 1200	AL 1500
Bands — Coverage	160M-10M	160M-10M	160M-10M	160M-10M
Input Typical	70W	85W	75W	65W
Max.	100W	100W	100W	100W
Output C.W.	400W	850W	1500W	2000W
P.E.P.	600W	1000W Plus	2000W	2500W
Max. Current at Full Output	4 AMPS @ 240V	8 AMPS @ 240V	13 AMPS @ 240V	15 AMPS @ 240V
Dimensions Depth Width Height	10"x11"x5"	15½"x14"x8"	17"x15"x9"	18½"x17"x10"
£ PRICE	£599	£899	£1599	P.O.A.

It's nice to see our American friends producing such quality linears using traditionally exacting U.S. standards.

Sole European Agents:

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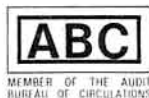
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All articles received are reviewed for technical merit by the RSGB Technical & Publications Committee, or an acknowledged expert on the subject, before acceptance. Payment at high competitive rates will be made for all articles published.

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from TRIO, a **new** handheld transceiver, the **TH205E**.

The TH205 is a new 2 metre FM handheld transceiver from TRIO. It is supplied complete with a helical aerial, PB2 nicad (8.4V, 500mAh) and charger. Slotting into the range between the TH21E and the TH215E, the rig is designed and built to the usual TRIO high standard. A rugged diecast metal case adds to the strength of the handheld. For greater flexibility the TH205E operates on DC voltages from 7.2 to 16 volts. An external power supply connection is included on the rig's top panel (use optional power cable PG2V or PG3C). Output power is dependent on voltage. Switched to its high power setting, the TH205E produces 2.5 watts at 8.4 volts. This increases to 5 watts when supply is 13.8 volts. On its low power setting the output is reduced to 500 milliwatts.

The TRIO TH205E combines the simplicity of the TH21E with the additional convenience of band scan, three memories and a liquid crystal frequency display. In addition to frequency the memory channels remember whether the selected channel is in simplex or repeater shift mode. Information is quickly entered into any of the three memories which in turn are selected by the push of a front panel button. Another push of the same memory button restores the previous frequency. QSYing

from a memory channel is also simple. Up and down buttons located alongside the digital display shift the frequency in 5 kHz steps. A single push of the button results in a 5 kHz step, continued press and frequency stepping is increased, both up and down buttons pressed together (the required direction button pressed first) and the shift is even more rapid. In band scan the same 5 kHz steps are used, the transceiver halting on an occupied frequency so that nothing is missed.

The TH205E has both an auto and operator set squelch, full repeater facilities including reverse repeater, a battery saver function whilst on receive and for operating in the dark, the frequency display can be illuminated. A comprehensive range of optional NICAD packs are also available. These are the PBI (12V, 800mAh), PB3 (7.2V, 800mAh) and the PB4 (7.2V, 1600mAh). Other optional accessories include a rapid charger (BC7T), a compact charger (BC8T), dry battery case (BT5), soft cases (SC12 and SC13), belt hook (BH4), swivel mount (BH5), mobile mount (MB4), DC cable (PG2V) and for mobile operation a DC filtered cigar lighter power cable (PG3C).

TH205E..... £218.00 inc VAT. carriage £7.00



from TRIO, a **new** short wave receiver, the **R5000**.



The R5000 is a new general coverage receiver. It offers the dedicated short wave listener and radio amateur a receiver that will match the performance of the best transceivers available today.

The R5000's frequency range is continuous from 100 kHz to 30 MHz and its modes of operation are USB, LSB, CW, AM, FM and FSK. An optional VHF converter (VC20) extends the frequency range to include 108 to 174 MHz.

The R5000 uses 2SK 125 junction-type FETs in the

high sensitivity direct balanced first mixer resulting in outstanding two signal characteristics and a substantially improved noise floor level.

Operating from either 12 V DC and 240 V AC the receiver can be used both in the home or whilst out in car, caravan or boat.

The receiver has two rates of tuning for each mode selected by a front panel switch. The frequency increments for SSB/CW/FSK are 10 Hz and 100 Hz, for AM 100 Hz and 1 kHz and for FM 2.5 kHz and 5 kHz.

Both low (50 ohms) and high (500 ohms) aerial

connections are provided on the rear panel of the R5000. The required aerial can be selected by means of a front panel switch. Information on which aerial to be used with a stored frequency can also be held in memory.

The R5000 has 100 memory channels which store frequency, mode and which of the two aerial connections has been selected. Information is easily transferred from one VFO to the other, from memory to VFO and in order to quickly access your favourite station, from VFO to any of the memories. Both memory scan and frequency scan (between frequencies in memories 8 and 9) are included in the receiver. Halt on an occupied channel whilst scanning can either be timed or until the signal drops. The entire one hundred memories can also be quickly scrolled to check the data held and to find the location of an empty channel.

To enhance reception, IF shift and a tunable notch filter are part of the R5000 receiver. Filter selection according to mode is automatic when the front panel selectivity switch is set to AUTO. This automatic selection can, of course, be overridden. Additionally the introduction of optional SSB and CW filters (YK88SN for SSB and either YK88C or YK88CN for CW) will improve the already excellent signal to noise ratio and selectivity. The optional YK88A-1 AM filter will improve the shape factor and enhance reception even further.

The R5000 general coverage receiver also has keyboard frequency entry, dual mode noise blanker, two 24 hour clocks with timer, option VSI voice synthesizer and CW tone mode indication for the blind operator, a large 100 mm diameter top mounted speaker, switchable AGC (fast or slow), RF attenuation (10, 20 or 30 dB steps) and a FLOCK switch which protects against frequency shift if the VFO knob is accidentally moved.

R5000..... £895.00 inc VAT. Carriage £7.00

All prices subject to confirmation

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 2817, 2430, 4057, 4995.



send £1 for complete mail order catalogue.

station accessories

TL922 HF amateur band linear amplifier

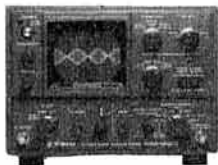
The TL922 is a class AB2 grounded grid linear amplifier using two high performance EIMAC 3-500Z tubes. It covers 160 to 10 metres for SSB, CW and RTTY modes of operation. Engineering perfection, those who have seen a TL922 will know what I mean. It is one of the few items of amateur radio equipment which is truly hand built by a specialist engineer.



TL922 inc tubes . . . **£1350.00** inc VAT, carriage £7.00.

SM220 station monitor

Based on a wide frequency range oscilloscope, the SM220 station monitor features in combination with a built-in two-tone generator, a wide variety of waveform observing capabilities. The SM220 aids efficient station operation as it monitors transmitted waveforms and it also serves as a sensitive wide frequency range oscilloscope for various adjustments and experiments. When fitted with the optional BS8 panoramic display and connected to one of the following transceivers (TS940, TS830, TS180, TS820 series) signal conditions in the vicinity of the receive frequency can be seen over a 40 or 200KHz range.



SM220 . . . £286.35 inc VAT, carriage £7.00

BS8 . . . £72.05 inc VAT, carriage £1.50

amateur band transceivers

TS830S HF amateur bands transceiver

Needing no description, the TRIO TS830S, which uses a pair of 6146B valves in the PA, is well known on the amateur bands (160 to 10 metres) for its superb signal quality. Modes of operation are USB, LSB and CW. Having variable bandwidth tuning, IF notch, IF shift and provision for various filters, its receive performance is excellent too.



TS830S . . . **£981.59** inc vat, carriage £7.00

TS530SP HF amateur bands transceiver

An HF amateur bands (160 to 10 metres) valve transceiver without frills but providing today's amateur with all the necessary facilities for reliable worldwide communications. Modes of operation are USB, LSB and CW.



TS530SP . . . **£849.82** inc vat, carriage £7.00

amateur band plus general coverage transceivers

TS940S HF transceiver with general coverage receiver.

Top of the range, the TS940S has every operating feature that the discerning HF operator needs. Amateur bands from 160 to 10 metres plus a general coverage receiver tuning from 150 kHz to 30 MHz. Modes of operation are USB, LSB, CS, AM, FSK, and FM. Forty memory channels, each effectively a separate VFO and easy keyboard frequency entry make operation and ownership of the TRIO TS940S a pleasure.



TS940S . . . **£1895.00** inc vat, carriage £7.00.

TS930S HF transceiver with general coverage receiver

Much has been said and written about the TS930S and it now has a place high in the affection of radio amateurs. Modes of operation are USB, LSB, CW, AM and FSK. Providing full coverage of the amateur bands from 160 to 10 metres and including a general coverage receiver tuning from 150 kHz to 30 MHz, the TRIO TS930S is the ideal rig for today's crowded bands.



TS930S . . . **£1595.00** inc vat, carriage £7.00

TS440S HF transceiver with general coverage receiver

A step forward in compact HF equipment, the TS440S covers the amateur bands from 160 to 10 metres and is also a general coverage receiver tuning from 100 kHz to 30 MHz. It has keyboard frequency entry, full and semi break-in on CW, one hundred memories and provision for fitting an internal ATU. Modes of operation are USB, LSB, AM, FM and AFSK.



TS440S . . . **£998.00** inc vat, carriage £7.00

TS430S HF transceiver with general coverage receiver

A compact HF transceiver suitable for mobile or portable operation, yet having all the facilities necessary for effective radio communication. The TS430S covers the amateur bands from 160 to 10 metres and is a general coverage receiver tuning from 100 kHz to 30 MHz. Modes of operation are USB, LSB, CW, AM with FM optional.



TS430S . . . **£867.6** inc vat, carriage £7.00

send for the
TRIO
general catalogue

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AR2002 interface.

AR2002

RC PACK



Now available for the AR2002 is an RS232 interface (RC PACK) which consists of an 8 bit CPU with its own ROM and RAM.

Designed to be connected directly to the AR2002 or with an additional adapter to the AR 2001, the RC PACK gives two methods of controlling the receiver.

Using the internal software and with your own computer acting as a dumb terminal, the RC PACK provides 50 memory channels, 10 search bands, selectable up/down steps and adjustable delay times etc. You can also assign station descriptions to each listed memory.

If you wish to write your own programs using the RC PACK as an interface then "the sky's the limit".

For those who own a BBC computer we have designed an additional control system which is available in ROM.

The RS232 settings of the interface are 8 bit, no parity, 1 stop bit and either 2400, 4800 or 9600 baud (internally switchable).

AR2002.....£487.30 inc VAT carriage £7.00

RC Pack.....£255.63 inc VAT carriage £7.00

ARPROM (BBC).....£10.00 inc VAT carriage £1.00

DAIWA meters.

CN410M...3.5 to 150 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors...£61.72 inc vat, carriage £1.50.

CN460M...140 to 450 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors...£65.40 inc vat, carriage £1.50.

NS448 with remote head...900 to 1300 MHz, forward 5/60 W, reflected 1.6/6.6 W, N type connections...£86.60 inc vat, carriage £2.50.

NS660P with switchable meter reading (average, normal PEP and hold PEP) and provision for optional remote head (U66V), 1.8 to 150 MHz, forward 15/150/1500 W, SO239 connectors...£115.00 inc vat, carriage £2.50.

U66V remote head, 140/525 MHz, max 300 W, N type connectors...£55.27 inc vat, carriage £1.50.

SC20 extension cable for U66V, approx 20 metres long...£29.21 inc VAT, carriage £1.50.

CN410M

NS660P



CN460M



data communications equipment.

CD600...RTTY, CW, ASCII, TOR, AMTOR decoder, output for UHF television, monitor and printer, can also be used as morse tutor...£215.14 inc vat, carriage £7.00.

CD670...A higher specification RTTY, CW, ASCII, TOR, AMTOR decoder complete with liquid crystal dot matrix display, variable RTTY shift, normal/reverse mode switch, outputs for TV, monitor and printer and can also be used as morse tutor...£286.73 inc vat, carriage £7.00.

CD660...Similar to the CD670 but without the built-in display...£264.97 inc vat, carriage £7.00.



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

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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, GW0CAB, the address, c/o South Wales Carpets, Clifton Street, Cardiff, 0222 464154.

In London.

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.

Although not a shop, there is on the South Coast a source of good advice and equipment, John, G3JYG. His address is Abbotsley, 14 Grovelands Road, Hailsham, East Sussex. An evening or weekend call will put you in touch with him. His telephone number is 0323 848077.

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.

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Why you must buy YAESU equipment from us!

Read the reviews, study the features/benefits and you'll soon be convinced (if you're not already) of the 'giant-leap' recently made by YAESU engineers, with their latest products.

But, why buy YAESU from us?
A good question — read on and we'll give you a good answer!

YAESU's total dedication and patience in harnessing of advanced technology have produced equipment of such brilliant, innovative design, using the highest quality professional engineering standards that one 'almost' hesitates to just call it 'amateur-radio'.

We have spent hours studying, discussing, and reading the manuals and talking with the YAESU people. We also operate the equipment regularly so we've gained first-hand experience of its performance and most important, its versatility.

It's our pleasure to pass that information on to you with our 'Hands-on' product 'teach-in'. We want you to derive the maximum benefit from the equipment. We've put it 'through its paces' and we'd like to sit down and answer **any** questions you may have about what these remarkable new radios are capable of. Take the FT 767 GX for example. We'll give you easy to understand 'how', 'what', 'when' and 'why' explanations of its 6 **unique features** (viz TX Shift, Tone Encoder, Twin VFO's with auto-tracking, RF Amplifier, HF/VHF/UHF coverage, and Auto SWR/Power Meter), and don't feel embarrassed because the RAE doesn't cover some of these breakthroughs!

If you wish we'll go through in detail, one by one, the no less than 71 buttons, switches, knobs, plugs or controls on the front panel and the 25 on the back!

The same 'Teach-in' service **applies to the entire YAESU range or for that matter all equipment in stock**, but while we're on the subject of YAESU — here are the other latest additions to the family:



FL 7000 — The Shape of Things to Come

A new concept in convenience, control and reliability

1.2kW P.E.P. HF Solid State QSK Linear

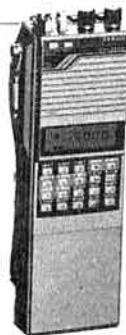
- Weight only 30kg (66lbs)
- Auto tuning and band changing
- 160m through 10m
- Integral P.S.U.

The Linear with everything



YAESU's super portable twins FT 290 & FT 690 Mk II

- 2 metres • 6 metres
- ... destined for even greater success — available now!
- 'New look' front panel
- Completely new rig with optional 25W p.a. for mobile use, and lots, lots more!
- Super new additions and changes to the world's biggest ever selling amateur transceiver.



FT 727 R Dual Band Handle . . . YAESU's experience and patience pays off — they succeeded where others failed

- 2m and 70cms FM Handle
- Hit 'hard-to-reach' repeaters with a punchy 5W plus a wealth of CMOS microprocessor controlled commands
- 20 keys/40 channels
- CAT system • Liquid Crystal meter

FULL IMPORTER WARRANTY ON ALL YAESU PRODUCTS.

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 Tel: 021-327 1497/6313. Telex: 334312

NEW FOR '87. NEW FOR '87.

NEW! IC-275E, 25 WATT 2 METRE MULTIMODE.



The ICOM IC-275E is the most advanced all-mode transceiver available to the Amateur today. It features a new technological breakthrough in frequency synthesizer systems. This Direct Digital Synthesizer (DDS) operates in just 5 milliseconds, providing one of the fastest transceiver lock-up times available. Ideal for PACKET and AMTOR communication modes. The IC-275E has high sensitivity and dynamic range making it an ideal unit for contests and DX operation.

99 programmable memories can store frequency, mode, offset frequency and direction. A total of four scanning functions for easy access to a wide range of frequencies, memory scan, programmed scan, selected mode memory scan, lock-out scan.

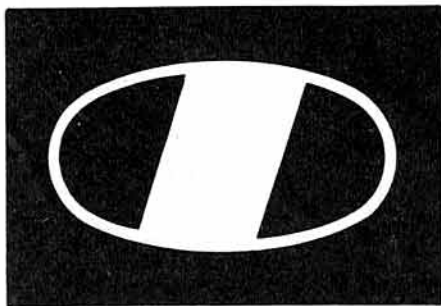
A new LCD uses a soft orange backlight for ease of operating even in bright daylight. The C1-V communications interface for computer control via a serial port is mounted on the rear panel. Pass Band Tuning and Notch Filter Systems have been incorporated to provide clear operating reception.

This transceiver has a built in A.C power supply, but can also be used on 13.8v D.C for mobile or portable operation. Optional accessories available are AG25 Masthead pre-amplifier, VT36 Voice Synthesizer, FL83 CW Narrow Filter and CR64 High Stability XTAL.

To fully appreciate all the facilities of this sophisticated transceiver contact your local ICOM dealer or Thanet Electronics for further information.



Thanet ICOM **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM**



ICOM

NEW! IC-MICRO-2, MINI-HANDPORTABLE.

This is the smallest handportable from ICOM. The Micro-2, 2 metre FM measures only 148 x 31mm with the BP22 nicad battery pack. The Micro-2 is a hand-size transceiver which will equally fit most pockets.

On the top panel a clear LCD readout gives frequency, memory channel number, signal and R.F power bargraph. A LCD backlight is provided for viewing under difficult conditions. ICOM's innovation has replaced thumbwheel tuning with up/down toggle switches to select 1MHz, 100KHz or 12.5KHz steps. Scanning is possible by depressing and hold the 12.5KHz switch. 10 memories are provided and are automatically programmed by retaining what is selected by the toggle switches. Full repeater and simplex operation facilities including repeater access tone. An automatic power saving function reduces battery power consumption when in receiver mode. Output power is 1.5 watts or 100 milliwatts (low) with the BP22 nicad pack. 2.5 watts is possible with the BP24 pack.

The ICOM Micro-2 is very advanced 2 metre miniature handheld and yet still provides a simple mode of operation. This handy transceiver is supplied complete with BP22 nicad pack, A.C wall charger, helical antenna.

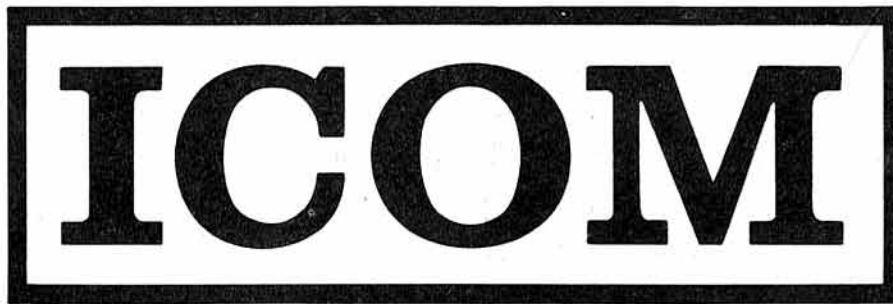
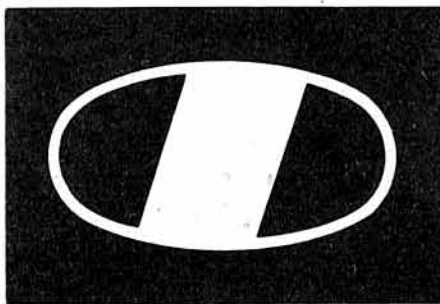
Optional accessories include the BC50 desk charger, rapidly charges the Micro-2 nicad packs in one hour, a variety of rechargeable nicad packs, dry cell battery pack, D.C regulator and soft cases. Contact Thanet Electronics or your local ICOM dealer for more details on this exciting new product.

Actual Size Photograph.

This shows the non-standard low capacity battery pack. N.B. Standard battery pack is normally the higher capacity BP22 as mentioned in text.



ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet



IC-751A, The New ICOM HF Flagship.



ICOM are proud to launch their new flagship. The IC-751 was good, the new IC-751A is even better, with a general coverage receiver from 100KHz-30MHz, it is a full featured all mode solid state transceiver that covers all the WARC bands. The IC-751A has an excellent 105dB dynamic range and features pass band tuning, a 9MHz notch filter, adjustable AGC, noise blanker, RIT and XIT. A receiver pre-amp provides additional sensitivity when required. On C.W. the electronic keyer is standard, QSK rated up to 40 w.p.m. The FL32A 9MHz/500Hz CW filter is fitted and CW sidetone on RX and TX modes. On SSB the new FL80 2.4KHz high shape factor filter is fitted.

A high reliability transmitter full 100% duty cycle designed for SSB, CW, AM, FM, RTTY and AMTOR, with a high performance compressor for better audio clarity. With 32 memory channels and twin VFO's scanning of frequency and memories is possible from the transceiver or the HM36 supplied.

The IC-751A is supplied for 12 volt operation but can be used with either an internal or external A.C. power supply. It is fully compatible with ICOM auto units such as the IC-2KL linear amplifier and the AT500/100 antenna tuners.

Options available: PS35 internal AC power supply, PS15 external power supply, EX310 voice synthesizer, EX309 microprocessor interface connector, SM8 and SM10 desk mics, SP3 and SP7 external speakers and GC5 world clock.

The SM10 desk top microphone consists of an electret condenser microphone element with a compressor amplifier plus tunable equaliser for maximum control of the audio characteristics of your transmitted signal. The SM10 is highly sensitive and produces clean crisp audio.

SM10 Desk mic.

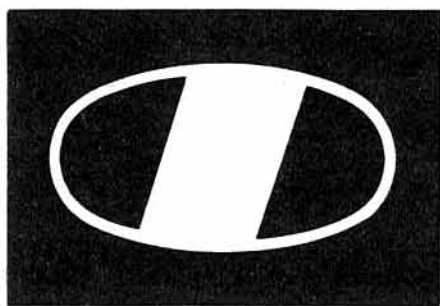


ICOM HF Filter selection guide:

Transceiver	Mode	Desired Filter Bandwidth	Optional 455KHz Filter Selection (1st Choice)	Optional 9MHz Filter Selection	Special Notes
IC-751A	CW	500Hz	FL-52A	FL-32*	Must remove FL-32 filter to install FL-63 or FL-33. Signal loss with FL-63 is 4dB less than FL-32. PBT control is not effective when FL-33 is selected.
	CW	250Hz	FL-53A	FL-63	
	AM	5.2KHz	-	FL-33	
IC-745	CW	500Hz	FL-52A	FL-45	Add FL-52A before adding FL-45. Add FL-53A before adding FL-54. High skirt selectivity SSB filter. Replaces standard ceramic filter.
	CW	250Hz	FL-53A	FL-54	
	SSB	2.4KHz	FL-44A	-	
IC-735	CW	500Hz	-	FL-32	Signal loss with FL-63 is 4dB less than FL-32.
	CW	250Hz	-	FL-63	

* FL-32 is factory installed in IC-751A.





ICOM

Total coverage.. 100kHz to 2GHz!



IC-R7000.

The R71E now has a team-mate – the IC-R7000.
With these matching receivers it is now possible to tune from 100kHz-2GHz.*

The IC-R7000 covers Aircraft, Marine, FM Broadcast, Amateur Radio, Television and weather satellite bands. The IC-R7000 incorporates FM wide/FM narrow, AM, USB and LSB modes of operation with six tuning speeds: 0.1, 1.0, 5, 10, 12.5, and 25KHz. *Frequency coverage 25-1000MHz and 1025-2000MHz (25-1000MHz and 1260-1300MHz guaranteed specification). With the IC-R7000 you have normal tuning capability with the front panel tuning knob or for quick tuning of a desired frequency by using the front panel key-pad. A total of 99 memory channels are available for storage of received frequencies and operating mode. Memory channels can be called up by pressing the memory switch then rotating the memory channel knob or by direct keyboard entry.

The IC-R71E is a general coverage receiver 100kHz-30MHz featuring direct keyboard frequency entry and infra-red remote controller (optional). SSB, AM, CW, RTTY and FM (optional) modes of operation. With 32 programmable memory channels, twin VFO's scanning systems, selectable AGC, noise blanker, pass band tuning and a deep notch filter. Keyboard frequencies can be selected by pushing the digit keys in sequence of frequency. The frequency is altered without changing the main tuning control. Options include: EX257 FM unit, RC11 infra-red controller, CK70 D.C. adaptor for 12 volt operation, CW filter options and a high stability crystal filter, SP3 and SP7 external loudspeakers, EX310 voice synthesizer, HP1 headphones.

Computer Control These receivers can be connected to a computer terminal via a suitable interface.
 JT602 Serial Interface for IC-R7000.
 JT603 Parallel Interface for IC-R71E (IC-R7000).
 The ICOM IC-R71E requires the IC-EX309 interface connector.

These receivers are available separately but together would make a superb listening station for the shortwave listener or licensed amateur.

A sophisticated scanning system provides instant access to specific frequency ranges. By depressing the Auto M switch, the IC-R7000 automatically memorises frequencies that are in use whilst in the scan mode and can be recalled later. The scanning speed is adjustable and the scanning system includes memory selected frequency ranges or priority channels. All functions including memory channel readout are clearly shown on a dual-colour fluorescent display with dimmer switch. Other features include dial-lock, noise blanker, S-meter and attenuator.

Options include: RC12 infra red controller, EX310 voice synthesizer, SP3 and SP7 external loudspeakers, HP1 headphones and the ICOM AH-7000 super wideband discone antenna.



IC-R71E.

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 Dept. RC

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UHF MOBILE




YAESU FT 770RH 70cm 25w FM high visibility display	495.00
YAESU FT 790R 70cm all mode	399.00
YAESU FT 2700RH 70cm/2m 25w each band full duplex	399.00
ICOM IC 490E all mode 70cms 10w/1w	617.00
ICOM 3200E 2m/70cm 25w each band	556.00
ICOM IC 47E 25w FM very small 9 memories	495.00

HF EQUIPMENT



YAESU FT 767 1.8MHz-430MHz. All mode gen cov rcvr	POA
YAESU FT ONE gen cov tcvr	POA
YAESU FT 980 gen cov tcvr inc AM/FM	1750.00
YAESU FT 757GX gen cov tcvr inc AM/FM/Keyer	949.00
ICOM IC 751A gen cov tcvr inc AM/FM/Keyer	1465.00
ICOM IC 745 gen cov tcvr	925.00
ICOM 735 gen cov tcvr inc AM/FM	929.00

HF LINEAR AMPLIFIERS



YAESU FL 2100Z 160m to 10m	899.00
YAESU FL 7000 solid state integral PSU and ATU	1590.00
TOKYO HL 1K 1Kw amplifier	POA
TOKYO HL 1KGX new 1K linear	POA
TOKYO HL 2K new 2K linear	POA
TOKYO HL 3K 3Kw new linear	POA
ICOM IC 2KL/LPS	1646.00

HANDHELD TRANSCEIVERS



FT 727 VHF UHF Hand held	425.00
YAESU FT 203R with FBA 5 battery case	225.00
YAESU FT 203R with FNB 3 nicad 2.7w	255.00
YAESU FT 203R with FNB 4 nicad 3.7w out	259.00
YAESU FT 209R with FBA 5 battery case 1.8w	269.00
YAESU FT 209R with FNB 3 nicad 2.7w	299.00
YAESU FT 209R with FNB 4 nicad 3.7w	305.00
YAESU FT 209R with FBA 5 battery case	275.00
YAESU FT 209RH with FNB 3 nicad 3.7w	309.00
YAESU FT 209TH with FNB 3 nicad 3.7w	315.00
YAESU FT 209RH with FNB 4 nicad 5w	225.00
YAESU FT 209RH with FNB 3 nicad 3.7w	289.00
ICOM IC 2E synthesised 1.5w 2m	275.00
ICOM IC 02E keypad entry lcd display	289.00
ICOM IC 4E synthesised 1.5w 70cm	
ICOM IC 04E keypad entry lcd display 70cms	

FT 703R and FT 709R available same output spec as FT 203/209.

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RECEIVERS



YAESU FRG 8800 gen cov 150Khz-30Mhz large display, keyboard entry/free tuning	609.00
ICOM IC R71 100 Hz to 30Mhz passband tuning/notch filter, variable tuning rate	789.00
YAESU FRV 8800 converter module 118-179 for FRG 8800 range extension	100.00
AOR 2002 UHF/VHF 25Mhz-550Mhz and 800 Mhz-1300Mhz	465.00
STARBUY Scanning receiver all mode 100 mem. Now up to 950Mhz	499.00
ICOM R700 Scanning tcvr 25-2000 Mhz 99 memories	919.00
FDK ATC 720 airband rcvr handheld 720 channels all mode	189.00
FDK RX 40 141-180 Mhz handheld rcvr	159.00
JIL SX 400 UHF/VHF rcvr inc PSU	598.00

RTTY/CW

TONO 5000E CW RTTY ASCII and AMTOR c/w 5" high res monitor	POA
Range of 50 Mhz equipment both YAESU and ICOM in stock.	

VHF MOBILE TRANSCEIVERS



YAESU FT 290R mob/port 2m all mode c/w nicads, chgr. case. Mk II	POA
YAESU FT 290R as above with Mutek	POA
YAESU FT 270R 25w FM	379.00
YAESU FT 270RH 45w FM with fan	445.00
YAESU FT 2700RH 2m/70cms 25w each band full duplex	399.00
ICOM IC 290D 25w all mode	515.00
ICOM IC 27E 25w FM 9 mem	379.00
ICOM IC 27H 45w FM 9 mem	419.00
FDK M750XX 2m all mode 20w	449.00
FDK M725X 2m FM 25w	279.00

VHF BASE STATIONS



YAESU FT 266R/2M all 726 options available	949.00
ICOM 271E multi mode 25w 32 mem	799.00
ICOM IC 271E/H multi mode 100w	979.00

UHF BASE STATIONS

YAESU FT 726 70cms multimode — all 726 options	949.00
ICOM 471 E 25w multimode 70cms	889.00
ICOM 471 H high power multimode (75w) — 70cms	1099.00
ICOM 1271 E multimode 1240-1300 Mhz	1099.00

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VHF LINEAR AMPLIFIERS



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HL160V 2m 10w in 160w out	250.95
HL82V 2m 10w in nom 85w, typ 100w out	145.95
HL110V 2m 10w in 110w out	250.95
HL 30V 2m 5-3w in 35w out	86.25
HL 35 2m Gaasfet preamp	56.70
HL 30V 2m 5-3w in 30w out	89.25
HL 20U 70cms 5-3w in 20w out	126.00
HL 30U 70cms Gaasfet preamp 2w in 30w out	225.75
HL 60U 70cms Gaasfet preamp 1-15w in 60w out	418.95
HL120U 70cms Gaasfet preamp 12w in 100w out	105.00
HRA 2 2m mast preamp, Gaasfet	105.00
HRA 7 70cms mast preamp, Gaasfet	

BNOS

LPM 144-1-100 2m c/w preamp 1w for 100w out	197.50
LPM 144-10-100 2m c/w preamp 10w for 100w out	175.00
LPM 144-10-100 2m c/w preamp 3w for 100w out	197.50
LPM 144-3-100 2m c/w preamp 25w for 160w out	250.00
LPM 144-25-160 2m c/w preamp 3w for 180w out	290.00
LPM 144-3-180 2m c/w preamp 10w for 180w out	125.00
LPM 144-10-180 2m c/w preamp 10w for 180w out	125.00
LP 144-3-50 2m c/w preamp 3w for 50w out	230.00
LP 144-10-50 2m c/w preamp 10w for 50w out	235.00
LPM 432-1-50 70cm c/w preamp 1w for 50w out	195.00
LPM 432-3-50 70cm c/w preamp 3w for 50w out	329.00
LPM 432-10-50 70cm c/w preamp 10w for 100w out	
LPM 432-10-100 70cm c/w preamp 10w for 100w out	

MICROWAVE MODULES range also available, call for details or literature on above.

ANTENNA COUPLERS



AMCOMM 9000 coax, random wire, tuned feeders 100w	89.00
CAPCO SPC 300C 1Kw antenna coupler	188.37
CAPCO SPC 3000C 3Kw antenna coupler	279.42
CAPCO SPC 300M 1Kw module only	103.09
CAPCO SPC 3000M 3Kw module only	132.18
TOKYO HC 200 8 band 200w pep with SWR/power meter	115.00
TOKYO HC 400 9 band 350w pep with SWR/power meter	199.00
TOKYO HC 2000 9 band 2Kw pep	399.00
WELZ AC 38 3.5-30Mhz 200w	85.00
ICOM AT 100 100w auto antenna coupler	345.00
ICOM AT 500 500w auto antenna coupler	485.00
YAESU FC 757GX receiver antenna coupler	339.00
YAESU FRT 7700 receiver antenna tuner	59.00

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HEIL HC3 Mic element Yaesu/Trio	22.85
HEIL HC5 Mic element Icom SM5/6	25.40
HEIL HM5 Desk Mic (300Hz-3KHz) cardioid	65.00
HEIL MM5 handheld Mic with HC3	29.00
HEIL SS2 Speaker special comms spkr	59.00
HEIL BM10 lightweight headset/boom mic	65.00



POWER SUPPLIES

YAESU FP 757HD 20A	239.00
YAESU FP 757 GX 20A	169.00
YAESU FP 700 20A	195.00
BNOS 12/6amp	69.00
BNOS 12/12amp	115.00
BNOS 12/25amp	169.00
BNOS 12/40amp	340.00
BNOS professional range also available on request	POA
ICOM IC PS 35 switch mode	193.00
ICOM IC PS 15 20amp external	158.00
ICOM IC PS 55 20amp	185.00
ICOM IC2 KLPS to match IC2KL linear	429.00
ICOM IC PS 25 switch mode	112.00
SMC RS12 4amp 5 amp peak	14.95
DRAE 4 amp	40.50
DRAE 6 amp	63.00
DRAE 12 amp	86.50
DRAE 24 amp	125.00

HI-MOUND MORSE KEYS

HK 702 manual with marble base	42.50
HK 704 manual	28.50
HK 705 manual	22.50
HK 706 manual	23.00
HK 707 manual	22.25
HK 708 manual	21.50
HK 802 manual solid brass	99.00
HK 803 manual solid brass	99.00
MK 702 single lever paddle	29.95
MK 703 twin lever paddle squeeze heavy base	37.15
MK 704 twin lever without base	20.00
MK 705 twin paddle squeeze marble base	32.20
KENPRO KP 100 squeeze paddle/Cmos keyer	89.00
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TS440S	NEW Amateur band Transceiver	
	General coverage RX	998.00 (—)
	Heavy Duty PSU for TS440S	198.00 (5.00)
PS50	Auto ATU for TS440S	135.48 (3.00)
TS940S	9 Band TX General Cov RX	1895.00 (—)
TS930S	9 Band TX General Cov RX	1595.00 (—)
TS830S	160-10m Transceiver 9 Bands	981.59 (—)
AT230	All Band ATU/Power Meter	185.98 (2.00)
SP230	External Speaker Unit	56.03 (2.00)
TS530SP	160m-10m Transceiver	849.82 (—)
TS430S	160m-10m Transceiver	867.68 (—)
PS430	Matching Power Supply	151.48 (3.00)
SP430	Matching Speaker	39.50 (2.00)
MB430	Mobile Mounting Bracket	14.78 (1.50)
FM430	FM Board for TS430	45.00 (1.50)
MC50	Dual Impedance Desk Microphone	43.18 (2.00)
MC35S	First Microphone 50K ohm IMP	20.33 (1.50)
LF30A	HF Low Pass Filter 1KW	30.18 (2.00)
YK88A	6kHz AM filter for TS430S/440S	46.28 (2.00)
YK88C	500Hz CW filter for TS430S/440S/530	43.10 (1.00)
YK88CN	270Hz CW filter for TS430S/440S/530	51.11 (1.00)
YK88S	2.4kHz SSB filter for TS440S	44.34 (1.00)
YK88SN	1.8kHz SSB filter for TS430S/440S/530	43.71 (1.00)
MC65	Deluxe Desk Mic with Audio Compensator	95.45 (2.50)
MC42S	Up-Down Hand Mic 8-Pin 500ohm	19.70 (1.50)
MC40S	Up-Down Hand Mic 6-Pin 500 ohm	19.07 (1.50)
MC60A	Desk Mic with built-in Pre-amp	77.60 (2.50)
TM201A	2M 25W mobile	322.68 (—)
TH21E	2m Mini Handhelds	199.00 (—)
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HMC1	Headset with vox for TH21E/41E/2600/3600	30.80 (2.00)
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TS81E	70cm Base Stations	998.00 (—)
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ST2	Base Stand	72.05 (2.00)
SMC30	Speaker Mike	26.47 (1.00)
MS1	Mobile Stand	41.88 (2.00)
R2000	Synthesised 200kHz-30MHz Receiver	565.32 (—)
H55	Deluxe Headphones	32.02 (2.00)

NEW

R5000	Receiver 100kHz-30MHz plus 108-174MHz with optional VC20 VHF Converter	895.00 (—)
TR205E	2M Handheld Transceiver	218.00 (4.00)
TR751E	2M Multimode with DCL (mobile)	580.70 (3.00)
MU1	DCL option for TR751E	28.95 (1.00)

Linear Amps

B.N.O.S.		
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LPM 144-3-100	2m, 3W in, 100W out, preamp	197.50 (2.50)
LPM 144-10-100	2m, 10W in, 100W out, preamp	175.00 (2.50)
LPM 144-25-160	2m, 25W in, 160W out, preamp	255.00 (2.50)
LPM 144-3-180	2m, 3W in, 180W out, preamp	295.00 (2.50)
LP 144-3-50	2m 3W in, 50W out, preamp	125.00 (2.50)
LP 144-10-50	2m, 10W in, preamp	125.00 (2.50)
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00 (2.50)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	195.00 (2.50)
LPM 432-10-50	70cm, 10W in, 50W out, preamp	195.00 (2.50)
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00 (2.50)

Yaesu

MMB11	Mobile Bracket	37.50 (1.00)
NC11	Charger	10.50 (1.00)
CSC1A	Carrying Case	6.50 (1.00)
YNA15	2m Helical	7.50 (1.00)
YMA9	Speaker Mike FT290/790	22.00 (1.00)
FT209RH	NEW 2m H/Held/GW/FN84	309.00 (—)
FT209	70cm H/Held	319.00 (—)
MMB10	Mobile Bracket FT209/709	11.00 (1.00)
NC9C	Charger	10.35 (1.00)
PA3	Car Adaptor/Charger	20.50 (1.00)
FT268	2m Base Station	999.00 (—)
430/726	70cm Module for above	349.00 (2.50)
FRG8800	HF Receiver	639.00 (—)
FRV8800	Converter 118-175 for above	100.00 (1.50)
MH188	Hand 600 8-pin mic	20.00 (1.00)
MD188	Desk 600 8-pin mic	79.00 (1.00)
MF1A38	Boom mobile mic	25.00 (1.00)
YH77	Lightweight phones	19.50 (1.00)
YH55	Padded phones	19.55 (1.00)
YH1	L/weight Mobile H/set-Boom mic	19.00 (1.00)
YH2	L/weight Mobile H/set-Boom mic	19.00 (1.00)
SB1	PTT switch Box 208/708	21.00 (1.00)

Royal Blue

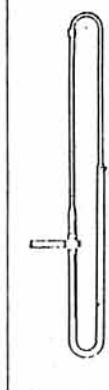


Photo Acoustics have pleasure in presenting the ROYAL BLUE—a Short Wave Listeners folded dipole antenna that covers 2-30MHz. Its neat and compact design (just 6' tall) makes it ideal for unobtrusive outdoor or indoor use. It will work quite happily on your roof or stood in the corner of your shack. It is a truly versatile antenna that will pull in the DX and which works exceptionally well with modern receivers such as the Yaesu FRG8800, Icom R71, Trio R2000 and so on.

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Yaesu (cont)

SB2	PTT switch Box 290/790	18.00 (1.00)
SB10	PTT switch Box 270/2700	21.00 (1.00)
NEW		
FT767GX	HF Gen Coverage trans with optional VHF/UHF/6M modules	1550.00 (—)
FL7000	Solid State linear with built-in auto ATU	1600.00 (—)
FT727R	Dual Band handheld transceiver 144-146MHz, 430-440MHz up to 5W on each band	425.00 (3.00)
FT290RMK II	2M Multimode portable/mobile/base	429.00 (3.00)
FT23R/FN810	2M mini-handheld with LCD display 5W	249.00 (2.00)
FT73R/FN810	70cm mini-handheld with LCD display 5W	269.00 (2.00)

Icom

IC751A	HF Transceiver	1465.00 (—)
IC735	New HF Transceiver	949.00 (—)
PS15	P.S. Unit	158.00 (4.00)
PS30	Systems p.s.u. 25A	343.85 (—)
SM6	Base microphone for 751/745	46.00 (1.00)
IC2990	2M 25W M-Mode	542.00 (—)
ICR71	General Coverage Receiver	825.00 (—)
IC02E	2M H/Held	299.00 (—)
IC04F	70cm handheld	299.00 (—)
IC34S	Base Charger	70.15 (1.00)
HM9	Speaker mic	21.85 (1.00)
RP3	Sid Battery Pack	29.90 (1.00)
RP5	High Power Battery Pack	60.95 (1.00)
CP1	Car Charging Lead	6.90 (1.00)
DC1	12V Adaptor	17.25 (1.00)
R7000	VHF/UHF Scanning Receiver	957.00 (—)
IC3200	2M/70cm Mobile Transceiver	556.00 (—)

SPECIAL OFFER

IC505	50MHz multimode 10W ONLY	349.00 (3.00)
NEW		
IC48E	10W 70cm FM Mobile	449.00 (3.00)
IC28E	24W FM mobile (Tiny)	359.00 (3.00)
IC28H	45W FM mobile (Tiny)	399.00 (3.00)
IC-Micro	2 mini hand portable LCD display 1W	259.00 (2.00)

Switches

Sigma	2 way S0239	17.50 (1.00)
Sigma	2 way n S415	22.95 (1.00)
Weiz CH20A	2 way S0239	30.75 (1.00)
Weiz CH20N	2 way n S415	54.00 (1.00)
Drae	3 way S0239	15.40 (1.00)
Drae	3 way n S415	19.90 (1.00)

Power Supplies

DRAE			BNO5		
4amp	40.50 (2.00)		6amp	69.00 (2.50)	
6amp	63.00 (2.50)		12amp	115.00 (3.00)	
12amp	86.50 (3.00)		25amp	169.00 (4.00)	
24amp	125.00 (4.00)		40amp	345.00 (4.00)	

Aerial Rotators

DAIWA MR750E	Heavy duty rotator. Can have up to 4 motors.	254.10 (4.00)
KR400	Med/H Duty	139.00 (3.50)
KR500	6 core Elevation	149.95 (3.00)
KR400RC	5 core Medium Duty	169.00 (3.50)
KR600RC	6 core Heavy Duty	219.00 (3.50)
KC038	Lower mast clamps	17.45 (2.00)
K5065	Rotary Bearing	26.00 (2.50)
AR1002	Lightweight VHF Rotator	52.95 (3.50)

CW/RTTY/Equipment

BENCHER			P&P
BY1	Squeeze Key, Black base	67.42	(2.00)
BY2	Squeeze Key, Chrome base	76.97	(2.00)
H-MORSE MORSE KEYS			
HK708	Straight Key	21.50	(2.50)
HK702	Deluxe version of above on Marble Base	42.50	(3.00)
HK706	Straight key	23.00	(2.50)
MK704	Straight key	22.25	(2.50)
MK705	Squeeze paddle	20.00	(2.50)
MK706	Squeeze paddle on Marble Base	32.20	(3.00)
NEW			
RTTY-EQUIPMENT			
PK-232	Packet, Amort. RTTY, CW, ASCII transceiver in one unit. Works with any computer equipped with an RS232 interface. 12V operated.	269.95	(3.50)
FAX-1	New HF Fax receiver. Obtain weather maps, press photographs and satellite cloud cover detail on any Epson FX-80 compatible printer. 12V operated.	269.95	(3.50)
AMT-2	Terminal Unit RTTY/AMTOR/ASCII/CW	245.00	(3.00)
AMT-2/CBM64	Software for the above for the Commodore 64	51.75	(2.50)
AMT-2/VIC20	Software for the above for the Commodore VIC 20	51.75	(2.50)
AMT-2/BBCB	Software for the above for the BBC B	44.85	(2.50)
KEYERS & ACCESSORIES			
Star Master Key	Electronic Keyer	54.70	(3.00)
NEW Star	Masterkey electronics CMOS Memory keyer	95.00	(3.00)
TRX3	Morse Oscillator	13.65	(1.50)
Datong	D70 Morse Tutor	56.50	(2.50)

Sony

Sony	ICF 2001D 150kHz-30MHz 76-108MHz 108-136MHz 32 memories AM/SSB/FM broadcast/Air-band	329.95	(3.00)
Sony	ICF6000 150kHz-30MHz 76-108MHz 10 memories AM/SSB/FM broadcast receiver	179.95	(3.00)
Sony	Air-1 108-136MHz, 144-174MHz 76-108MHz plus LW/MW/SW superb broadcast receiver	249.95	(3.00)

Aerials

JAYBEAM			
2 metre antennas			
LR1/2M	Omnidirectional vertical coil aerial	35.71	(4.00)
LW3/2M	5 element folded dipole yagi	17.31	(4.00)
LW3/2M	8 element folded dipole yagi	21.85	(4.00)
LW10/2M	10 element folded dipole yagi	38.23	(5.00)
LW16/2M	16 element folded dipole yagi	42.45	(7.50)
PBM14/2M	14 element Parabeam	68.08	(7.50)
SXV/2M	Crossed 5 element yagi	33.41	(7.50)
8XV/2M	Crossed 6 element yagi	43.01	(7.50)
10XV/2M	Crossed 10 element yagi	53.95	(11.00)
70cm antennas			
MBM28/70cm	28 element Multibeam yagi	25.70	(4.00)
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G5RV	Half size 51"	14.25	(2.00)
G5RV	2 metres	3.95	(3.00)
HB9CV	70cms	3.95	(2.00)
2 metre	Sim Jim	8.95	(3.00)
1-1 & 4-1	Baluns	12.95	(2.00)
3 & 7 & 11MHz	Traps (pair)	9.50	(2.00)
	Dipole	2.25	(0.50)
	Cooper wire	7.95	(2.00)
G-WHP	Tri-bander helical mobile HF antenna 10/15/20 metres	34.95	(3.00)

	Coils for above for 40/80/160M	8.40	(1.50)
	Telescopic whip for above coils	5.60	(1.50)
	Base mount single hole fixing with 5M of coax	8.25	(2.00)
	Flexiwhip 10M antenna mobile	25.25	(3.00)
	Coils for above for 15/20/40/80/160M	8.40	(1.50)
	Multiseal 36 10/15/20M mobile auto selecting antenna	38.00	(3.00)
	Coils for above for 40/80/160M	8.40	(1.50)
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	Extended for fixed use with above aerials, improves LF band performance	14.55	(2.00)
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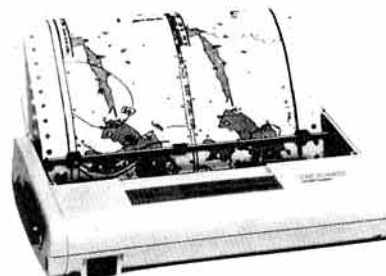
Hardware improvements also make the PK-87 stand above the rest. In addition to standard Data Carrier Detect, Push to talk, Status, and Connect indicators, the PK-87 has front panel LEDs for operation mode (Converse, Transparent, Command) and multiple connects. The PK-87 uses a Zilog 8530 SCC for hardware HDLC. The Modem disconnect of the PK-87 guarantees compatibility with high speed modems in the future.

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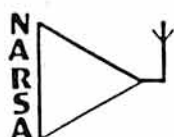
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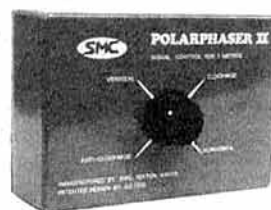
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RSGB CLUBS—WHERE ARE YOU?

No one would dispute the value of clubs—after all, they provide a service to amateur radio at a local level that could not be provided in any other way. Besides their more serious role, clubs provide a source of interest, companionship and sheer downright enjoyment.

The number of licensed amateurs and swls involved in club activity must be considerable. Most clubs appear to have between 10 and 100 members (some a lot more); say 50 on average. Even counting only those clubs which are affiliated to RSGB, nearly 700 in number, there could be some 30,000 people who belong to a club. This represents a high proportion of amateurs and listeners, and is an estimate consistent with a figure shown by one of our surveys a few years ago. This uncertainty about total club membership really begs many other questions such as: How often does a club meet and where? How many members actually attend its meetings? What is the cost of membership? Equally interesting is: What services are provided? For example: How many contests do club members participate in as a club activity? How many junk sales? One would like to know how many have an officer specially responsible for the newcomer? How many run RAE and morse classes or projects for beginners?

If the future well-being of amateur radio is to be assured, then special attention must be paid to the beginner, young and old, at this time. To help achieve this, those clubs with the right resources have a unique responsibility to work in a complementary way with the RSGB. It is making this essential RSGB/club relationship work to the best advantage of amateur radio which needs to be addressed by the Society this year. In fact, all of our "field operations" need to be reviewed to make them more effective and in tune with today's requirements. These not only include the educational aspects of club activity but also the dedicated volunteer effort available to help local members and the local community. Included in the list: emc, antenna planning, and the host of other jobs that can be best handled at local level. All this effort needs to be co-ordinated in a way which we may never have previously envisaged.

Returning specifically to clubs, there is a real need for a suitable questionnaire to provide information on what clubs do and don't do. It also raises a more basic question which Council should perhaps consider. Could not some grading system be devised which would give an indication of the activities and benefits of each club—this would be of special interest to potential new members. It seems to me that this could be one of the best things to happen to clubs for a long time. As to where clubs are today, that information is on this month's front cover.

David Evans, G3OUF

I don't agree but do you?

INTRODUCTION

Many members feel that there are areas in amateur radio in which non-popular opinion, especially non-official opinion, is not heard. This "controversy" column seeks to address such complaints by allowing a non-popular opinion to be aired in public, together with opposing views. Neither contributor has seen the other's article, and members are invited to write their opinions to the "honest broker", who will reflect members' opinions at a later date. This month, the subject is "SSB now on 10MHz", proposed by Les Moxon, G6XN, and opposed by Martin Atherton, G3ZAY, chairman of the HF Committee.

If you have a subject you'd like discussed, write to me at Three Oaks, Braydon, Swindon, Wilts SN5 0AD. Subjects should be amateur radio controversial, rather than RSGB controversial; and if you know someone with violently opposing views who would like to write, so much the better! If you feel that your dissenting view is not represented, now's your chance.

Peter Chadwick, G3RZP

This month's "honest broker": Ian White, G3SEK, 52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP.

10MHz SSB NOW—The case for

The case for ssb on 10MHz is based on three main considerations:

1. The need to establish a sufficient amateur presence on the band with minimum risk of interference to primary users.
2. Justification of this presence by using the band for worthwhile tasks not otherwise capable of fulfilment.
3. Acceptance of a challenge which could lead to important advances in frequency-sharing provided our hands are not tied by restrictions which kill incentive, prevent innovation, and stifle progress.

At present amateur activity is concentrated mainly in a few kilohertz at the low end of the band, which have been for the most part vacated by the primary users. Any attempt fully to occupy the remainder of the band other than by ssb would involve a serious threat to other occupants and be in breach of the undertaking given by the IARU at the last WARC. In the case of ssb, the risk is minimal because of the relatively low mean power (30W as measured with a linear amplifier and processor) and the fact that this is spread over a relatively wide band so that less than 1W falls within the 50Hz bandwidth of a typical commercial receiving channel which, in contrast, experiences the full impact of any cw or rty transmission within its passband. Being some 100 times greater than the ssb signal, this poses a much more obvious threat to commercial receiving terminals which are unable to respond to the usual amateur QRL? enquiry.

The present pattern of band occupancy would be consistent with the supposition that primary users have moved away from the low end to avoid amateur QRM, the absence of complaints indicating merely that this has not yet caused them undue difficulty. If this is so it is essential, and in any case it is desirable, that the bulk of cw operation should continue to be concentrated at the low end of the band. In the remainder of the band it is usually possible to find some two to four channels suitable for ssb use, and these would probably suffice to meet the band-occupancy requirements. To get matters into perspective it is essential to realize that spectrum occupancy depends only on *time-bandwidth product* and bears no relation whatsoever to bandwidth as such. Because of the higher information rate of speech, I find that after making due allowance for normal operating practices, four ssb channels have a capacity roughly equivalent to 16 morse channels, whereas the maximum number of simultaneous morse transmissions that I have so far observed on 10MHz is only about 12.

The contribution of amateurs to knowledge of chordal-hop propagation and its value in the commercial field has been fully acknowledged. The importance in this context of 10MHz and the necessity for ssb as an aid to further investigations have been explained in detail in a report circulated to interested parties but not as yet published. Needs in this regard are currently being met to a large extent by G/VK nets, one of which has been in daily operation for several years without complaint from primary users, and it would be somewhat ironic if, at the next WARC, the IARU has to fall back on this experience as the sole justification for extension, or even retention, of the 10MHz band. It is desirable for this activity to be extended to include other transequatorial and transpolar paths, but further concessions need to be governed by a strict set of priorities to ensure that the objectives set out above are not put at risk.

Access to the 10MHz band constitutes a major challenge, and it will be tragic if we fail to grasp the opportunities presented. In my case it has provided the main incentive for developing a new multiband technique whereby the frequency coverage of small beams has been extended downwards by half an octave, and by a trade-off with efficiency it should be possible to go even further in the direction of confining signals to the wanted direction only. Other areas to be investigated include filtering, rpe and improved operating procedures. It may be argued that much of this does not require the use of ssb or even 10MHz, but motivation is all-important and the higher information-rate of speech has been crucial for whatever successes I may have achieved in the experimental field.

L A Moxon, G6XN

10MHz SSB NOW—The case against

Use of the 10MHz band today must take into account not only the commitments made on our behalf by the International Amateur Radio Union (IARU) at ITU conferences in the past, but also the long-term need to strengthen our negotiators' credibility so that they can better protect and enlarge our existing allocations in the future.

At the 1979 WARC the present secondary 10MHz allocation was granted by a majority of one vote following strenuous lobbying by the IARU team. This result was only possible because the team was able to give credible assurances that amateurs worldwide would adopt a band plan that would minimize the possibility of interference to existing primary users. The plan that was proposed then, and has since been endorsed by all three IARU regions, was to restrict activity to narrowband modes only and discourage contests.

The logic of this approach has been challenged by a few individuals, but it remains an IARU recommendation. Each time it is ignored the future credibility of our negotiators at ITU conferences is damaged and their ability to protect our existing bands or win more spectrum is reduced.

It is assumed that amateurs operating on 10MHz will always avoid frequencies that they can hear are in use, so the argument on the relative interference potential of cw and ssb hinges on the problem of "inaudible links"; ie links where the receiving point is within range of an amateur station but the transmitting point is not. It has been alleged that ssb may be safer because its wider bandwidth gives it a lower power density in terms of watts/Hz, for the same total power, which may make it less likely to cause problems to these links when it overlays them.

The difficulties with this argument are as follows:

First, the broader bandwidth of phone signals increases the probability of overlaying any "inaudible links". The lower power density may have no impact on the majority of the links but a proportion will be disrupted and the net interference potential of cw and ssb may be similar. Exact calculations are almost impossible to perform without full details of the various links in the band.

Second, cw power density in W/Hz may often be similar to or even lower than ssb because the total cw power needed to maintain communication is less than the necessary ssb power.

Third, error correction codes on professional links may be better able to work through the gaps in a cw signal than through occasional pauses in speech.

Fourth, ssb signals may spread further than senders intend, particularly when drive and power levels are increased to work long-path dx.

The arguments in favour of ssb are thus by no means as clear as their protagonists claim.

A final practical consideration is that because of heavy use by the primary service there are only a handful of 3kHz gaps but plenty of 250Hz slots on the band. If phone were to be encouraged then the band would support about six simultaneous QSOs; hardly enough evidence of use to justify an expansion at the next WARC! There would also be a danger of people unsuccessfully trying to squeeze between primary links. With cw on the other hand, a large number of users can be safely supported and a good case built up for expansion.

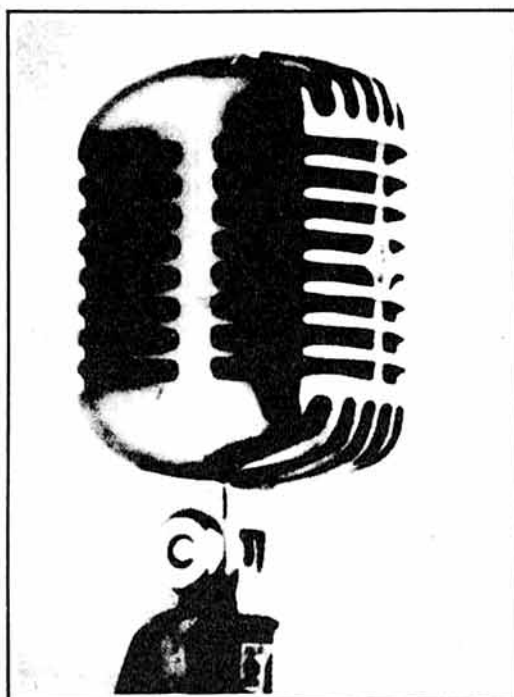
The arrival of Soviet operators has boosted interest in the band, and, it is likely that further steps will be taken to encourage the use of cw.

The future of 10MHz is continually being debated within IARU, and the regions have been asked to prepare ideas for a major policy review in 1988. It may be that then, or at some later date, following consultation with the primary users, some limited use of ssb can be contemplated. Until that time, the RSGB recommendation is to support the IARU and use narrowband modes at the minimum power level needed to maintain communication. Remember that 10MHz is unique in being the only HF band which is entirely a secondary allocation. Careful use, scrupulous avoidance of interference to the primary users, and adherence to band plans now will pay dividends later.

M J Atherton, G3ZAY

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A TERMINAL UNIT USING SWITCHED CAPACITOR FILTERS

T D Forrester, G4WIM (Ex G8GIW)*

WITH SWITCHED CAPACITOR FILTERS now available to the radio amateur at reasonable prices, it is possible to design audio systems with great versatility which previously would have been much more complex had they been implemented with conventional RC op-amp components.

This article describes the use of some of these new generation filters in a terminal unit for use in data communications. The design is readily modifiable for practically any data rate and standard, however the design was primarily intended for hf Amtor/rtty applications.

Over the past year the design has shown itself able to cope with large amounts of interference, and still detect the incoming traffic with relatively few errors. On the vhf and uhf bands its performance has been excellent, often detecting data which is practically inaudible. The performance of the internal filtering make it an ideal addition to any data communication set up which lacks pre-detection filters.

Switched capacitor filter operation

To enable a better understanding of the circuit operation for amateurs unfamiliar with switched capacitor filters (scfs), here is a brief introduction to their operation.

Usually, in the design of filters; resistors, capacitors and inductors are used to form the filter network. However, for high Q (narrow band) filters a high quality inductor is usually required; that is an inductor with a high intrinsic Q. This type of inductor is normally quite large and/or expensive.

A common method of eliminating the inductor in a lower frequency filter is to use an active element, eg an op-amp, in conjunction with resistors and capacitors.

Unfortunately, using an active element combined with passive components can lead to instability and drift in high Q filters, and therefore tends to need very careful design.

SCFs use a modulation technique, from an external frequency source, to overcome the above problems. There are several configurations of scf each with its own particular properties, but in this article we shall consider just the shunt switched bandpass filter as it is among the easiest to understand.

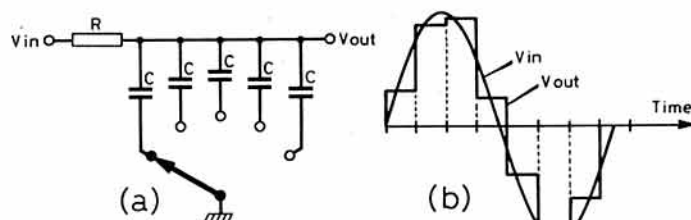


Fig 1. (a) Circuit diagram of the shunt-switched bandpass filter.
(b) Resulting waveform

The basic circuit arrangement is shown in Fig 1(a) and the resulting waveform in Fig 1(b). Providing the rc time constants are much greater than the rate at which the switch is operated then each capacitor is exposed to a segment of the applied waveform and so eventually reaches the average value of the applied signal. The voltages on the capacitors only remain

absolutely constant if the applied waveform has a frequency of F_{clk}/n , where F_{clk} is the frequency of rotation of the switch and n is the number of capacitors.

In real life, however, the applied waveform is not in exact synchronism with the clock frequency and so the average voltage on each individual capacitor during each successive time interval varies. Because of this lack of synchronism the voltage across each capacitor varies at a rate dependent on the difference between the applied waveform frequency and F_{clk}/n .

For large differences, the capacitors do not accumulate appreciable charge and the output voltage remains close to zero.

When the input frequency and switching frequencies are in synchronism, each capacitor will, after a few cycles, charge to the average sample value of the input signal. As this happens to each capacitor, the output becomes a stepped approximation of the input. Thus, the bandpass function is formed. A simple lowpass filter is then required to remove the sampling frequency components.

Due to the sampling nature of this type of filter, it is possible for responses to occur at the sampling frequency and at the harmonics of the filter frequency. If required to prevent this 'aliasing' occurring an anti-aliasing filter is normally placed ahead of the scf.

In order to realise other types of filter (notch, highpass, lowpass etc), this basic filter can be used with op-amps in various circuit configurations, which are outside the scope of this article.

However, for further reading on this matter I recommend the *Siliconix Handbook on Analogue Switches*. This handbook is available from Siliconix Ltd, Morriston, Swansea.

Components List

R1, R2	1kΩ	C12	22μf tantalum
R3, 16	56kΩ	C9, 15	22μf electrolytic
R4, 5, 6, 7, 8, 9, 13,		C13	220μf electrolytic
14, 15, 17, 19, 21, 30		C16	10μf electrolytic
33, 37, 38, 63, 64, 65	10kΩ	C19, 20	47μf electrolytic
R10	150kΩ	C27	4,700μf 25V electrolytic
R11, 26, 27, 28, 53	3.3kΩ	C17, 18	0.01μf paper
R12, 59	2.2kΩ	C25	0.22μf paper
R18, 57	2.7kΩ	C26	0.22μf 25V paper
R20	18k	C28, 29, 30	1nf suflox
R22	50kΩ pre-set		All capacitors 16V wkg unless
R23, 24	47kΩ		otherwise stated
R25	220kΩ	IC1	RS 306-803
R29	10kΩ pre-set	IC2, IC3	RU 5620
R31, 32, 34	680Ω	IC4, IC5, IC8, IC9,	
R35, 42, 45	27kΩ	IC10, IC11	741
R36, 43, 46, 49	5.6kΩ	IC6	4538
R39, 40	33kΩ	IC7	R 5609
R47, 44, 62	470Ω	IC12	78L08
R48	5kΩ pre-set	IC13	7812
R50, 52, 54, 56, 58, 60	8.2kΩ	IC14, IC15, IC16	4047
R51	1kΩ pre-set	TR1, TR2, TR3, TR4	BC108
R55	3kΩ	D1, D2, D3, D4,	
R61	3.9kΩ	D5, D6, D7, D9, D16	1N914
	1.8kΩ	D9, D10, D15	LED
		D11, D12, D13, D14	1N4001
		T1	15V 10VA
		M1	± 100μA
C1, 3, 5, 6, 7, 8, 11, 14,	2.2μf tantalum	S1, S4	SPCO
21, 22, 23, 24	220pf ceramic	S2	2P3W
C2	470pf ceramic	S3	1P3W
C10			

*12 Lime Close, Hartwell, Northampton NN7 2PS

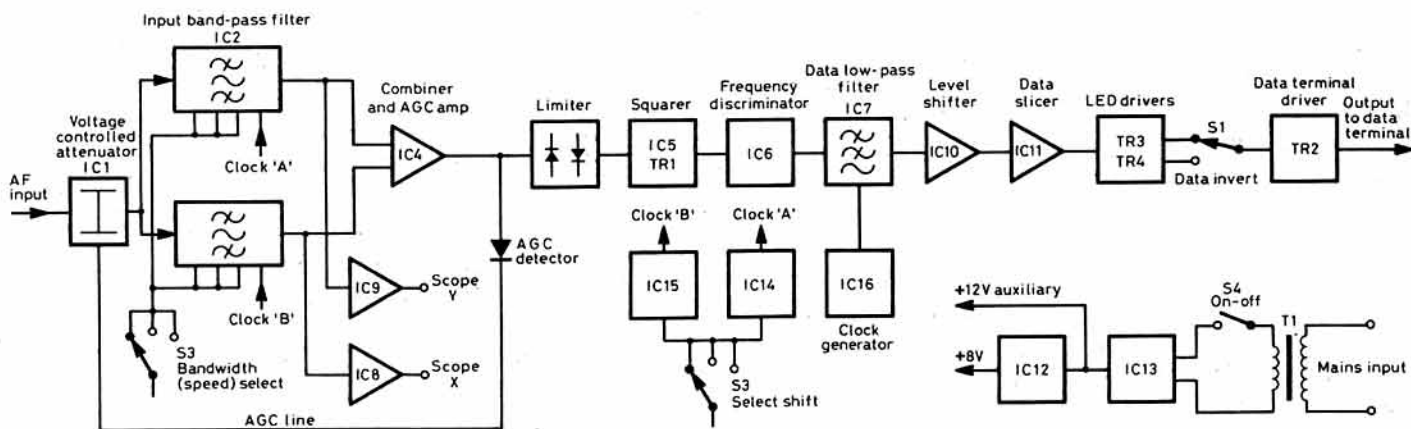


Fig 2. System block diagram

Circuit description

This circuit description should be read in conjunction with the block diagram Fig 2 and circuit diagram Fig 4.

The incoming audio from the receiver is first fed to IC1. This serves to control the level of the audio, to the following filters, by means of the agc voltage generated by D1 and D2, which is applied to pin 2. This levelling of the audio signal serves to combat fading and as it is achieved by using "linear" techniques, as opposed to the conventional "back-to-back diodes"; it does not introduce any great deal of distortion into the signal which could have a detrimental effect on the data.

After the audio has been suitably levelled it is passed onto IC2 and IC3, which form the mark and space bandpass filters. These ICs are of the programmable switched capacitor type, which make it easy to set the required centre frequency and bandwidth for any particular system requirement.

For instance, the centre frequency is determined by the clock frequency applied to pin 7, divided by n. Where n is a number selected from Table 1. Likewise, the bandwidth or Q is determined by the code applied to pins 2,3,4,5 and 6. The required Q can be selected from Table 1.

Q	Code	Fc/Fo	Code	Q	Code	Fc/Fo	Code
Q4...Q0	F4...F0		F4...F0	Q4...Q0	F4...F0		F4...F0
0.57	00000	200.0	00000	5.00	10000	97.8	10000
0.65	00001	191.3	00001	5.80	10001	93.5	10001
0.71	00010	182.9	00010	7.20	10010	89.4	10010
0.79	00011	174.9	00011	8.70	10011	85.5	10011
0.87	00100	167.2	00100	10.0	10100	81.8	10100
0.95	00101	159.9	00101	11.5	10101	78.2	10101
1.05	00110	152.9	00110	12.0	10110	74.8	10110
1.20	00111	146.2	00111	13.5	10111	71.5	10111
1.35	01000	139.8	01000	15.5	11000	68.4	11000
1.65	01001	133.7	01001	17.5	11001	65.4	11001
1.95	01010	127.9	01010	20.0	11010	62.5	11010
2.20	01011	122.3	01011	24.0	11011	59.8	11011
2.50	01100	116.9	01100	30.0	11100	57.2	11100
3.00	01101	111.8	01101	35.0	11101	54.8	11101
3.50	01110	106.9	01110	55.0	11110	52.3	11110
4.25	01111	102.3	01111	85.0	11111	50.0	11111

In this application IC2 and IC3 are configured as bandpass filters; however, it is equally easy to configure them into any of the following:

- | | |
|--|------------------------|
| a) Lowpass | e) Highpass elliptical |
| b) Bandpass (as described in this article) | f) Notch |
| c) Highpass | g) Allpass |
| d) Lowpass elliptical | |

To use these filters in any of the above modes, refer to Table 2.

Fig 3 details the pinouts for IC2/3; should further data be required on these ICs, it can be obtained from: EG&G Reticon, 34/35 Market Place, Wokingham, Berks RG11 2PP, telephone 0734 788666.

Filter type	LPin	Connections	HPin	BPin
Lowpass	Vin		GND	GND
Highpass	GND		Vin	GND
Bandpass	GND		GND	Vin
Notch	Vin		Vin	GND
Allpass	Vin		Vin	Vin

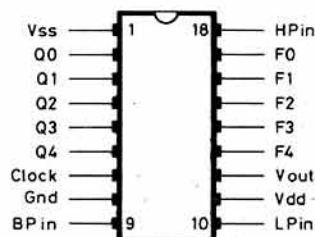


Fig 3. RU5620 pinouts. Note that this ic is designed for + and - supplies. However, by biasing inputs to mid-rail it is possible for the device to be powered from a single supply rail. Q0 to Q4 program the "Q", see Table 1. F0 to F4 program the Fc/Fo ratio, see Table 1. BP in = bandpass input. LP in = lowpass input. HP in = highpass input

In this design the centre frequencies are set by the clock frequencies generated by IC14 for IC2, IC15 for IC3 and IC16 for IC7. For IC2 and IC3 the centre frequency is the clock frequency divided by 50.

The bandwidth or Q of the filters is set by S3, which programs pins 3,4,5 of IC2 and IC3. Pins 2 and 6 are connected to the supply rails and are not programmable in this design.

After the audio tones have passed through IC2 and IC3 they are substantially free of noise and interference, at this point they are amplified in IC8 and IC9 to drive an oscilloscope in XY format to aid the accurate tuning of the signal. This feature is extremely useful to get the best out of the system and also makes it very easy to 'net' accurately onto a station calling CQ.

After the tones have been filtered on IC2, IC3 they are combined and amplified by IC4. The output of this amplifier is rectified in D1 and D2 to provide the agc voltage for IC1. IC4 also removes any residual clock leak-through and reconstitutes the waveform.

The output of IC4 is symmetrically limited in D3 and D4 before being amplified in IC5 and squared up in TR1.

The collector of TR1 is used to trigger IC6, which is a precision monostable set to 0.7ms. The output of IC6 is used to charge up a capacitor (IC18), and the resulting voltage across this capacitor is a measure of the predominate frequency.

As there may be some residual noise present on this voltage, due to interference etc, a lowpass filter is inserted by means of IC7. This IC again is of the switched capacitor type, and has a very fast roll-off typically, >60dB per octave.

The cut-off frequency of IC7 is set by the clock frequency generated by IC16 divided by 100. Typically, the cut-off frequency is set to 1.5 times the bit rate. A cut-off frequency lower than this will cause the data to become blurred and so make the operation of the data slicer inaccurate.

The filtered data from IC7 is fed to IC10, where the transition frequency is accurately set by R29, and the data is sliced in IC11. M1 provides an indication of tuning, should an oscilloscope not be available.

TR2 provides an open collector output to the terminal, while TR3 and TR4 light the appropriate LEDs to indicate the presence of either tone accordingly.

S1 provides a convenient means of inverting the sense of the data. S2 selects the clock frequencies for IC2 and IC3, to set the appropriate shift (170Hz, 425Hz, 850Hz). S3 sets the bandwidth of the mark space filters, so as to be optimum for 50, 75 or 110 baud rates.

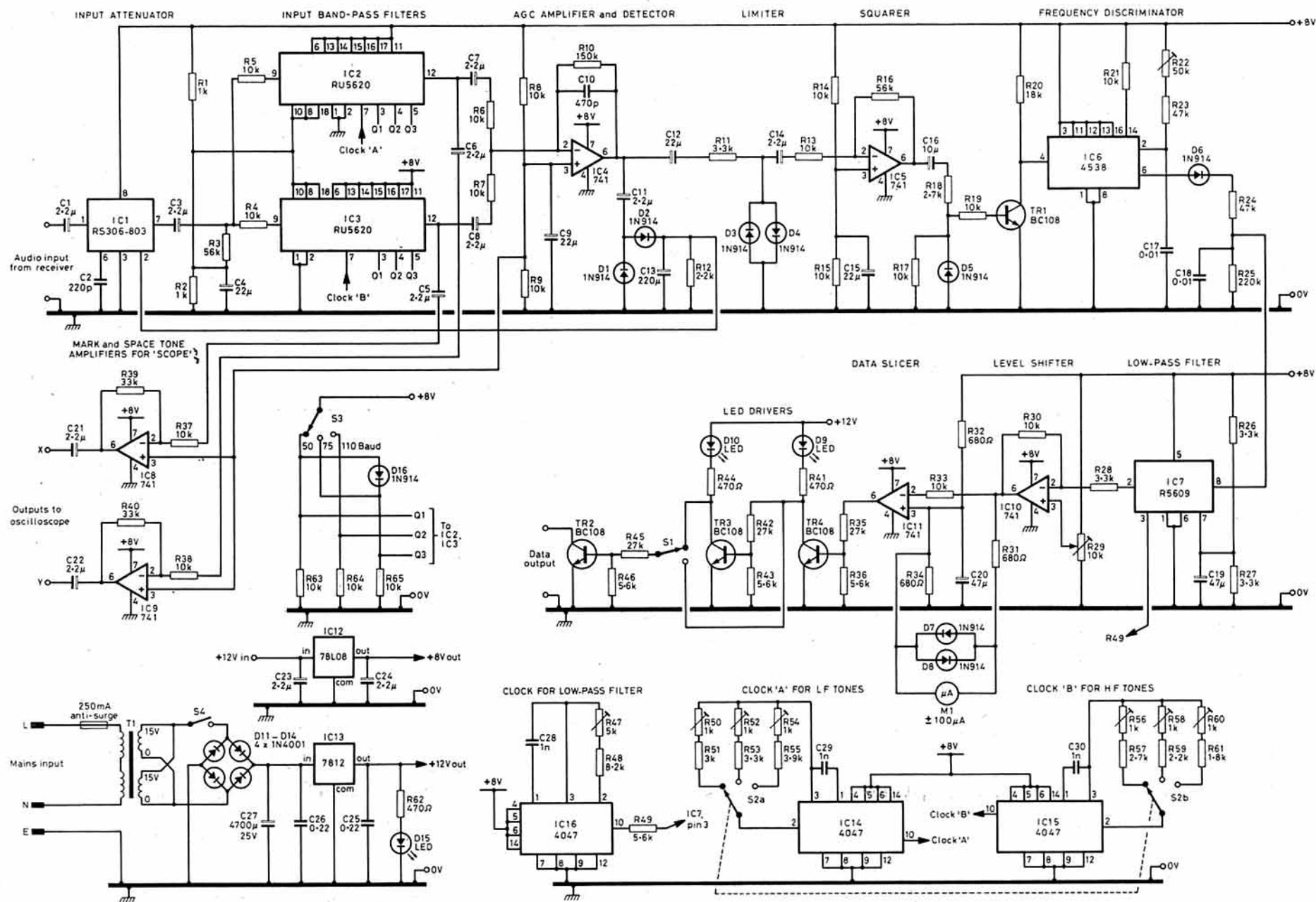
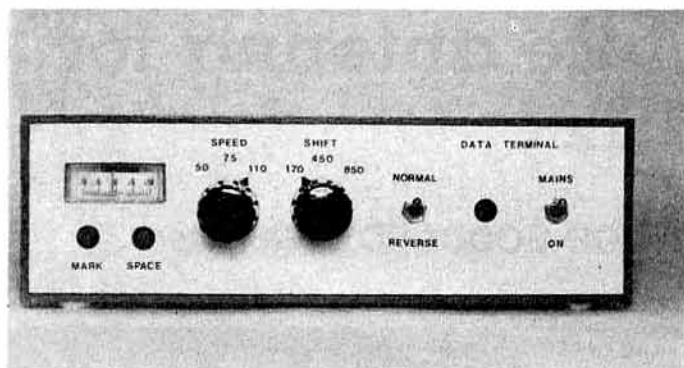
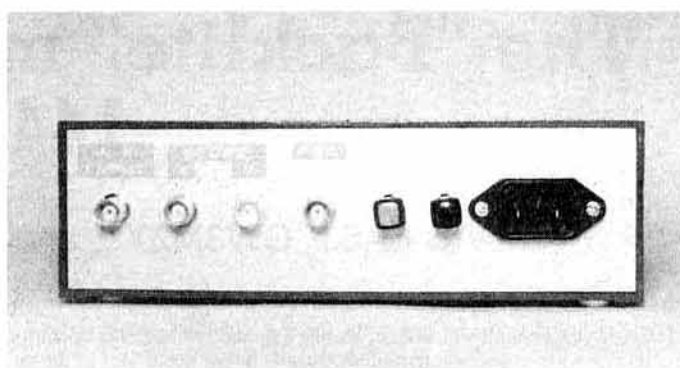


Fig 4. Circuit diagram of the terminal unit



Front view of the data terminal



Rear view of the data terminal

IC14, IC15 and IC16 are conventional cmos oscillators with an integral divide by two stage, to provide the filters with a 1:1 duty cycle clock. However, a 1:1 duty cycle clock is not essential for the correct operation of the filters, and any other clock oscillator (such as NE555 etc) could be substituted.

The power supply is of conventional design, using the popular 78 series of regulators. IC13 being the main 12V regulator, which in my case is used to power an external code converter, while IC12 provides a regulated 8V supply for the terminal circuitry. T1 is a miniature 10VA toroidal type, which gives good safety isolation from the mains.

In the unlikely event of a catastrophic failure of the psu a 1A fuse is located in the mains plug, however with psus of this size it is very difficult to provide adequate protection of the transformer due to inherent current limiting in the mains transformer.

Construction

The construction of the prototype was carried out on Veroboard, to aid development of the circuit. As yet, no pcb has been made. If demand is great enough, then a pcb will be laid out.

Due to the cost of some of the ics it is preferable to use ic bases and to check the power supply voltages prior to inserting the ics into the completed circuit.

No special techniques are required in the construction of this unit with the possible exception of proofing the circuitry against rf on transmit, by means of suitable chokes and capacitors for the frequencies in use.

IC13 should be fastened down to a suitable heatsink and the decoupling capacitors C26 and C27 mounted adjacent to the device, to prevent instability.

As this unit consumes less than 10W, it is permissible only to switch the secondary of the mains transformer, so reducing the amount of mains wiring and the risk of electric shock.

Although separate op-amps devices are shown for individual stages, there is no reason why multiple op-amp packages, such as LM324, should not be used with the appropriate changes to the pin-outs.

The prototype was built into a Schroff case, which was a convenient size for this type of project. The case is not particularly rf proof, but as yet no problems have been experienced while operating at full legal maximum power on any band from 1.8MHz to 432MHz. Therefore, it seems that the circuitry is fairly immune, providing sensible precautions are taken to prevent excessive amounts of rf energy entering the case.

Setting up

To accurately set this unit up, it is preferable to have either a frequency meter or a source of the tones to be used and an oscilloscope. Ideally, all the above would aid setting up and any fault-finding necessary. It is possible to adjust this unit without any test gear at all, providing the constructor has the time and patience.

Setting up the filters

To set the centre frequencies of the filters, it is necessary to set the clock frequencies as follows:

For 170Hz shift, set R50 for 63,750Hz, this sets a filter centre frequency of 1,275Hz, then set R56 for 72,250Hz, this sets a filter centre frequency of 1,445Hz.

For 425Hz shift, set R52 for 57,375Hz, this sets a filter centre frequency of 1,147.5Hz, then set R58 for 78,625Hz, this sets a filter centre frequency of 1,572.5Hz.

For 850Hz shift, set R54 for 46,750Hz, this sets a filter centre frequency of

935Hz, then set R60 for 89,250Hz, this sets a filter centre frequency of 1,785Hz.

The above clock frequencies are all measured at pin 7 of the filter ic under adjustment.

This procedure sets the various mark and space frequencies for 170, 425 and 850Hz symmetrically around a transition frequency of 1,360Hz. The reason for this is that the design is primarily intended for amateur 170Hz shifts, and as such the frequency discriminator formed by IC6 is optimized for frequencies around 1,360Hz. Therefore, to ensure optimum performance at other commercial shifts the filter frequencies are centred around 1,360Hz.

Setting up the discriminator

Initially, 170Hz shift should be selected at a speed of 110 baud, then with an audio source of 1,275Hz at approximately 200mV rms connected to the input, R22 should be adjusted for approx 2V at the junction of C18 and R24. This voltage should be measured with a high impedance voltmeter. If no suitable instrument is available then R22 should initially be set mid way.

The clock frequency for IC7 should be set for 20,000Hz, this sets a low pass frequency of 200Hz and is adequate for data rates up to 110 baud.

With an audio source of 1,360Hz at approximately 200mV rms connected to the input R29 should be adjusted for a centre zero indication of M1, both mark and space i.e.s should be lit or rapidly flashing alternately.

Reset the audio source to 1,275Hz and note that the meter moves to half scale to the left and that only the space i.e.d. lights. Then set the audio source to 1,445Hz and note that the meter moves to half scale to the right and that only the mark i.e.d. lights.

Repeat the above procedure for input frequencies of 425Hz and 850Hz shifts, as previously stated.

Check also that the oscilloscope outputs are operating and that the input level can be varied from 400mV rms to 25mV rms without the level at pin 6 of IC4 varying by more than 20 per cent. This check ensures that the internal agc is operating.

Operation

With the unit connected up to a suitable receiver, either to the headphones or loudspeaker taking care not to short out the output stage in the receiver, and with the data output of the unit connected to a suitable terminal for the data type in use, tune the receiver into a transmission which matches the type selected on the unit (shift and speed) and centre the tuning meter. If random characters (rubbish) appear on the screen try inverting the data to the terminal by operating S1.

If an oscilloscope is being used as an additional tuning aid then tune the receiver for a "+" shape. This indicates the correct tuning.

Other applications

While this article describes the design of an rtty/Amtor terminal, there are many more applications for these types of filters, eg auto tracking notch filters, adjustable cw filters, sstv filters etc. Practically anywhere an audio filter is required, a digital filter is possible and usually is easier to implement.

Conclusion

This design is a prototype and as such is still under development, therefore if anyone has any suggestions or questions regarding this design I would be pleased to hear from them. □

The "Backlite" mobile antenna for 144MHz

DAVID LAST, GW3MZY*, and TREVOR GODDARD, GW6RYH*

THE MOST EFFICIENT, simple, mobile antenna for 144MHz operation is a vertical whip or colinear mounted centrally on the metal roof of the car. It transmits vertically-polarized signals almost uniformly in all directions. However, such antennas have many drawbacks for the owner of the vehicle: the expense and time of fitting, additional windage and difficulties with car washes, garage doorways and multi-storey car parks. Even if a mag-mount or gutter mount is used to avoid the need to drill an antenna mounting hole, the feeder still has to be routed to the radio inside the car. And prominent antennas attract the attention of vandals and equipment thieves!

Many of these disadvantages also apply to wing-mounted whip antennas for broadcast reception, which also suffer from corrosion and are hazardous to pedestrians in accidents. These drawbacks have led to the development recently of broadcast receiving antennas for the long-wave, medium-wave and vhf bands which use the conductors of the car's rear-window heater [1,2]. Such "backlite" antennas ("backlite" is an American motor manufacturers' term for the rear window of a car) are now fitted as standard equipment to the Ford Granada and to certain models of the Orion and Escort [Photo 1].

On these cars power is fed to the heater via an "isolator" unit hidden in the pillar at the side of the rear window or in the lower part of the tailgate, adjacent to the heater connections. The isolator decouples the received radio signals from the heater supply and also prevents electrical noise carried by the heater supply lead from reaching the antenna. The unit contains a low-noise head amplifier for vhf reception which is fed from the heater-antenna via an impedance matching circuit. The design of this matching network is unique to each model of vehicle since its task is to match the complex impedance of the antenna, which depends upon the dimensions of the heater conductor pattern and the window aperture, to the input of the amplifier.

The success of this type of antenna in replacing the whip for broadcast reception has stimulated the interest of mobile radio users in the possibility of employing them for communications. Manufacturers of specialized vehicles, such as police cars, are also attracted by the prospect of fitting a rear-window transmitting antenna during manufacture for the lifetime of the vehicle. However, there are problems to be overcome. Transmitters generally demand more-accurately matched antennas than do receivers. Also, transmitting antennas do not enjoy the benefits of the low-noise head amplifier which helps the rear-window antenna to compete with the whip for broadcast reception.

Despite these obstacles, rear-window mobile transmitting and receiving antennas have recently been tested [3]. They include one for the Ford Sierra, for use at UK police frequencies where the mobiles transmit at 82-83MHz and receive between 97 and 100MHz. A matching unit transforms the complex terminal impedance of the Sierra antenna to 50Ω. However, the wide separation of the two frequency bands, together with the relatively-high Q-factor of the heater-antenna, makes it impossible to achieve an acceptably-low vswr in both transmit and receive bands simultaneously



Photo 1. The Ford Orion is one of a range of production cars which use the rear-window heating element as a radio receiving antenna. Both heater terminals are at the same side of the window. They are connected, via an isolator unit mounted in the adjacent roof pillar, to the heater supply and radio

using a single, broadband matching network. Instead, two separate, relay-switched matching circuits are used.

The polar diagram of this rear-window antenna for vertically-polarized signals at 82.5MHz [Fig 1] shows that its performance averages 12dB below that of a roof-mounted, quarter-wave whip and that it varies with direction by ± 8 dB. However, when the antenna is used in a built-up area, its performance with horizontally-polarized signals must also be taken into account. This is because the multiple signal reflections, by which urban mobile radio communication takes place, give rise to a horizontal component of polarization which is typically only 10dB less than the vertical component. The response of the rear-window antenna to these horizontally-polarized signals is stronger than that of the whip, and the satisfactory performance of the heater-antenna in day-to-day operation appears to be better than the simple vertical-polarization measurements would suggest.

Design of the "Backlite"

A rear-window antenna for amateur radio operation at 144MHz begins to look attractive. It would not require transmit/receive switching, nor variable tuning once installed, since the fractional bandwidth of the 144MHz band is only ± 0.7 per cent. This should also allow narrowband impedance-matching techniques to be employed. However, instead of custom-designing an isolator unit for each model of vehicle, to be installed by the manufacturer, we are now looking for a design which can be fitted and adjusted easily on a wide range of existing vehicles.

Approximately 85 per cent of cars in the UK have heated rear windows. Of these, almost half are saloons and the rest estate cars or hatchbacks. So

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Dr David Last (left) was first licensed as a schoolboy in 1958. He studied at the universities of Bristol and Sheffield (where he acquired a taste for vhf contest operating) and trained with the BBC. He is now a senior lecturer in electronic engineering at the University College of North Wales, Bangor, where he is proud to be the licence holder of the university's distinguished callsign, GW3UCB.

Although he teaches and has published papers and patents in semiconductor design and micro-electronics technology, his research interests in recent years have returned to his first love—radio engineering! He has specialized in the development of radio-navigation systems (not Syledis!) for both marine and aeronautical applications—he is an instrument-rated pilot—and he is a technical consultant to navigation and communications organizations.

The development of the rear-window heater antenna for cars earned him and his industrial and university collaborators a Design Council award, and it seemed too good an idea to be confined to broadcast reception when it could be used for transmitting and, especially, for amateur radio.

Trevor Goddard became interested in electronics at an early age, and while he was in the Scouts he became involved in amateur radio through visiting a JOTA station. He became licensed in 1982 at the age of 16. In 1981 he obtained a BSc in electrical engineering with power electronics at UCNW, Bangor; his final-year project being concerned with developing the "Backlite" 144MHz antenna. He is now a development engineer with Mullards.

Components list

L1, L3	256nH. 9t 16swg enamelled, tight-wound, 0.25in internal diameter
L2	55nH. 3t 16swg enamelled, tight-wound, 0.25in internal diameter
C3, C4	100pF Jackson type C803

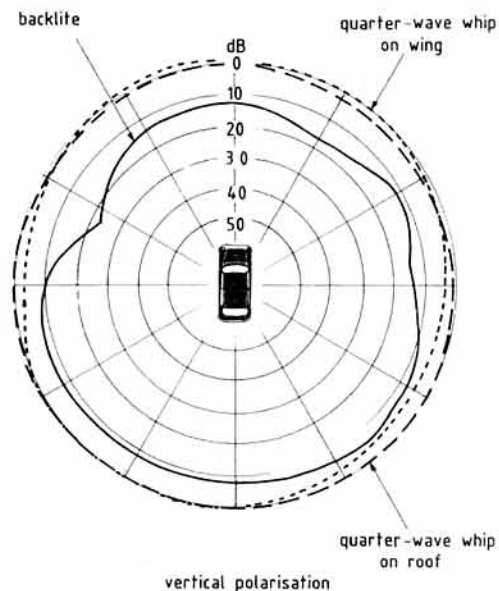


Fig 1. The solid line is the horizontal polar diagram of a Ford Sierra heater antenna at 82.5MHz. The dashed lines show quarter-wave whips on the roof and front wing

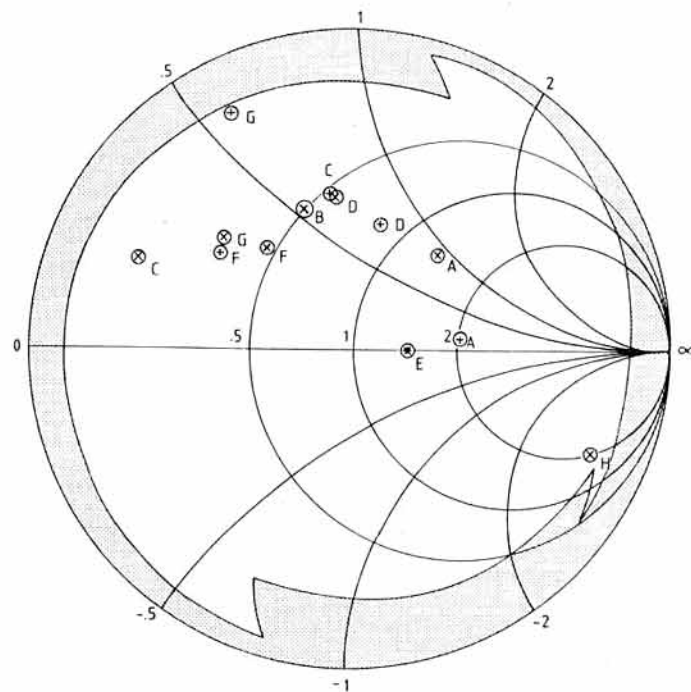


Fig 3. Smith chart showing heater feedpoint impedance with far end grounded (X) and decoupled by choke (+). The matching unit, in combination with the two alternative lengths of feeder, can match any complex impedance in the unshaded area to 50Ω resistive. Car models shown: (A) Leyland Mini, (B) VW Polo GL, (C) Ford Fiesta, (D) Chrysler Alpine, (E) Ford Orion Ghia, (F) Ford Cortina Estate, (G) Ford Sierra, (H) Triumph Toledo (self-adhesive demister)

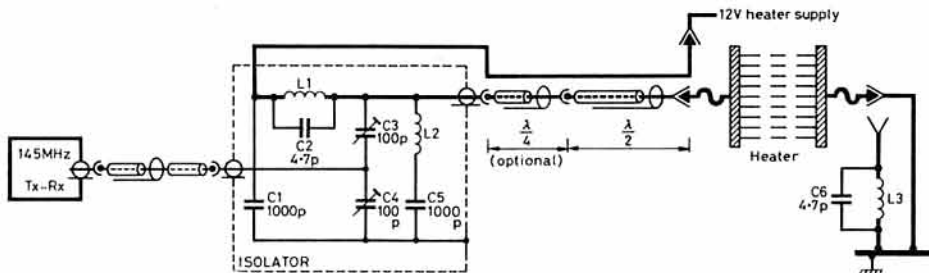


Fig 2. The "Backlite" transmitting/receiving antenna system for 145MHz. Bold lines show route of heater current. The "earthy end" of the heater may be connected to ground or decoupled by a parallel-tuned 145MHz LC circuit

a 144MHz rear-window antenna system must be suitable for all these types of car body. The installation arrangements may be made much more flexible if the isolator unit can be mounted some distance from the heater. This can be arranged by connecting the unit to the heater via a coaxial cable as is shown in Fig 2.

The complex impedance values at the heater terminals of a number of popular models of car (and a stick-on heater) were surveyed to establish the range of values which the matching circuit is required to transform to 50Ω resistive. Some of these are plotted in Fig 3. The impedances were measured with the end of the heater remote from the feedpoint grounded and also with it decoupled from ground at rf by a simple 145MHz parallel-tuned LC circuit. This option allows the antenna to be operated in two different modes. The range of impedances with which the matching unit must cope can be reduced by cutting the coaxial cable feeding the heater to either an even multiple of a quarter wavelength (half wavelength for example), when it will present to the matching circuit an impedance equal to the terminal impedance of the heater, or an odd multiple, in which case impedance transformation will occur.

The operation of the heater is unaffected by using it as an antenna. Fig 2 shows how the heating current passes through the isolator unit, along the coaxial cable and then via the heater to ground. The temperature rise of the cable has been carefully monitored over the full range of normal heater currents—up to 17A—and found to be less than 20° when UR43 coaxial cable is used. The 144MHz parallel-tuned circuits have also been checked at the same current.

Installation of the antenna system is straightforward, although the details differ from model to model of vehicle. The isolator unit is mounted in a convenient and unobtrusive position reasonably close to one heater terminal [Photo 2]. Suitable locations are beneath the rear parcel shelf in saloon cars, and either on the tailgate or above a rear roof trim panel in

hatchbacks or estates. To minimize rf coupling into the wiring of the vehicle, it is recommended that the unit be grounded. The coaxial cable and the heater supply lead are run discreetly along one edge of the rear window and secured using P-clips or double-sided adhesive pads.

Photo 3 shows the centre conductor of the coaxial cable connected to the heater terminal in place of the supply cable. The heater current is diverted to the isolator unit via a wire fitted with an appropriate connector—normally a 0.25in push-on blade socket. The parallel-tuned circuit, which is also fitted with these connectors, may be inserted at the grounded end of the heater [Photo 4]. Finally—and this is generally the biggest task!—a coaxial feeder cable is installed between the transceiver and the isolator unit.

The two capacitors in the matching unit must be adjusted for minimum

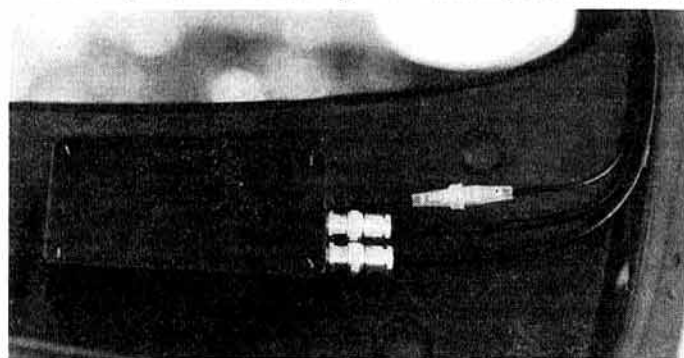


Photo 2. 144MHz isolator unit mounted in a Ford Sierra tailgate, below rear shelf

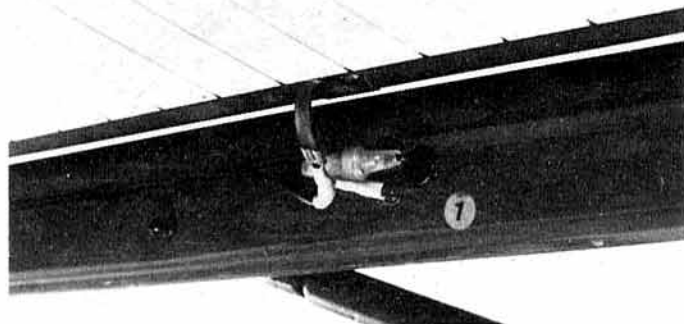


Photo 3. Heater current is diverted to the isolator unit and returns via coaxial cable, together with rf

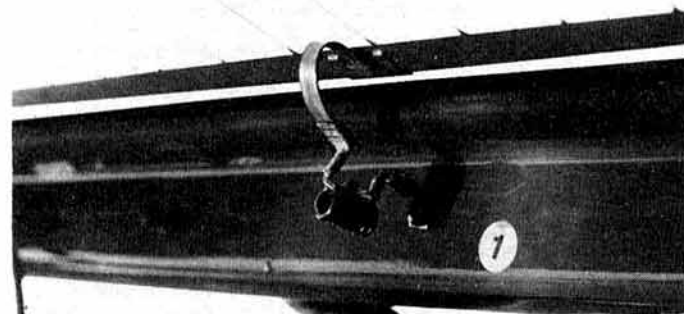


Photo 4. The parallel-tuned 144MHz LC circuit used to decouple the earthy end of the heater from ground

reflected power, using a vswr meter inserted between the transceiver and the isolator. If a good match cannot be obtained, a further quarter-wavelength of coaxial cable is inserted between the unit and the heater, as shown in Fig 2. If UR43 cable with its solid polythene dielectric is again used, the length of this additional section will be 35cm.

The 144MHz "Backlite" antenna system is, of course, unsuitable for installation in those vehicles which already enjoy the benefits of a rear-window heater antenna for broadcast reception!

The performance of the antenna system depends, of course, upon the vehicle in which it is installed. It is well worth testing it with the earth-end choke in place and then removing the choke, grounding the heater connection there, and re-adjusting the matching unit. These two antenna arrangements will have different polar diagrams, and you can choose the arrangement you prefer.

An occasional problem is caused by rear-window wipers. If the electrical length of the arm and blade is close to a quarter wavelength—approximately 50cm at 144MHz—the performance of the antenna will vary somewhat as the wiper sweeps across it. Also, rear wiper motors sometimes cause electrical interference and require an additional capacitor to be fitted to bring them up to the suppression standard of front wipers.

Another factor which causes one "Backlite" antenna to out-perform another is quite unexpected: the moulding between the glass and the metal body of the vehicle. In most cars this is made of plastic, loaded with carbon which colours it black—and makes it electrically conductive and lossy at vhf!

Fortunately, the heater busbars of an increasing number of models of car are no longer buried beneath these mouldings and the performance of their rear-window antennas benefits accordingly. One such vehicle is the Ford Sierra which has an excellent rear window heater for 144MHz "Backlite" use. Fig 4 shows its polar diagram for vertically-polarized signals with the earth-end choke fitted. The signal level from the roof-mounted whip antenna is only 5dB stronger on average than that from the "Backlite's" for vertical polarization. The "Backlite's" signal is actually stronger than that from the whip in certain directions, although its polar diagram is, of course, less uniform. When horizontally-polarized signals are used, the "Backlite's" signal is stronger on average than that from the whip. Removing the choke and grounding the earthy end of the Sierra heater reduces its vertically-polarized performance and increases its horizontally-polarized signals, but only by 1dB on average in each case.

A 5/8-wavelength whip antenna in the centre of the roof should have an approximately-uniform polar diagram and 3dB gain over the quarter-wave

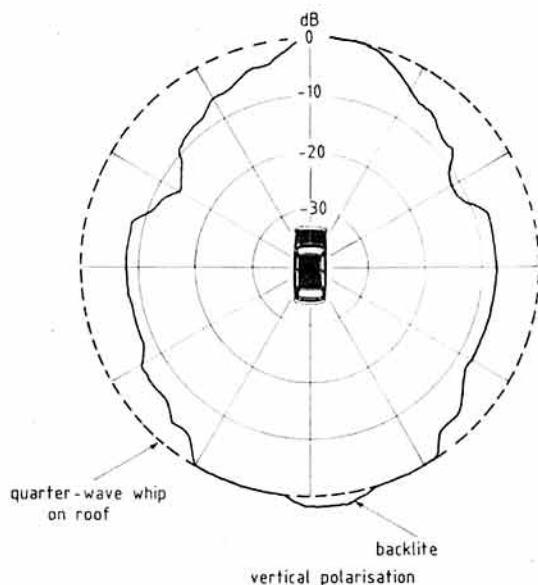


Fig 4. Performance of a Ford Sierra "Backlite" at 144MHz. Polar diagram shows that the signal from the "Backlite" (solid line) is actually stronger than the signal from the roof-mounted whip (dashed line) in certain directions. Overall the whip is the stronger, though only by an average of 5dB

whip we used. However, if either whip antenna is gutter-mounted, its polar diagram may be far from uniform.

GW4KAZ, using a Ford Sierra "Backlite" in the difficult, mountainous terrain of North Wales, reports regular contacts with the GB3AR and GB3GD repeaters, and has found the overall performance of the antenna to be subjectively similar to that of his previous roof-mounted whip antennas.

Although the performance of the "Backlite" varies from model to model of vehicle, experience in daily use has shown that it is possible to achieve operation comparable with that of a roof-mounted or wing-mounted whip and also to enjoy freedom from worry about car-washes, low roofs, vandals, corrosion and the need to drill holes in expensive motor cars!

One word of caution. It is important to avoid exposure to very high intensity radio-frequency fields when experimenting with any form of transmitting antenna, especially when using hand-held or other kinds of portable or mobile equipment. Bear in mind that, although the driver sits further from a rear-window antenna than from, say, a wing-mounted whip, rear-seat passengers may be quite close to the antenna in some vehicles. If that is the case, high power levels should not be used. The field intensities measured inside the Ford Sierra which was fitted with the 83MHz rear-window antenna mentioned earlier, fed by an 18W transmitter, confirmed that there was no hazard to any occupant, given the intermittent nature of police mobile transmissions [4]. However, the internal fields are different for every model of vehicle, every frequency and every kind of mobile antenna.

Acknowledgements

The rear-window antenna has been developed for broadcast reception and mobile radio by BSH Electronics Ltd, GW3MZY having acted as a consultant, together with his colleague Mr Brian Easter, for whose advice in this project both he and GW6RYH are grateful. We also acknowledge the agreement of the directors of BSH Electronics to the publication of this paper, the advice of Mr Peter Thorpe of the Ford Motor Company, and the assistance of Mr Brian Davies, GW4KAZ, in conducting tests on the "Backlite".

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Technical Topics

by Pat Hawker, G3VA

MOST AMATEURS ACCEPT the inevitability of some degree of unreliability in their radio equipment. Even the best suffer from the so-called "bath-tub reliability curve"—initial high rate of failures, reducing to a more or less flat period of low failures, then rising once again as the equipment reaches the end of its useful life.

Frustrating though it is when a transceiver goes on the blink, it is fortunately not a matter of life or death. A minor personal tragedy perhaps for individuals or groups who may have gone to much trouble and expense, only to experience the frustrations of Murphy's Law that if anything can go wrong it will do so at the most inconvenient moment.

Where reliability really matters

But there are many professional and defence applications of radio communications, radar, broadcasting, speech and data telecommunications where reliability over many months or years is by far the single most important performance characteristic. Even with modern equipment, whether or not entirely dependent upon solidstate technology, the provision of redundancy and fall-back systems is regarded as essential. Even so it would be a rash or stupid engineer who would claim any system as 100 per cent reliable: 99 per cent, even 99.9 per cent or 99.99 perhaps, but never 100 per cent.

I once heard John Glenn, the astronaut, when asked what he thought about during his space trip, reply that he looked critically at the equipment on which his life depended and remembered that NASA always bought on the basis of accepting the lowest of three tenders!

Recently, the IEEE's *Spectrum* monthly journal (November 1986) ran a special feature "Our burdened skies" devoted to a critical examination of the American domestic air transportation system which is under great stress due in part to the increasing burdens placed on its air traffic control system. The journal emphasized that this is still an essentially safe system since "when crises do arise, the great majority are resolved without mishap".

But, it would seem, an increasing number of problems are arising. "The radios, radars and computers that help controllers do their job—some 23,000 pieces of equipment operating 24 hours a day, seven days a week—are not the latest available. Breakdowns occur. Failures in radio communications are not uncommon. Radars can be troublesome; some sets date to the second world war and still use vacuum tubes. Computers tend to become overloaded with data and are forced to throw away critically useful information. The air traffic control computers are not even as good in some respects as the IBM PC-XT personal computer."

Failures of the atc ground transmitters, despite the installation of back-up transmitters on the same channel, are by no means rare. This can be due to semiconductor, valve or component failures, failures of the control systems for switching in the reserve transmitters, failures in the telecommunications links connecting the controllers to the transmitters, power supply failures, problems with electromechanical relays and presumably to a lesser degree any of the various problems that arise with antennas, feeder cables, receivers and interconnecting links.

While the aviation industry, not unnaturally, claims that "outages" could be greatly reduced by installing the latest all-solidstate radio, radar and information-processing equipment, it should not be forgotten that semiconductors are vulnerable not only to transient overvoltages etc (from which they need to be protected) but also to long-term chemical and corrosion failure mechanisms that can affect a very small percentage of chips and components over a matter of years.

Spectrum reports that: "The information that is provided to the controller by computers and radars is transmitted to the pilots by radios. Along with the phone lines and switching equipment that carry signals to and from transmitters and receivers, radios are cited by controllers as the least reliable part of the atc system."

Loss of mains power at remote transmitter/receiver sites—a problem that also plagues broadcasters in all countries—may be due to accidental cutting of cables, lightning, snow and ice, failure of stand-by and "no-break" diesel generators, etc.

My own feeling is that more important than any calculated "mean time between faults" (mtbf) for amateur equipment is their "mean time to

repair" (mttr). It is here that the older valve equipment scores heavily, provided the user maintains a stock of replacement valves. The other most common faults on older equipment, in my experience, are open-circuited high-wattage resistors, defective electrolytic capacitors, defective valve sockets and open-circuit lower frequency transformers due to "green-spot" corrosion. The most annoying faults are faulty band-change switches and slow-motion tuning drives.

Solidstate and the future

The December *TT* (pp853 to 854) included an item on the continued relevance of thermionic devices to amateur-radio transceivers, transmitters and linear amplifiers at other than low-power and/or portable and mobile operation. This was not to imply that in some areas, including uhf and microwave receivers, the conventional valve can match solidstate devices in performance; though we should not forget that satellite communications by and large still depend on the travelling-wave-tube-amplifier (twta). In the laboratories, the latest marvel is the modfet, a new class of Group 3 high-electron-mobility-transistor (hemt). Modfet stands for "modulation-doped GaAs (Al, Ga). As heterojunction field-effect transistor". At room temperature the experimental devices have achieved under 1dB noise figure up to 10GHz, under 2dB to 20GHz, under 3dB well above 30GHz at 300K (ie room temperature). Under cooled conditions, a modfet amplifier is capable of providing a noise figure of 0.4dB with 14dB gain at 10GHz at 77K. It is being claimed that these devices should prove inherently superior to all other fet technologies in operating or switching frequency, power dissipation and noise. But low-cost modfets may still be some way away.

A valid reason for the trend in amateur equipment towards all-solidstate power amplifiers is not performance but the fact that so many valve makers have virtually ceased production with the result that prices of new valves and high-voltage components, including mains-transformers, have risen at a rate much faster than inflation, whereas increasing production of semiconductors has had the opposite effect. But valves can still be found, not only in junk boxes, though this is not always true of valve bases.

Alan Williams, G3KSU draws attention to "The last days of the vacuum tube" by Joseph H Johnson, president of Microwave Modules & Devices (*Microwave Systems News*, September 1986, page 58). This argues the case for consigning valves not to the junk box but to the dustbins—a view that I find difficult to accept but one that needs to be examined. He poses provocative questions:

"Is the time approaching when vacuum tubes will no longer be required? . . . How long will it be before we see the last days of the vacuum tube? . . . Over the next two decades, dramatic changes will occur in high-power, high-frequency transmitters used in applications from weather radar, commercial broadcast or military communications to medical nmr equipment, linacs and industrial heating. Businesses dealing with high-power rf or microwave that fail to foresee this change are doomed to stagnation or failure. The wave of the future in the solidstate world is integrating device, circuit and cooling technology to achieve impressive performance improvements. *Once the transistor package with all its parasitics is discarded* (added italics) and the transistor chip is integrated directly into a thick- or thin-film hybrid module, decade-wide bandwidths or kilowatts of power become possible . . . Another innovation of the last few years is to use a building block approach to combine many amplifiers or modules to achieve very high power . . . Today a building block of 500kW is being developed . . . In the medium-wave broadcast band the transmitter of choice today is a 50kW all-solid-state unit. A 5kW vhf/fm (broadcast) transmitter can be sold for the same price as a tube unit, but operating and maintenance costs decline dramatically . . . Ultra-high-power solid-state and microwave amplifiers are a reality. Increases in both the power level and the frequency are constantly pushing many high-power tubes into the history books. Make sure you are part of the change."

Although there is more than a touch of jam tomorrow about this article, it illustrates well the strong pressures on the diminishing areas of valve technology still found in professional equipment. Yet I for one would continue to argue that *for amateur equipment* at medium or high-power, at the present time and possibly for some time to come, there remain valid

reasons for resisting commercial pressures to write-off valves. There is still a place for them in our shacks as well as in the history books.

The valve/solidstate debate

Peter Chadwick, G3RZP, chairman of the RSGB's Technical & Publications Committee, enters the debate with a useful list of pros and cons. He writes:

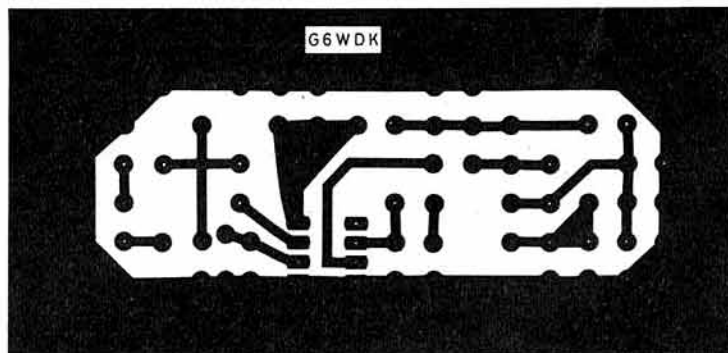
The case against valves

- (1) *Cost*—Look at the prices being asked even for small-signal receiving valves (although as an effective scrounger who came back from a recent business trip to the States with a load of metal octal valves who am I to complain?).
- (2) *No valves in the RAE*—This really means that articles to be useful to newly licensed amateurs need basing diagrams, wiring diagrams etc.
- (3) *High voltages are dangerous*—Many of today's amateurs may well only have high voltages in the power amplifier; as a result they forget about the danger.

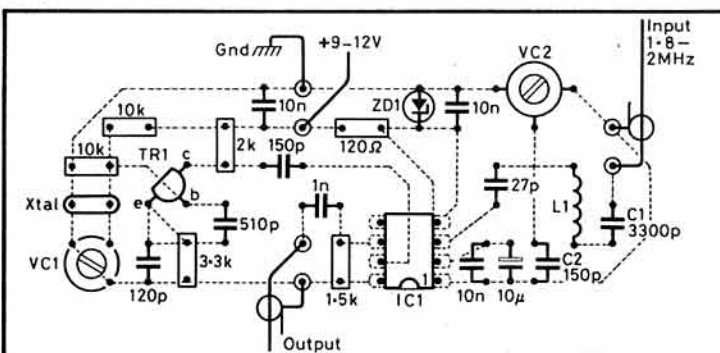
The case for valves

- (1) Power amplifier stages are more linear and less likely to have parasitics or, if they do, it is easier to find and cure them. Solidstate power amplifiers can have lots of spurs—and you will never know without a spectrum analyzer.
- (2) For pa stages, the cost is comparable, especially if you consider the cost of the power supply unit.
- (3) Linear amplifiers providing reasonable power efficiency, cost and ruggedness are much easier to build with valves.
- (4) Valve circuits tend to be simpler.
- (5) High voltages only kill if you touch them!

G3RZP continues: "It isn't a clear cut case by any means. Listening to some of the homebrew (solidstate) QRP transmissions on 3·5MHz, I think an EF91-EL91-5763 valve rig would give a signal with less drift, chirps, T7 notes and spurs than some of the solidstate rigs I hear! Homebrewing a solidstate pa is *not* easy if you are going to avoid parasitics; using a 2N3866 on frequencies as low as 3·5MHz is not a good idea, use a BFY50. The F_t is lower and so are the chances of parasitics. Within the professional field, nobody now knows how they ever managed in the days before the spectrum analyser. In my view, the older valve circuits were tamer and possibly engineers (and amateurs) were technically more experienced!" At one time it was argued that nobody should use ssb without a good oscilloscope; the trend today is that to build a solidstate transmitter you need to have, or have access to, a good spectrum analyzer that can cost thousands of pounds. A powerful argument for sticking to "old-fashioned" valve technology.



(a)



(b)

Fig 2 Printed circuit board and component layout for top-band converter

receiver. The SL1640C has a low-impedance emitter-follower output (pin 6). Since the makers do not recommend this pin being used to drive capacitive loads, G6WDK includes a 1·5KΩ load resistor. To reduce the voltage across the SL1640C (rated at 9V), the supply is regulated by a zener diode to a safe 6·2V. The converter is accommodated on a small (1½in by 3¼in) pcb (Fig 2). Since the current drain is low, a PP3 battery could be used.

No alignment is necessary and, as G6WDK puts it, the converter should work on completion of the final solder joint. While not claimed as a high-performance system (a tunable pre-amplifier or rf stage might prove desirable for dx), it brought in 120 stations in 22 countries in a few weeks of operation using a 100ft random-length wire at only about 15ft above ground.

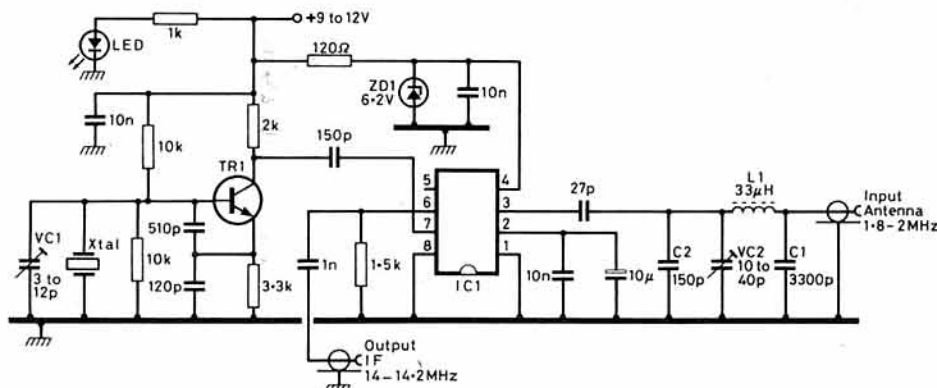


Fig 1. Top-band converter by F/G6WDK for use with any 14MHz receiver. Crystal 16·000MHz (fundamental), HC18U or HC25. IC Plessey SL1640C. TR1 any general-purpose small-signal npn silicon transistor with T018 case such as BSX51, 2N2222, 2N2369, 2N708, 2N914 etc. Capacitors ceramic unless shown otherwise. VC1 and VC2 small trimmer capacitors about 3-12pF. Resistors miniature 0·25W. L1 miniature 33μH rfc. ZD1 6·2V (0·25W) zener diode. Typical voltages (positive) to ground with 9V battery: IC pin 2, 3V; 3, 3V; 4, 6·5V; 5, 5·5V; 6, 5V; 7, 3V

Top band converter for hf receivers

There are still many receivers/transceivers in use that do not cover the 1·8MHz band. Michel Monteil, F/G6WDK, Egletons, France (one time G5MZC and who also operates G6WDK/P from the Isles of Scilly) built a 1·8MHz converter to use with a 1967 SR700A that would be equally suitable for any hf receiver lacking this band (Fig 1). This is based on a crystal-controlled oscillator and Plessey SL1640C double balanced mixer. Using a 16MHz crystal the converter spreads the 1·8MHz band over the i.f. range 14 to 14·2MHz. Crystal frequency can be trimmed over a small range by means of the trimmer VC1. The antenna input circuit forms a broadband, low-pass filter with a cut-off frequency of about 2MHz and its primary function is to attenuate strong hf signals ahead of the mixer, particularly 14MHz signals to minimize break-through into the main

Valves and the 807

Recent items in *TT* on the use of valves in medium and high-power transmitters have brought in a good deal of comment—plus an embarrassing number of base connections/characteristics of the old TT11 including the bitter sweet information that these were given in at least one book in my collection. A useful reminder that it is not sufficient to have a large number of ancient and modern books and brochures unless you can remember what's in them! I rule out the use of home computers as a memory since the amount of data needing indexing is too large for anything much less than a main-frame computer. My policy is just to hoard all the paperwork that comes my way and then try to remember what I should have somewhere!

Charles Wells, G4ZZG returned to amateur radio as a retirement hobby

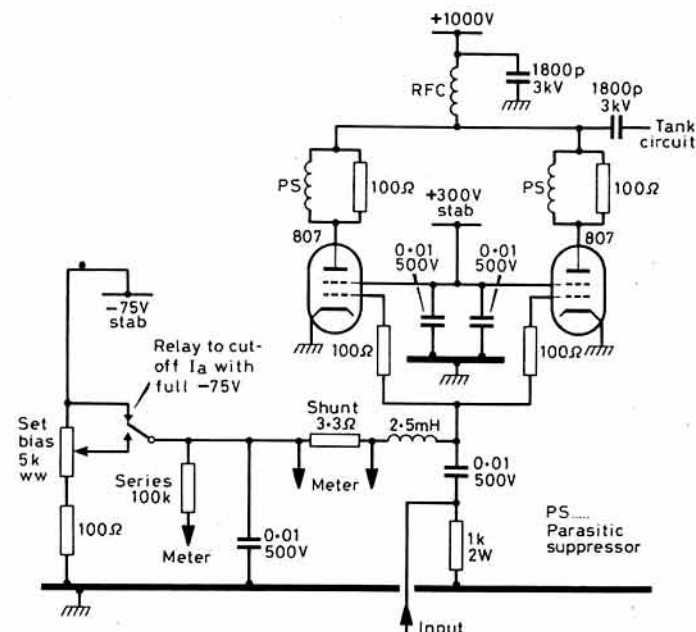


Fig 3. G4ZZG's linear amplifier using a pair of 807 valves with passive grid input. 1mA meter arranged to read grid volts and current (which should be nil)

after a break of 35 years. Remembering fondly the days of plentiful 6V6, 6L6, 807 valves, he acquired a TS120V (10W/26W p.e.p output) and set about adding on a valve linear amplifier. After the initial trauma of finding out current valve prices (actually, I see adverts for the 807 at £2 which is still not bad for a device that can run at a good 75W dc input in Class C telegraphy). Having long ago thrown away his old *WW Valve Guide* and the contents of his junk boxes he is now steadily compiling his own reference book of valve "pin outs". He would welcome pin numbers on diagrams and similarly would like to see an RSGB publication on transmitting valves along the lines of Chas Miller's *Handbook of Valve Radio Repairs* which includes receiving valve information.

G4ZZG has acquired some UX5 valve sockets (still around but quite difficult to find) and has built a linear with two 807 valves and a psu providing a good 1000V (yes it is more than they are rated for but you can often get away with it). Unfortunately the first pair of 807s, obtained from a surplus dealer Sylvania JAN-type (that is to US Joint Army Navy specification) proved the exception; one glowed red and quickly gave up the ghost. He obtained a second pair from a Kent dealer who advertises valves in several journals and these appear to be of recent manufacture, with the brand name Selectron on the envelopes but supplied in plain white boxes (this usually means they come from Poland, the USSR or other East European countries which are still manufacturing valves in large numbers—G3VA).

Initially G4ZZG neutralized his 807 linear but found this unnecessary even on 28MHz when using passive grid input. Fig 3 shows his present

Table 1 Typical valves as Class C amplifiers

Valve	Anode Diss (W)	Max ht (v)	Max dc input (W)	Max freq full power	Heater V/A
6AG7	9	375	11.5	10	6.3/0.65
5763	13.5	375	15	175	6.3/0.75
6V6	8	350	16.5	10	6.3/0.45
6AQ5	8	350	16.5	54	6.3/0.45
6L6	21	400	40	10	6.3/0.9
6146	25	750	90	60	6.3/1.25
6146B		750	120	60	6.3
807	30	750	75	60	6.3/0.9
TT11	7.5	300	10	100	6.3/0.8
TT21	45	1,250	160	30	6.3
813	125	2,500	500	30	10/5

Notes: Figures are based on published ratings and are mostly conservative ICAS ratings. Figures for dc input apply to a single valve. Valves designed for television line-output (sweep) service not included (PL509, 6HF5, 6KD6, 6LF6 etc). Note that Class C (biased well beyond cut-off) is not suitable for linear service for which the lower efficiency Class AB2 is normally used.

Typical efficiencies (ie rf watts output/dc watts input):

Tripler stage	20-25%
Doubler stage	30-40%
Class A amplifier	10-50%
Class AB amplifier	50-60%
Class B amplifier	55-70%
Class C amplifier	65-80%

Table 2 Valve base connections

Valve	Base	1	2	3	4	5	6	7	8	9	TC
6K7 (corr)	IO	S	H	A	G2	G3		H	K		G1
TT11	IO		H	BP	G1	G2		H	K		A
6SN7	IO	1G1	1A	1K	2G1	2A	2K	H	H		
813	7-pin L	F		G2	G1	BP		F			A
12BY7	B9A	K	G1	G3	H	H	HCT	A	G2	G3	
2E26	IO	K, BP	H	G2	K, BP	G1	K, BP	H	BS		A
829	7-pin X	H	2G1	G2	K, G3	HCT	1G1	H			1A, 2A
6AG7	IO	G3, H	H	IS	G1	K	G2	H	A		
6SK7	IO	S	H	GS	G1	K	G2	H	A		
6AQ5	B7G	G1	K, BP	H	A		G1				

BP Beam plates, BS Base sleeve, S Shield, L Large, X Special

arrangement; initially he had a tuned grid input circuit but changed to passive grid. With his 10W (TS120V) input he tried 50, 100, 200, 500 and his present 1000V (2W) input loading. He uses anti-parasitic devices in both anode and grid circuits (resistors-only in grid circuits) and single-point earthing for everything, including the tank circuit. Because of antenna restrictions, the rig is used only on 14, 21 and 28MHz, chiefly cw with some ssb. The new 807s perform well with 1000V and 120mA total current on cw providing 120W dc input and about 60W rf output. Bias voltage on the grids is -30V and standing anode current about 55mA; both grid and screen voltages are stabilized.

It is perhaps worth reminding some readers that the anode dissipation of a valve relates, not surprisingly, to the power dissipated (ie wasted) in the valve. A valve rated at 30W anode dissipation can be run with a dc input that depends on the amplifier efficiency; for example with say 70 per cent efficiency of a Class C sine-wave amplifier, the dc input could safely be about three times the anode dissipation, say 90 to 100W maximum dc input and around 70W rf output. Since more linears are run in Class AB2, with significant standing current and a maximum efficiency of around 50 per cent, you need a pair of valves (as in the G4ZZG amplifier) to achieve the same order of power output as a single valve in Class C. The older valve types were also designed for operation at full power only to a specified frequency, often 30MHz. Although usually still useful above this frequency, they need to be derated to a lower maximum power. Table 1 shows some examples of transmitting valves when used in Class C telegraphy service or narrow-band fm. Table 2 adds a few more base connections to G3GDU's list in the December '86 *TT*. As noted from time to time, the older valve types were often capable of surviving with the anode voltage well above the recommended figure—but not always!

An 813 linear amplifier

A new 813 is a costly beast but there are still quite a lot around as surplus or hidden away in junk boxes if you can prevail upon their owners to part with them. W M Frost, G3OHE writes:

"Having experimented over the years with 813s and PL509s in various modes, I have finally come up with the basic arrangement shown in Fig 4. It is a development of the G2DAF design but with significant detail differences which considerably enhance the efficiency. Using a cheap, non-branded 813, this circuit, properly assembled, will provide a comfortable 400 watts at 28MHz, rising to 600W at 3.5MHz, without exceeding 250-260 mA anode current. Some of the modifications may be considered contentious by purist designers but signal reports confirm a clean signal with excellent audio quality; in fact, as good as comes from the driver unit.

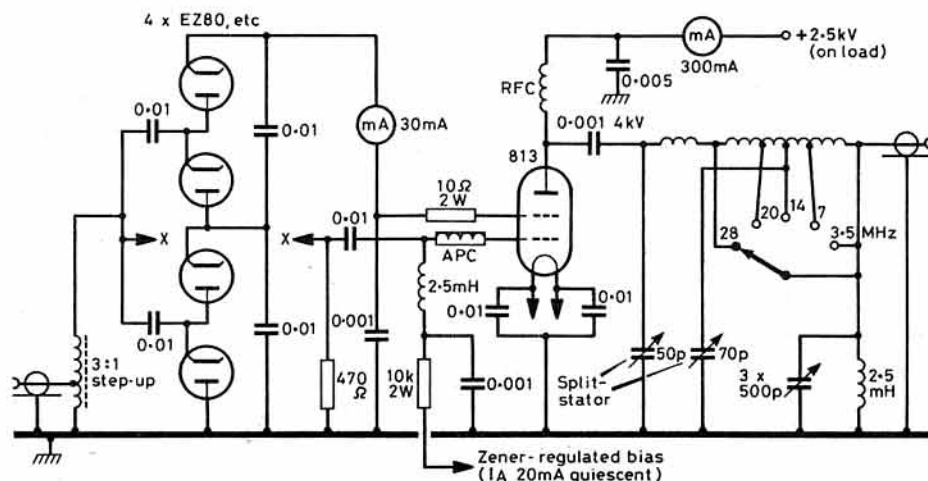
"The main points of difference from the G2DAF arrangement are:

Input: This is through a trifilar balun connected to give a 3:1 voltage step-up from the 50Ω line. Input impedance is thus transformed to about 450Ω and ten 4.7k (2W) resistors in parallel give a close match under resting conditions. The arrangement makes the linear much easier to drive.

Quadrupler and 10K in 813 grid line: While the G2DAF amplifier is an excellent arrangement it has the disadvantage that 180-200V on the screen is not sufficient to give good AB2 efficiency. The change to a quadrupler alone is not an answer because the absence of bias causes the screen to draw very high currents, so depressing output from the four rectifiers to 250V maximum. The 10kΩ resistor allows bias to rise as drive increases. The result is that bias may rise at maximum output to 100V, allowing screen voltage to reach about 400V. At that level the valve can really perform efficiently.

Anti-parasitic arrangements: The 813 simply devours any device placed in its anode line. A choke in the grid circuit, plus a 10Ω screen stopper appear to provide sufficient safeguard against parasites.

Pi-tank capacitor: This is a 120pF component with the stator bars sawn through. Instead of switching in the extra 70pF section on 7 and 3.5MHz, it is connected to the 14MHz tap on the pi-coil. On 28, 21 and 14MHz, it forms an extra section to the pi-output capacitor. On 7 and 3.5MHz it helps to tune the tank circuit.



The pi-tank values can be taken from the amplifier circuit for two 4-125A valves in the *Radio Communications Handbook*, the operating conditions being much the same.

It should go without saying that any amplifier and associated power supply unit operating with voltages in the kilovolt range should be constructed and treated with great care and full regard to personal safety. For example in Fig 4 omitting the 2.5mH rf choke shown across the rf output connection makes no difference to the *performance* of the amplifier as an amplifier, but can make a tragic difference in the event of a failure of the 0.001 μ F 4kV coupling capacitor since, in the absence of an rfc sufficiently rugged to ensure that an ht fuse blows, it would put a lethal 2.5kV dc voltage on the antenna.

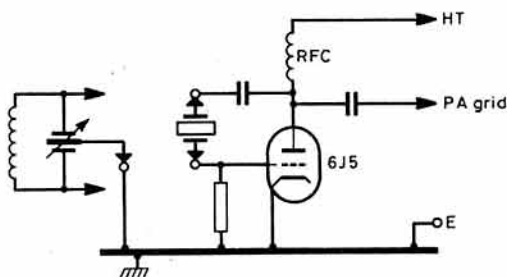


Fig 5. Untuned Pierce crystal oscillator readily doubling as a variable tuned oscillator—a once popular circuit on the lower-frequency hf bands (G3GDU)

mentions "the lovely 808". G3GDU, whose
Today on values I may have appeared too

Today on valves it may have appeared too critical or, writes "The demise of vhf power amplifiers in professional 1kW transmitters has not been welcomed by all manufacturers. A friend who is managing director of a firm manufacturing 1 to 10kW hf transmitters maintains that the use of solidstate amplifiers is primarily due to customer requirement. Another manufacturer of vhf transmitters comments that his equipment is fully solid state for this same reason and that he could think of no more horrible device in a vhf power amplifier than a transistor." G3GDU adds that although interested in Project 6L6 single-stage transmitters he has always preferred, even in the simplest rigs, to use two stages and remembers the popular combination of a 6J5 Pierce crystal oscillator (Fig 5) which could double as a vfo in conjunction with 6V6, 6L6 or TT11 pa. Although it was not always appreciated at the time the oscillator split-stator capacitor should be of a reasonably large value to prevent excessive frequency drift as the 6J5 warms up or when the load on the oscillator is varied. Perhaps not to be recommended in this form above 7MHz.

Oil-immersed resistor mystery

Louis Varney, G5RV/CX5RV, writing from Uruguay, poses an interesting question on the effect of vegetable oil on carbon resistors. This may appear a rather esoteric question but it stems from a very practical problem. He writes: "I have encountered a curious problem with a carbon tubular DI

Whither amateur radio?

With so much high-tech telecommunications and information technology on the horizon, one wonders sometimes what can be the future role of amateur radio. For instance, a paper "Telecommunications services in the next decade" by W E Falconer and J A Hooke of Bell Laboratories (*Proc IEEE*, September 1986) paints the following domestic scene. This, it is stressed, may seem futuristic, but is based on what is possible today. What separates it from reality is not lack of technology but cost, availability and compatibility:

NEWS BULLETIN

DTI POLICY CHANGE

... and a look at their Annual Report 1985/6

On 7 January 1987 the Department of Trade and Industry announced a change in policy relating to the re-issuing of lapsed amateur radio licences with the original callsigns. The text of their Press Release reads as follows:

“The Department's policy has been to permit only the re-issue of licences which were obtained on the basis of a pass in the Radio Amateur Examination, conducted by the City & Guilds of London Institute and awarded after 1958. The Department has now decided, after considering several individual cases and representations from the Radio Society of Great Britain, to change this requirement and permit any previously held licences to be re-issued to the legitimate holders (even where the original qualifications were not based on the current City & Guilds RAE syllabus). The one exception concerns licences which had callsigns in the G5 plus three letter series; that series has already been withdrawn for re-use so will not be available. In order to reduce the administrative burden on the Department the onus will be firmly on the applicant to provide evidence that he/she did in fact hold that licence and to satisfactorily provide confirmation of their identity. The applicant would be required to provide:

a) Incontrovertible evidence of having previously held the licence with that call sign (for example a copy of the original licence document)

b) Full details of the lapsed licence - including full call sign, address to which it was issued, all subsequent changes of address notified to the Department and its predecessors while the licence was valid, date of issue of the licence and any further information (such as correspondence with the Department)

c) Proof of the applicant's identity (a birth certificate or passport)

“There will be no change to the requirement that all new first-time licensees hold a pass in the Radio Amateur Examination.

“Applications for the reissue of lapsed licences should be made, in writing, fully supported by the necessary documentary evidence, to; Department of Trade and Industry, Radiocommunications Division, Amateur Radio Section, Room 613, Waterloo Bridge House, Waterloo Road, London SE1 8UA”

“All of which is a nice piece of news for anyone who falls into that category: well done, “RD” - we hope that this augurs well for your new name - Radiocommunications Division.

.....(cont next page)

RSGB NATIONAL CONVENTION - LATEST

In last month's News Bulletin we mentioned that the dates for this year's NEC had been changed to open on Friday/Saturday instead of Saturday/Sunday, at the request of a large number of traders.

Just to remind you, the new dates and opening times are:

27 March 1987 10am-6pm
28 March 1987 10am-6pm

In next month's issue we'll be publishing a special 'NEC Preview' with details of the stand plan, the lecture programme and facilities available for visitors to the convention. There'll be a map showing the best routes to take, train times from Birmingham New Street, London and elsewhere to get you there by opening time or soon after. The Solihull & Chelmsley Wood Raynet Group will be providing the talk-in again this year and we'll give you details of the frequencies they'll be using.

Morse tests will be conducted on both days and will be split into morning and afternoon sessions. If you'd like to take the test at the NEC, apply now for an application form. Places are limited and will be allocated on the usual first-come first-served basis.

Still with NEC, examinations for US amateur radio licences will take place on the Saturday afternoon. Candidates should register their interest beforehand with the UK co-ordinator, D.G Lambert, G0/KK1J, 27 Redcliffe Rd, London SW10 9NP.

And finally - if you're thinking of running a trip to the NEC this year you might like to know that advance tickets are available at £2.50 each and we'll give you one FREE for every 20 that you purchase. Send your cheques to HQ (marking your envelope "NEC Tickets - Circulation Department") by first post 13 March, stating how many tickets you want. We'll do the rest. Only bit of small print is that the minimum order is 20 tickets.

.....(from previous page)

Still at Waterloo Bridge House, we've received a copy of the Radio Regulatory Division's Annual Report for 1985/6. In the Foreword the Minister of State, Geoffrey Pattie, states that "As part of its efforts to improve openness and consultation, (RRD) is publishing this, its first report. It is somewhat unusual for Divisions within Government Departments to issue reports, but then RRD is in an unusual position....I believe that radio users should be given this opportunity to learn what RRD is up to, why it is pursuing certain policies and what its thoughts for the future are....". Geoffrey Pattie goes on to say that "....Radio Regulatory Division has now changed its name to Radiocommunications Division. This is intended to reflect its new approach, which is aimed less at regulation - a phrase suggesting heavy-handed bureaucracy - and more at providing a service to responsible users...." One wonders whether this change of name is also associated with the proposals formulated in the CSP International report (mentioned in last month's Bulletin) connected with "privatisation" of the radio spectrum. Incidentally, despite our expressed hope of providing more on that story this month, nothing further has emerged yet over and above what we said last month. As soon as we receive more information we'll let you have it.

Probably the most interesting part of the review from the Society's point of view is that dealing with the Radio Investigation Service. In essence it outlines the changes which have taken place during the last year and a half, and discusses the review of the RIS which also took place in that timescale. The report indicates that the review "....found much of the (RIS) domestic remedial work to be more appropriate to retailers, rental companies and manufacturers who supplied equipment, rather than to Government. In the case of manufacturers it was clear that poor engineering design had led to the building of receivers that did not give sufficient immunity to the growing and diverse use of radio - much of it in urban areas - for PMR, CB and amateur radio. The review therefore proposed that new standards of immunity should be introduced....The review saw enforcement of licence requirements as an appropriate function of Government, and one which should be paid for out of licence revenues, and it proposed that resources should be re-directed to that end...."

In regard to enforcement work, the report states that the RIS has been given a new mandate by Ministers. This reads;

"To reduce to an acceptable level the avoidable degradation of radio communications experienced by authorised radio users, giving greatest priority to radio services which are important on grounds of safety and business efficiency; and to ensure radio users are licensed in order to facilitate the management of the spectrum and to raise the funds necessary to carry out the regulatory functions"

In the context of amateur radio, the report adds;

"Amateur radio is essentially a leisure use of radio (although it can play an important part in arousing the interest of the young in radio and engineering) and the resources that can be devoted to abuse of the amateur radio service are limited. Nevertheless, the RIS welcomes evidence of serious abuse of the amateur bands and takes action against offenders. RRD and the

Radio Society of Great Britain have developed a strategy whereby the Society itself is to undertake a major role in identifying abuse in the amateur bands"

From statistics given in the report, in the course of the financial year 1985/6 there were 5 prosecutions and 5 convictions for unlicensed use of the amateur bands. A total of £349 in fines (and £235 in costs) was imposed.

The report also contains various interesting items on, for example, the work of the Radio Monitoring Station at Baldock and the overall international regulatory perspective as seen from Waterloo Bridge House. There is also a comprehensive statistical section at the back.

We found the Annual Report interesting, although we've certainly quarrelled with some of its precepts in the past and we expect to do so again. You can obtain a copy at no charge by writing to the Librarian at Waterloo Bridge House.



Cat & Mouse..?

Kismet the cat thinks packet radio is great fun. She likes nothing better than to play with the computer when Trevor, G6TJT is trying to have a QSO.

Trevor is a founder member of AMRAC - the national Amateur Radio & Computing Club - and operates regularly from his QTH in Barton-on-Sea, through AMRAC's digipeater, GB3HP in Winchester on 144.650 MHz. (Photo tnx G6TJT)

SAFETY IN THE SHACK

If you haven't the slightest idea what Protective Multiple Earthing is (and no, it doesn't have the slightest thing to do with how to radiate a bigger signal on Top Band or how to get 3 kW out of an 807), read on.....

PME is all to do with the incoming mains supply; specifically it's to do with the earth side of it. In previous years, the practice in domestic-type installations was to provide a local earth of some sort, often involving either a rod or spike driven into the ground or the copper or lead pipes in the domestic water supply system. The earth impedance obtained in this way was usually quite low but it wasn't always reliable and, with the advent of large-scale use of plastic pipes in domestic water supply systems, something better was needed.

In the mid-seventies the electricity supply regulations were altered to permit the use of what is known as Protective Multiple Earthing. In this system the main earth terminal of the installation is connected to the neutral of the incoming supply at the user's consumer unit or switchboard. All metallic surfaces within the building concerned - such as gas pipes, water pipes, the central heating system, the bath and accessible structural steelwork if there is any - are also bonded together. This gives the consumer an earth of very high reliability and low impedance.

Under normal circumstances a small voltage might appear between a PME earth and the true earth potential measured outside the building as a result of voltage drop in the neutral of the Electricity Board's system. In the very rare fault condition of a rupture of the Board's neutral conductor - at least we hope it's very rare - a rather higher potential difference may appear, which could in theory rise to the full phase-to-neutral voltage (nominally 240 volts plus or minus 6%). However, because all

This month we take a look at Protective Multiple Earthing and its implications in the shack

the metalwork in the building is bonded together, the shock hazard is minimised; the building or premises effectively form what is known as a "Faraday cage".

It is permissible to connect other earths or means of earthing to the main earth terminal of the installation if you wish. However, there is a potential snag - as we outlined above. If a low impedance RF earth is connected directly to the radio equipment, a very large current could flow in the earth wire of the connected equipment if the Board's neutral broke. This current could be as high as several tens of amps - not good.

Following consultation with the Electricity Council, the RSGB Technical & Publications Committee has been considering this matter and offers the following advice to members whose properties have been provided with a PME facility:

1) If possible, disconnect the protective earth leads from the earth pins of the 13 amp mains plugs supplying every piece of equipment in the station. Bond the chassis of each piece of equipment to the radio earth, making sure you're using a heavy conductor - 32/0.2 mm as a minimum and anything larger wouldn't hurt a bit. Having done that, go out and buy a Residual Current Circuit Breaker (RCCB).

These devices have been mentioned in Technical Topics from time to time and come in various sorts - basically either connected into the cable or replacing a standard twin 13A wall socket - and you need the "high-sensitivity" type. Many DIY establishments sell the "Power-Breaker" range and they come in various styles, or you can obtain one from RS Components via the new "Electromail" facility - their part number 334-094 can go on the cable, or 331-095 or 331-102 replace the conventional twin 13A socket. The RCCB will protect the socket, the equipment and to some extent yourself.

Now the important bit. Having done the above, NO METALWORK BONDED TO THE MAIN EARTHING TERMINAL IN THE CONSUMER UNIT IS THEN ALLOWED WITHIN TWO METRES OF THE RADIO EQUIPMENT. THIS INCLUDES THINGS LIKE RADIATORS, ELECTRIC FIRES, KETTLES, ETC. WHICH ARE NOT CONNECTED TO THE RF EARTH. THE USE OF THE RCCB AS OUTLINED ABOVE IS

* M A N D A T O R Y *

The shack RF earth which you've no doubt gone to some trouble to make must also have a low a resistance as possible as far as 50 Hz is concerned, although if it's any good as an RF earth the odds are that it will automatically be pretty good from the mains point of view. All connections to it MUST be made with a generously-sized conductor and, as we said above, 32/0.2 is about the minimum (here again, you can get this type of cable from your local Payless/B & Q/Texas Homecare or wherever).

2) If the two-metre separation distance is not possible, the RF earth should be bonded to the PME bonding point at the consumer unit. If you choose to do this, the earth conductor must have a minimum cross-section of 10 mm² (which is something like 7/1.35 mm) and should preferably be even thicker than that. All parts of the RF earth must also be of thick conductor so that any mechanical

Continued over page

damage to the earth system doesn't lead to a high current density in one or two conductors if there's an earth fault. By "parts of the RF earth" we mean things like the radials of an HF vertical, for instance. RF isolation between the RF earth and the PME earth should be provided by winding the lead to the RF earth round some ferrite rings. Obviously the sort of conductor we've been talking about doesn't go round toroids terribly easily - we suggest that you don't try for more than four turns and that you put at least five and preferably eight toroids in

"series" and stack them closely together. Suitable rings can be obtained from Headquarters. The radio equipment should only be connected to the RF earth after you've done this, NOT to the wall socket earth.

3) If you have to provide an RF earth on any other equipment to solve an EMC problem, it is ESSENTIAL to carry out the precautions in (2) above for safety reasons. Please remember that installing RF earths in a neighbour's house without doing the job properly could quite easily

lead to fires at best and serious injury or death at worst, which in turn would leave you in a very unpleasant situation.

We're sorry if the above sounds a bit daunting, but it's an important topic and deserves taking seriously. If you don't understand anything we've said above and you feel you'd like some clarification, please don't hesitate to contact Peter Chadwick, G3RZP (QTHR) the chairman of the Technical and Publications Committee and ask him for more information.

IARU news

We regularly receive news letters from IARU and we thought you might like to read an extract from their 'year in review'.

“Perhaps the best way to set the stage for a review of the events of 1986 is to quote from the text of the congratulatory telegram that was sent on behalf of IARU to the ITU Secretary-General, Richard E. Butler on the occasion of World Telecommunication Day, 17 May 1986:

Dear Mr Butler,

On behalf of the 124 member-societies of the International Amateur Radio Union, its officers and Administrative Council, it is my privilege to extend greetings on World Telecommunication Day.

The year just past regrettably has been marked by numerous natural disasters. Radio amateurs are proud that their efforts have helped alleviate human suffering, in the spirit of Resolution No.640, adopted in Geneva in 1979.

As we look back on the year, we are also proud that you were able to join us for the IARU Region 3 Conference in Auckland last November, as well as for the WIA 75th Anniversary celebrations in Melbourne.

May this year to come be a year of progress and success for the world's telecommunications community.

With 73,

David Sumner, K1ZZ
Secretary, IARU.

"The dominant theme for IARU in 1986 was the development of even closer ties with the International Telecommunications Union. Special milestones were reached in Nairobi in September, and again in Tokyo two months later, with the conducting by IARU President Baldwin (with assistance from the regional organizations) of courses in Amateur Radio Administration under ITU auspices. These courses provided the opportunity to acquaint telecommunications officials from a number of developing countries with the potential that is represented by the Amateur Service.

"The IARU Radiosport Championship was renamed and modernised, becoming the IARU HF World Championship with a 24-hour operating period and special emphasis on working the headquarters stations of IARU member-societies.

Fifteen member-societies (including RSGB) activated their stations for the 1986 event, and more are known to planning for 1987.

"Region 2 held its triennial conference in Buenos Aires during October, with 24 member-societies represented.... The conference was followed immediately by a meeting of the IARU Administrative Council.

"No new member-societies joined our ranks during the year, but an application for membership was received on behalf of Liechtenstein.

"A number of member-societies noted special anniversaries during the year, including the Japan Amateur Radio League (JARL), which managed to have the launch of the first all-Japanese Amateur Radio satellite, Fuji-OSCAR 12, coincide with its 60th Anniversary celebrations. The Amateur Satellite programme itself marked the 25th

anniversary of the launch of OSCAR 1 on 12 December.

"Amateur Radio demonstrated once again its effectiveness as a disaster communications medium following the earthquake in El Salvador. In this instance, WARC-79 Resolution No.640, relating to the use of amateur bands in the event of natural disasters, proved its worth.

"The coming year promises to be a busy one, with TELECOM-87 representing a major opportunity to tell our story to the world's telecommunications community."

Short Wave Magazine - Takeover

Short Wave Magazine has been taken over by PW Publishing Ltd.

The publishers of Practical Wireless Magazine are pleased to announce that they have purchased Short Wave Magazine from its previous owners. This took effect from 1 January 1987.

Short Wave Magazine will continue to be published but, commencing with the April 1987 issue, it will shift its emphasis and become a magazine for DX listening and DX TV as well as covering scanners, weather satellites and FAX.

The cover price and publication date will remain the same and the magazine will continue to be available through newsagents.

Dick Ganderton, G8VFFH, will become the Editor and Charles Forsyth will be the Features Editor. Roger Hall will handle the advertising for SWM, in addition to Practical Wireless.

NARSA, the Northern Amateur Radio Societies' Association is looking for a venue for its 1988 exhibition as the Belle Vue complex has been sold. Anyone who can suggest a suitable venue with a floor space of around 10,000 square metres is asked to contact Chris Harrison, G8KRG on 061-773 7899 during the evening.

LICENCE REVIEW:

As we mentioned last month, the RSGB and the DTI are shortly to embark upon a major review of the UK amateur radio licence.

Input from members concerning this subject is welcome and should be sent to "The Secretary" at RSGB Headquarters, marking your envelope "Licence Review" in the bottom left corner. Please keep your comments clear, concise and to the point.

PHOTO CALL:

Now that we have full colour on the front page of RadCom, we'd like to see a few of the year's amateur radio events portrayed in all their glory - so all budding Snowdons and Lichfields are requested to take their Nikons and Hasselblads to the next Field Day or exotic DX location. Try thinking dramatically ("Sunset over the EME array"; "Lightning strikes SSB field day"; "4CX250B in the snow", etc, etc) We'd prefer 2"x2" or 35mm transparencies, but good quality prints will still be OK. You will, of course, be credited in RadCom if your photo is accepted.

REPEATER MANAGEMENT GROUP:

The Glenrothes & Dist ARC, who have run GB3FE in the Fife area of Scotland for some years, have decided to abandon the project. They are offering the entire repeater equipment to anyone willing to put GB3FE back on the air again. Any takers....?

Details from:

Colin Dalziel, G8LBC,
9 Dunlop Court,
Low Waters,
Hamilton, ML3 7YJ.

Anyone interested in applying for a packet switch (digipeater) licence should contact the RMG's Data Repeater Co-ordinator:

Martin Stubbs, G8IMB,
'Crofters',
Harry Stoke Road,
Stoke Gifford,
Bristol, BS12 6QH,



MORSE TESTS

The following list shows the dates and locations of all the available test centres from mid-March to mid-April 1987, as we went to press. If you want to take a test and any of the centres shown is within striking distance, send for an application form straight away. Completed applications will be dealt with strictly on a first-come first-served basis.

If there is no appropriate centre for you please contact RSGB Headquarters in a few weeks. By this time we may well have been notified of some additional centres, one of which may be more convenient for you.

Morse tests will be carried out in groups of three and will be of half an hour's duration. Details of the test, the venue and how to get there will be sent to you as soon as your application has been processed and your place confirmed.

COUNTY	TOWN OR LOCATION	DATE
Isle of Wight	Binstead	14/03/87
Strathclyde	Ayr	14/03/87
West Yorks	Pontefract & DARS	15/03/87
Shropshire	Telford	16/03/87
Merseyside	Huyton	17/03/87
Beds	Luton	19/03/87
South Yorks	Stocksbridge, Sheffield	19/03/87
Dorset	Dorchester	21/03/87
Cornwall	Liskeard	21/03/87
Bucks	Bletchley, Milton Keynes	22/03/87
West Midlands	RSGB CONVENTION NEC - (am session)	27/03/87
West Midlands	RSGB CONVENTION NEC - (pm session)	27/03/87
West Midlands	RSGB CONVENTION NEC - (am session)	28/03/87
West Midlands	RSGB CONVENTION NEC - (pm session)	28/03/87
Greater London	Croydon	30/03/87
Guernsey CI	St Martins	02/04/87
North Yorks	Scarborough	04/04/87
Lancs	Fleetwood	04/04/87
Wilts	Salisbury	04/04/87
West Sussex	Horsham	05/04/87
Derbys	Derby	06/04/87
Gwent	Newport	06/04/87
Cleveland	Billingham	08/04/87
Suffolk	Ipswich	09/04/87
Strathclyde	Glasgow	13/04/87

It is likely that more centres will have been notified to RSGB Headquarters since we went to press, so do give us a call for an application form or for further details.

The RMG is setting up a sub-committee to oversee the one-year packet switch experiment currently taking place on 144 MHz. Anyone interested in joining this working group should contact the RMG Chairman: (see address below)

The RMG has vacancies for for a Minute Secretary and a Regional Coordinator (Midlands). Applicants for the latter post must live in the Midlands, Wales or counties adjacent to the Wash. Details from the RMG Chairman:

Mike Dennison, G3XDV,
5 Lambs Walk,
Whitstable,
Kent, CT5 4PJ.

50 News update MHz

During January the Society submitted a report to the DTI concerning activity and operational experience at 50 MHz since the band became available to Class A licensees last year. The Society hopes that some of the existing licensing conditions can be relaxed, and a meeting with the DTI is scheduled to take place early in March to discuss all aspects of amateur operation at 50 MHz. From what we hear, it's been a good year for 50 MHz addicts.

Events Diary

Mobile Rallies

This is a list of all rallies, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Bulletin'.

8 FEBRUARY

Bury RS Hamfeast - Mosses Youth & Community Centre (minutes from the M66), Cecil Street, Bury, Lancs. Details G1PKO, tel: 061-764 5018.

28 FEBRUARY

Rainham Radio Rally - Bredhurst R&TS, Parkwood Community Centre, Deanwood Dr, Rainham, Gillingham, Kent. (5 mins from M2 junc 4) Talk-in on S22, GB4RRR. Opens 10am. Free car park. Admission 50p. Details G1LKE, tel: Medway 362154.

1 MARCH

Welsh Mobile Rally - Leisure Centre, Barry, S.Glam. Details GW8CMU, tel: 0446 711426.

7 MARCH

Tyneside ARS Blue Star Rally - High Gosforth Pk, Newcastle-upon-Tyne. Usual trade stands, bring & buy stall, morse tests (booked via RSGB HQ), talk-in station, free parking, bar & refreshments. Details G6VEG, tel: Tyneside 2866908 or G4KOT, tel: 2341148.

8 MARCH

Wythall RC Rally - Wythall Pk, Silver Street, Wythall. Spaces are made available at special prices for radio clubs and societies to sell of junk & surplus equipment. Details G0EYO, tel: 021 430 7267.

15 MARCH

South Essex ARS Mobile Rally - The Paddocks Community Centre, Canvey Is, Essex. Details G4FMK, tel: 0268 683805.

25th NARSA Amateur Radio and Electronics Exhibition - Belle Vue, Manchester. 11am - 4pm. 70 trade stands & 30 club stands. Details G6CGF, tel: 051 630 5790.

22 MARCH

White Rose Rally - Refectory, University of Leeds. Opens at 11am. Talk-in S22. Details G0EGM, PO Box 73, Leeds, LS1 5AR, tel: 0532 676368 (eve)

27/28 MARCH

RSGB NATIONAL AMATEUR RADIO CONVENTION - National Exhibition Centre, Birmingham, Hall 3A. Usual amateur radio & component dealers. RSGB Membership services &

Bookstall. RSGB Committee stands. Talk-in & ample parking. Refreshment & bar facilities. Details: RSGB HQ. Trade: Norman Miller, G3MVV (QTHR). Morse tests will be conducted and bookings must be made via RSGB HQ using the correct form.

5 APRIL

Pontefract & DARS Components Fair - Carleton Community Centre, Pontefract. Details GOAAO, tel: 0977 43101.

26 APRIL

RSGB VHF CONVENTION - Sandown Park Race Course, Esher, Surrey. Details VHF Committee.

3rd Radio Rendezvous - Grange Farm Hobbies Centre, Scunthorpe. Details G4ATA, tel: 0724 867137.

Lough Erne Mobile Rally - Killyhevlin Hotel, Enniskillen. Opens 12 noon - more traders - guest speaker GM3HAT - shield and cash prize for best construction project. Details Bill Ward, tel: 0365-24905.

IN BRIEF - More details later.

3 MAY

BATC Rally - Crick Post House Hotel, near Rugby. Details Trevor, tel: 0532 670115.

Swansea ARS Rally - Patti Pavilion, Swansea. Details GW4HSH, tel: 0792 404422.

4th Anglo-Scottish Rally - Tait Hall, Kelso, Borders. Details Andre, tel: 0573-24664.

4 MAY

Mid-Cheshire ARS Rally - Winsford Civic Hall. Details G4XFD QTHR.

10 MAY

Drayton Manor Rally - Drayton Manor Park, Staffs. Details Norman G8BHE, tel: 021-422 9787.

Swindon Rally - Oakfield School, Marlowe Ave, Swindon. Details Ken G8SFM, tel: 0666 89-307.

3rd Yeovil QRP Convention - Preston Centre, Yeovil, Somerset. Details Eric G3GC, tel: Yeovil 75533.

17 MAY

30th Northern Mobile Rally - Gt Yorkshire Showground, Harrogate. Details G3CQQ, tel: 0943 602118.

24 MAY

Maidstone Mobile Rally - Maidstone YMCA Sports Centre, Melrose Close, Maidstone. Details G6FZD, tel: 0622 50709.

11th East Suffolk Wireless Revival - Civil Service Sports Ground, Bucklesham, near Ipswich. Details G4IFF, tel: Ipswich 688204.

Plymouth ARC Mobile Rally - Plymstock School, Plymouth. Details G0BNT, tel: 0752 777777.

30/31 MAY

Milton Keynes Amateur Radio Exhibition - Bletchley Leisure Centre. Details G1GOF, tel: 0234 767904.

14 JUNE

Elvaston Castle Mobile Rally - Elvaston Castle Country Pk, near Derby. Details G4PZY, tel: 0332 767994 or G4CTZ, tel: 0332 799452.

RNARS Mobile Rally - HMS Mercury near Petersfield, Hants. Details G4UJR, tel: 0703 557469.

21 JUNE

Denby Dale Mobile Rally - Shelley High School, Nr. Huddersfield. Details G3SDY, tel: 0484-602905.

28 JUNE

30th Longleat Rally - Longleat Park, near Warminster. Details G4FRG, tel: Portishead 848140.

12 JULY

Worcester & DARC Droitwich Mobile Rally - High School, Droitwich. Details GOAOC.

17/18/19 JULY

AMSAT UK Colloquium - University of Surrey. Details Ron, G3AAJ, tel: 01-989 6741.

19 JULY

Cornish Mobile Rally - Camborne College of FE. Details G1AJB.

McMichael '87 Rally - Haymill Youth & Community Centre, 112 Burnham Lane, Slough. Details G0BTY, tel: High Wycombe 29868.

26 JULY

Scarborough ARS Rally - The Spa, Scarborough. Details Ian G4UQP, tel: 0723-376847.

2 AUGUST

RSGB MOBILE RALLY - Woburn Abbey, Woburn, Bedfordshire.

Rolls-Royce ARC Mobile Rally - Rolls-Royce Sports & Social Club, Barnoldswick. Details, G4ILG, tel: 0282 812288 or 0282 813271 (day).

9 AUGUST

30th Derby Mobile Rally - Lower Bemrose School, St Albans Road, Derby. Details Martin G3SZJ, tel: 0332 556875.

Hamfest '87 & Craft Fair - Wimbourne, Dorset. Details G0CDY, tel: 0202 872503.

16 AUGUST

Red Rose Rally - Bolton Sports & Exhibition Centre. Details G1100, tel: 0204-24104.

6 SEPTEMBER

Preston ARS 20th Annual Rally - Lancaster University. Details G3DWQ, tel: 0772 53810.

13 SEPTEMBER

Lincoln Hamfest - Lincolnshire Showground, Lincoln. Details G8VGF, tel: 0522 25760

Scottish AR Convention - The Magnum Sports & Leisure Centre,

Events Diary

Irvine, Ayrshire.

National Amateur Radio Car Boot Sale - Old Warden Aerodrome, Beds. Details G6EES, tel: 0582 607623.

SMC Open Day - Chandlers Ford Industrial Est, Eastleigh, Hants. Colin Ward (SMC), tel: 042 15-55111.

Telford Mobile Rally - Telford Racquet & Fitness Centre. Details G3UKV.

20 SEPTEMBER

Peterborough R & ES Rally - Wirrina Sports Stadium, Peterborough. Details G4PNW.

Trafford Rally & Components Fair - Lancs CCC (Old Trafford), Talbot Road, Stretford, Manchester. Details G1IJK, tel: 061-748 9804.

Vange ARS Rally - Nicholas School, Leinster Road, Laindon. Details G4QJN, tel: 02774-4386.

27 SEPTEMBER

Harlow Mobile Rally - Harlow Sports Centre. Details G4KVR, tel: 0279 22365, daytime or G3UEG, tel: 0279 27788, evenings.

4 OCTOBER

Wakefield Mobile Rally - Details G4RCH, tel: 0532 536633.

Great Lumley AR & ES Rally - The Community Centre, Great Lumley, Chester-le-Street, County Durham. Details G4MSF, tel: 091 469 3955.

22 NOVEMBER

Wesr Manchester RC Winter Rally - Pembroke Halls, Walkden. Details G1IOO, tel: 0204-24104.

6 DECEMBER (Provisional)

Verulam Christmas Rally - St Albans City Hall. Details Hilary G4JKS, tel: 0727 59318.

GB Calls

The list below shows ALL the special event stations licensed for operation during February and March (as at press date). It is taken direct from the GB Calls file on the HQ computer. These call signs are valid for use from the date given but the period of operation may vary from 1 to 28 days. There's now no need to send details direct to the editorial office.

31 JANUARY

GB2ILA - International Listeners Assoc: ILA HQ, Swansea. Details GW40XB.

1 FEBRUARY

GBOSIX - UK Six Metre Group: Brighton. Details G4IIL.

GB4WGG - Wellingborough Girl Guides: Wellingborough. Details G4MOP.

GB2KT - G2KT: Chelmsford, Essex. Details G3KPJ.

8 FEBRUARY

GB2EBS - East Birmingham Scouts: Castle Bromwich, Birmingham. Details G4BBT.

11 FEBRUARY

GB4RRR - Rainham Radio Rally: Parkwood Community Centre, Rainham, Kent. Details GOAMZ.

13 FEBRUARY

GB2HWW - York ARS (G3HWW): Details G3FTS.

GB4BGR - Brownies, Guides & Rangers: Crossland Moor, Huddersfield. Details G3SDY.

14 FEBRUARY

GBORAG - Rag Week: Bishop Grosseteste College, Lincoln. Details G4STO.

GBOSJW - Sir Joseph Whitworth: The Whitworth Institute, Darley Dale, Matlock. Details GOFSE.

16 FEBRUARY

GBOHSG - Hampden Park Scouts & Guides: Eastbourne, East Sussex. Details G4YJW.

19 FEBRUARY

GB2WG - Wingerworth Guides: Wingerworth, Chesterfield, Derbys. Details G3YBO.

20 FEBRUARY

GBOWGG - Wirral Girl Guides: Royden Park, Wirral. Details G4UDR.

GB8WGG - Wollaston Girl Guides: Wollaston, Northants. Details G6FJF.

GB2DGG - Dembigh Girl Guides: Denbigh, Clwyd. Details GW4UWI.

GBOLFG - Low Fell Guides: Miller Centre, Low Fell, Tyne & Wear. Details G4PDO.

21 FEBRUARY

GB2SK - 2nd Skellingthorpe (Brownies): Saxilby, Lincoln. Details G3UPL.

GB2SDR - Shelf District Rangers: St.Micheals School, Shelf, nr Halifax. Details G3TAY.

GB4GG - Girl Guides: Brighton, East Sussex. Details GOEXS.

GB4DX - "DX": Red Lodge, nr Bury St.Edmunds, Suffolk. Details G4BWP.

22 FEBRUARY

GB4LPB - Langley Primary Brownies: Middleton, Manchester. Details G4ZQL.

27 FEBRUARY

GBOSR - Blue Star Rally: North East Exhibition Centre, Newcastle upon Tyne. Details G4ILW.

GBONBL - Newcastle Breweries Ltd: North East Exhibition Centre, Newcastle upon Tyne. Details G4KOT.

28 FEBRUARY

GB4SCH - St.Catherines Hospice: Newdigate, Surrey. Details G4SIB.

GB2SDD - St.David's Day: British Steel Corp Sports & Social Club, Port Talbot, West Glam. Details GW4HQJ.

6 MARCH

GB2TSW - Training Ship Wizard: Sea Cadet HQ, White Hart Lane, Tottenham, London, N17. Details G4PSH.

8 MARCH

GB6WR - Wythall Rally: Silver Street, Wythall, Worcs. Details GOZYU.

21 MARCH

GB8PX - Prefix: "Midtown Farm", Cummertrees, nr Annan, Dumfriesshire. Details GM4NNC.

28 MARCH

GB2DX - "DX": Hawkley Hall, Wigan. Details G4NXG.

Contests

Listed below are the VHF and HF contests for the next quarter. The full list of RSGB's VHF and HF contests for 1987 was given in the December 1986 issue.

VHF CONTESTS 1987

1 FEB:	70 MHz Cumulative
8 FEB:	144 MHz CW
15 FEB:	70 MHz Cumulative
22 FEB:	432 MHz Fixed & AFS
1 MAR:	70 MHz Cumulative
7/8 MAR:	144/432 MHz & SWL
15 MAR:	70 MHz Cumulative
29 MAR:	70 MHz Cumulative
5 APR:	432 MHz CW
11/12 APR:	70/144 MHz & SWL
12 APR:	10 GHz Cumulative

HF CONTESTS 1987

3/11/17/25 JAN:	7MHz Cumulatives
4/10/18/24 JAN:	3.5MHz Cumulatives
5/13/21/29 JAN:	1.8MHz Cumulatives
11 JAN:	AFS
7/8 FEB:	7MHz SSB
4-15 FEB:	1st 1.8MHz
21/22 FEB:	7MHz CW
14/15 MAR:	Commonwealth '50'
21 MAR:	Town & Country
APR (tba):	ROPOCO 1.
19 APR:	QRP Fixed

INTERNATIONAL CONTESTS

Organising Society in brackets.

14/15 FEB:	PACC (Veron)
	YU DX CW (SRJ)
21/22 FEB:	URA Trophy (UBA)
	CQ WW 160m DX SSB
	Int DX CW (ARRL)

.....(cont over)

.....(cont from previous page)

28 FEB/1 MAR: French Phone (REF)
(rules p46 Jan)
7/8MAR: Int DX Phone (ARRI.)
4/5 APR: SP DX CW (PZK)
11/12 APR: Yuri Gagarin CW
(RSF)
25/26 APR: Helvetia (USKA)

CLUB CONTESTS

15 MAR: Derby & Dist ARS National
144-145 MHz

New Award

Following the success of the 144 MHz award for operators and SWLs which began on 1 January 1986 and based on the county of Shropshire and its borders, the Oswestry & Dist. ARC has introduced another award for the 10m to 160m bands. This time, the 'border' is that between England & Wales and the numbered certificates are of the same high quality and layout as the previous award. Bands and modes may be mixed but all stations worked or heard must be as from 1 January 1987. The requirements are as follows.

For this award, claims are based on the counties of Clwyd, Powys and Gwent in Wales, and Cheshire, Shropshire, Hereford & Worcester and Gloucestershire in England.

Claimants must work or hear either the Oswestry & DARC station (G4TOO), a member of the club or any special event station organised and run by the club. In addition, UK claimants must work/hear 10 stations in each of the above named counties and non-UK claimants must work/hear 5 stations in each of the above named counties.

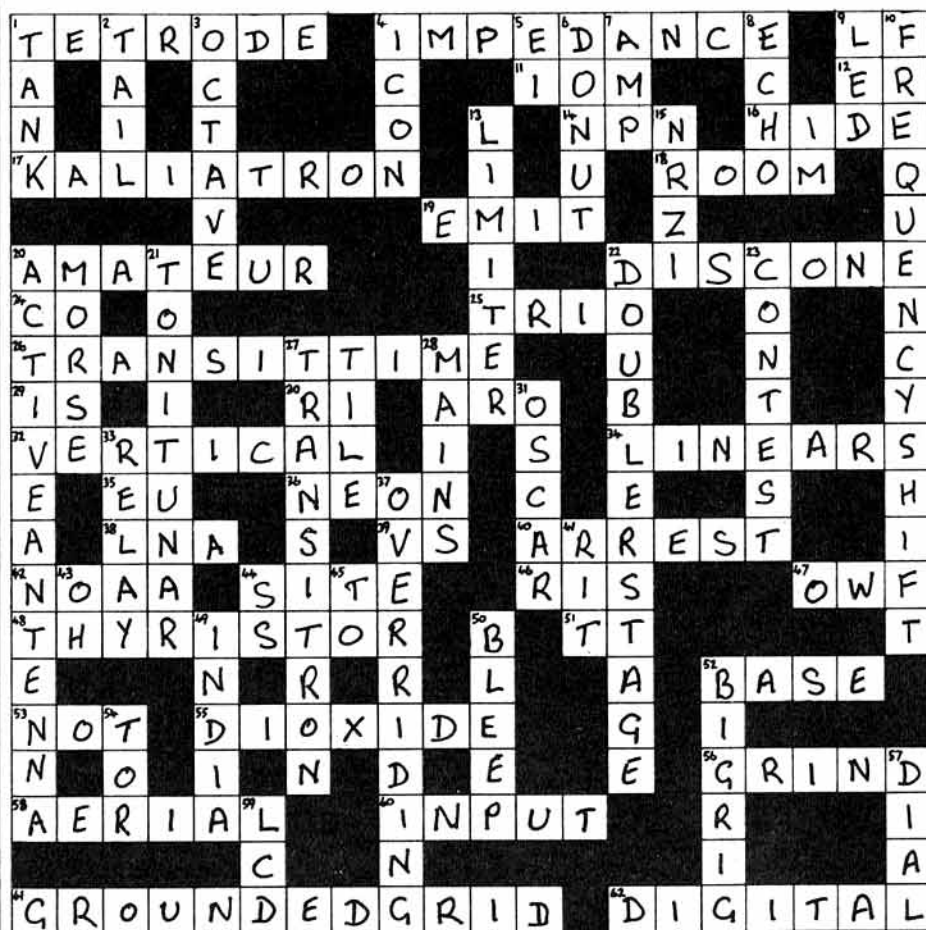
To sum up: the total number of stations worked/heard by UK claimants is 71 and the total for non-UK claimants is 36.

To claim the award, send a log extract certified by two other operators/SWLs giving the Date, Callsign, Frequency, Mode and County for each station worked/heard together with £1.75 or 10 IRCs to:

The Awards Manager,
PO Box 6
OSWESTRY
Shropshire
SY11 1ZZ

Further details are available by sending a SAE to the address above.

Crossword solution



Christmas Quiz

You remember that in the December issue we published a Christmas Crossword and a Christmas Quiz, with book tokens as prizes? Well, we received a fair number of entries for the crossword and we'll be announcing the results next month - the solution is given above. But would you believe that, out of a grand total of 36,000-odd readers of this magazine, NOT A SINGLE ONE OF YOU sent in an entry for the Quiz? That's right - we didn't receive a single entry, or at least we hadn't as of 13 January. The closing date for receipt of solutions to the Christmas Quiz was to have been the end of January, but so that we don't become thoroughly depressed and paranoid and think that no-one out there reads a single word we write, we'll give you another chance. The closing date for the receipt of entries will now be 20 February 1987, and there'll be RSGB book tokens for £15, £10 and £5 for the first three correct entries (or with the most correct answers) we open on that date. Always assuming we receive three entries, of course....come on, folks, it isn't difficult.

STOP PRESS..... ...STOP PRESS....

Just as we went to press we learned that the amateur licensing situation in Belgium - which looked rather ominous a couple of years ago - has now been resolved. We didn't have full details at press time but it looks as though 144-146 and 430-440 MHz have survived and indeed no parts of bands have been lost. However, the power limit on 2 and 70 is to become 150W output. There are now to be three licence classes, with the novice licence (Class A) being restricted to 15W telephony on 144 MHz; these may also receive a new prefix, possibly ON2. More details next month, but it looks like a happy New Year for Belgian amateurs.

The Presidential Installation and first Council meeting of 1987, scheduled for 17 January, had to be postponed because of bad weather. Those involved were notified by telephone and later by post of the revised arrangements for 31 January.

PS: "PS" will be back next month.

NEWS & VIEWS

HF

John Allaway, G3FKM*

MENTION OF G6ZY/EA6 was made in September *HF* in connection with his claim for the first EA6-GM QSOs on 18 and 24MHz. This provoked comments from GM3HBT who confirmed that the 10 June 1986 contact on 18MHz was the first and quite correctly pointing out that the first GM-EA6 contact on 10MHz was much earlier—between G6ZY/EA6 and himself on 29 August 1984. However, the plot has thickened since then with the arrival of a card from GM3GJB who says that he worked EA6KW on 12 August 1982! Who really was the first to make it on 10MHz?

At the time of writing (the deadline date for the February issue) December *Radio Communication* was still to appear on many readers' doormats and the result has been disastrous to G3GIQ and his table entrants as well as to the regular reporters who will have wasted much time and effort this month.

DX news

In his *DX Report* Jim Smith, VK9NS, reports on the recent 3C0A expedition. This was mounted by a small independent group of amateurs without backing from any of the major dx clubs or any sponsorship whatsoever. The expedition took place under the banner of AGRA—the Association Gabonaise des Radio Amateurs—a relatively new but progressive member society of the IARU. Over 17,000 QSOs were made and cards are now being sent out.

Pitcairn Is seems to be fairly active just now with VR6YL on the air regularly. Tom Christian, VR6TC, was on Norfolk Is in December and was to spend a month there before returning to VR6. It is rumoured that Meralda Warren took her examination recently and hopes to be licensed soon.

DL1VJ is in **Mauritania** and has the callsign 5T5XX. He has been worked around 0700 on 7MHz cw. According to *DX News Sheet* Yoland, FR5AI, expects to be active from **Tromelin** for one month in March and then from **Europa Is** for a further month around September.

PA0GAM will be in **Sudan** for about 18 months commencing next month and will try to get operating permission. He says that in order to obtain this it is necessary to be an associate member of the radio society. If he is lucky, he will be active on all bands 3.5 to 28MHz using cw, ssb, and AMTOR but mainly on cw. He says that Dr Sid, ST2SA, is often on 14,104kHz on AMTOR/Packet with his FT757 and TH6DXX. (Hopefully he will have QSY'd down below 14,100kHz by now in order to follow the recommended band-plan!)

JA2PDQ is 9K2MJ and will be in **Kuwait** for a few more months. He is often on the air on Fridays.

DXNL reports T32BD as being on 7,002kHz quite frequently and with hopes of coming on 1.8 and 3.5MHz in the near future. KL7LF/KH3 is likely to stay on **Johnson Is** for another nine months or so and to be on all bands 3.5 to 28MHz. So far he has mainly used ssb and has been heard on 14,250kHz around 0500. ZK1KV is reported to be on the **N Cook Is** and is Bing Crosby, formerly VK2BCH—check 14,200–14,250kHz in the early mornings.

DXNS says that PA0GAM has been supplying information to the Bhutan government concerning amateur licence regulations. There has been little progress and at present no amateur operation is allowed. Pradhan, A51PN, is still inactive and according to Gerben may remain so for some time to come.

Some welcome changes to frequency allocations have occurred recently. It seems that Belgian amateurs have been given the use of the 1.8MHz and "WARC" bands. On top band the allocation is 1,830–1,850kHz, phone and cw, with a 10W power input limit. No information on the other bands was available at the time of writing. Japanese amateurs had their 3.5MHz band extended to cover 3,791–3,805kHz from 15 December 1986.

A dxer's nightmare was announced in a special bulletin from the NCDXF issued in early December. This was notice of a possible 24h operation from **Peter 1 Is** by KD7P sometime between 28 December and 4 January. Most activity was planned to be on 14,145kHz ssb with some cw operation "contemplated" as was some time on 7 and 21MHz. Hopefully the rumour that others will visit the island in the not too distant future will turn out to be true! Such a short stay with the emphasis on ssb working could produce the world's worst behaviour on the hf bands to date.

A more leisurely activity from the Antarctic, this time from the **South Shetlands**, is being conducted by Hector, LU6UO. He should be on 25 de Mayo Is until mid-March. Look for him 5kHz above lower cw band edges on lower frequencies and 25kHz above on the hf bands. The recent VP8AQT operation was from **S Georgia** and G6KFR has told *DXNS* that he will try to go there again if the opportunity arises.

TK5BL was scheduled to be on the air from **St Martin** and **St Barthelemy Is** until 15 February as FG/TK5BL/FS. There should also be an IPA group consisting of FD1LWS, FD6IRD, FD1DGS, and F9MD on the island from 26 February to 12 March.

To celebrate the 20th anniversary of the Radioamateurs Association of Venezuela there will be an expedition to **Aves Is** between 16 and 22 March and this will use the special callsign 4M0ARV.

K4LIA and wife N4FKO together with NF5Z, W5PWG, and W5EP, will be active from **St Lucia** from 19 to 28 February and from **Dominica** from 1 to 10 March. They hope to use the calls J6LTA and J70A and will be especially active on cw 25 to 30kHz up from band edges.

Overseas news

G4AGI (formerly 9GIGE and 9J2GE) has written from Khartoum to say that, with probably one exception, the authorities in Sudan do not grant licences for amateur radio. Don, together with Tom Hutton, GW1TMG, has been attempting to get operating permission for a year or so without success. There was some indication that operating /ST2 was legal during Don's previous visit but this is now not allowed and the only licensed station operating today is Dr Sid Ahmed, ST2SA. Any station signing /ST2 should be treated with some degree of scepticism. Don and Tom are due to be posted to Egypt in the near future.

Those with long memories will be sorry to hear that Alex, PY2PA, husband of Eva, PY2PE, became a silent key recently. Before moving to Brazil the couple lived in Morocco and Eva was one of the world's leading dx'ers using her CN8MM call in the early days of ssb.



Tom Hutton, GW1TMG (left) and Don Radley, G4AB1, who tried unsuccessfully to obtain licences in Sudan

IARU Region 2 conference

The ninth Region 2 conference took place in Buenos Aires between 20 and 25 October. A number of topics of interest to hf band users were discussed and some decisions taken which are of interest to us here in Region 1. Some 24 national societies from North and South America took part either in person or by proxy. A particularly welcome attendee was the Radio Club of Cuba—I believe present for the first time at an IARU conference.

Considerable time was given to discussing the 10MHz band. Readers may know that it is agreed policy between societies in Regions 1 and 3 that no contests shall be organized on this band but that operating awards may be. However, ARRL proposed that the existing policy of Region 2 in not allowing award credits for 10MHz QSOs be continued, and that the other two regions be asked to follow suit. The existing policy of recommending that the band be used only for narrow-band modes was also endorsed.

Concern was expressed about the ever-increasing number of so-called "emergency" nets, many of which hardly merit such a title. These were asked to confine operations to times when there are real emergencies or

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Evio, PY1FO, who lives on the top floor of a 21-storey apartment block in Rio. He has a tower for his TA33 and uses an FT101ZD with linear and also has a Timex Spectrum for rtty use

when human life is at stake. The need for proper training sessions was recognized of course. An interesting proposal (which was accepted) was that in the early stages of an emergency the top 10kHz of the 14 and 21MHz bands be used as a focal point where stations should meet before perhaps moving elsewhere.

The Locator system, World Radio Amateur Day (18 April) and World QRP Day (17 June) were all adopted and are now recognized world-wide. Another practice which is now recommended by all three Regions is that of showing operation from another country by giving the prefix of the country of operation before the operator's home callsign (eg PY/G3FKM).

Packet radio was discussed at some length and its growing importance recognized. However, some worry that lack of bandplanning for the mode was leading to confusion resulted in a recommendation that on hf it should take place in parts of the bands designated for rtty and narrow band modes. The fact that experimentation may involve the use of some wideband transmissions has been catered for by the decision reached later (at the Administrative Council meeting) that one frequency per band will be chosen (after consultation with societies) for developmental work to take place outside the rtty segments.

A new Region 2 hf band plan was agreed, and this shows a most encouraging resemblance to our own. It may be a sign of the increasing co-operation between societies all over the world who recognize that rf transmissions do not stop at national frontiers! On a personal note, I should like to record the great courtesy and friendliness shown to me by a large number of members of the Radio Club Argentino. Perhaps all politicians should become radio amateurs. . . .

Permits for visitors to Ireland

The IRTS advises that a visitor's permit will generally be issued with a minimum of formality to any licensed amateur, even if there is no formal reciprocal licensing agreement between Ireland and the country concerned. The following letter is sent by the Department of Communications in reply to any query: "Ref No. R&BB VP. Re: Amateur Radio—Visitors permit. Dear Sir, I refer to your recent query . . . please supply the following information (1) The type of equipment you propose to use. (2) Dates inclusive of your visit. (3) Address at which you propose to operate. (4) A copy of your current licence. (5) Frequency bands, power and modes of emission required. If mobile operation is required, the make and registration number of the vehicle concerned should be stated. A permit is issued free of charge if required for less than a month in any year. If it is required for a period of between one and three months a fee of £8 is charged. The maximum period for which a permit is granted is three months; however, the permit may be renewed or extended for further three-monthly periods on payment of a further £8 fee on each occasion. . . ." Applications should be sent to the Secretary, Department of Communication, Radio & Broadcasting Branch, Scotch House, Hawkins St, Dublin 2.

Contests

ARRL DX Contests

0000 21 February to 2400 22 February (CW)

0000 7 March to 2400 8 March (Phone)

Single-operator single- or multi-band, multi-operator single- and multi-transmitter. There is QRP section which is for single-operator all-band entrants only running 5W output or less. W/VE stations send RS/T plus state or province. Stations outside the USA and Canada send RS/T and a three-digit number indicating their approximate input power. QSOs with W/VE count three points and the multipliers are the 48 contiguous US states and VE provinces (a maximum of 58) worked per band. Stations may be worked only once per band and no cross-band or cross-mode QSOs are allowed. Entrants are advised to use the official ARRL log stationery available from ARRL, 221

Main St, Newington, Conn, 06111, USA, in exchange for an sae and ircs. Logs must show date, time, band, calls and complete exchanges. Multipliers should be marked the first time worked. Entries with 500 or more QSOs must include cross-check (dupe) sheets. Entries must be postmarked within 30 days of the last contest weekend (7 April). Copies of the rules are available from G3FKM (sase please).

The Bermuda Contest

0001 21 March to 2400 22 March

Please note that at the time of writing (early December) no information had been received from the Radio Society of Bermuda, and intending entrants should check that the dates above are correct.

Based on the 1985 rules the contest is open to amateurs in the USA, Canada, Bermuda, the Federal Republic of Germany, and the UK. Actual operation must not exceed 36h and all entries must be single-operator. Off periods must be clearly marked in the log and each must be of at least three consecutive hours. Entrants in this contest must operate from their own stations from their own private residence or property. Top winners of the 1982 to 1986 contests (inclusive) will be eligible for area awards only. The contest covers 3.5 to 28MHz (but not the WARC bands) both phone and cw but no cross-mode QSOs may be counted. Exchange RS/T plus province (VE), state (W), DOK (DL), or county (UK). Bermudian stations will indicate their parish (SAN, SOU, WAR, PAG, PEM, DEV, SMI, HAM and STG). UK stations may work W, VE and VP9 stations for credit and each QSO counts five points, and both a phone and a cw QSO may be made with the same station on the same band provided that at least 30min have elapsed between the contacts. The multiplier is the total number of different VP9 stations worked per band added together, and a multiplier may only count once per band. Logs must be in gmt and separate log sheets used for each band. Duplicate sheets must be enclosed with all logs which have more than 200 QSOs in them. Each page of the log must be clearly marked with the callsign, band and date, and a signed declaration enclosed that the rules of the contest and the terms of the licence have been observed. Excess duplicates or illegible logs may result in disqualification. All logs must be received by the Contest Committee, RSB, PO Box HM275, Hamilton 5, Bermuda, no later than 2000 on 31 May. Entries should be sent by air-mail and should include sae and ircs if acknowledgement is required. Top scorers in each country will be invited to Bermuda to receive their awards in October 1987, with transportation and hotel for one week provided. Winners in each UK county will receive a certificate. In the 1986 contest the lucky winner was G4GIR who scored 336,630 points. Other UK scores were: G4IUF (177,190), G4YLO (173,855), G3NAS (163,080), G3RZP (106,720), G3TKF (85,360), G4SDJ (66,595), G4PLY (44,285), G4URG (33,840), G4SZD (10,750), G4CNY (6,500), G4DHO (5,280), G4GFH (4,320), G4IJW (3,850), G3NHF (3,240), G3CIX (1,850), G4ODV (950), GW3JI (780), G3VW (540), G0ASM (120) and G4SZD (55).

In the 1986 LZ DX Contest (single-operator single-band category) G3ZRH scored 448 points on 3.5MHz. On 14MHz G6NK scored 1,656, G4IJW 1,617, and G4ZNH 861. G3XWZ/A scored 26 points on 21MHz.

Awards

OI3AX Activity Award

The Finnish Defence Forces radio club stations use the OI prefix and there are 17 of them throughout nine call areas on OI1–OI9. They run 30W maximum power and operate on cw only within the following segments: 3,510–3,545kHz, 7,010–7,040kHz, 21,030–21,150kHz, and 28,040–28,200kHz. The Signal Regiment Radio Club is offering this award to those Europeans who have made five QSOs with OI3AX or OI3AI, others need only two. Only one QSO/station/day is permitted. Send log data with three ircs to PL 5, SF-11310 Riihimäki, Finland. Contacts may be made between 1 November 1981 and 31 December 1988. More information and possible schedules available from OH3GZ.

Jakarta Award

For confirmed QSOs or listener reports with/from at least 20 stations in Jakarta (0 call area only) including at least one with a club station. Send certified log extracts in alphabetical order by prefix. Club stations have three letter suffixes which begin with the letter Z. Applications go to M S Lumban Gaol, PO Box 96, Jakarta, 10002, Indonesia.

Worked All Indonesia Award

For confirmed QSOs/listener reports from two stations in each call area (a total of 20). Apply to M Maruto, YB0TK.

Worked the Equator Award

For QSOs/reports with countries on the equator. These include C2, HC, HC8, HK, KH1 and KB6, PR-PY, PY0 (St Peter), S9, T30, T31, T32, TN, TR, YB5, YB7, YB8, 5X, 5Z, 6O, 8Q and 9Q. Class 1 if for 15, Class 2 for 12, and Class 3 for eight. YB5, YB7 and YB8 are obligatory for all applicants. Apply to Ben Samsu, YB0EBS.

All these ORARI awards will be issued for two-way ssb, cw, or rtty, and for mixed or single modes, and for single bands 3.5 to 38MHz only. All QSOs or reports must be dated on or after 9 July 1968. Claims must be accompanied by a certified list of the QSLs held showing callsigns, date worked, bands and modes. They may be certified by a national society or two licensed amateurs. The fee for each award is US \$8 or 16 ircs and all applications should go to ORARI National QSL and Awards Bureau, PO Box 96, Jakarta 10002, Indonesia.

Radio Communication Citation

Not connected with this magazine, but issued to amateur radio operators or anyone assisting operators during the national Australian telephone breakdown of 10–17 June 1981, the Mexico City earthquake 21–25 September 1985, or the San Salvador earthquake 11–19 October 1986, during which time radio amateurs and their friends came to the service of distressed members of the Australian community. Eligible are those who originated, relayed, or delivered messages or helped the emergency services in any way during these periods. Citations have already been sent to many who are known to qualify but others are invited to send details to Sam Voron, VK2BVS, 2 Griffith Av, Roseville 2069, NSW, Australia, and enclosing A\$5 or equivalent.



During a recent holiday, G4IBZ met members of the Cyprus ARS, who allowed him to operate their stations. L to r: Nicos, 5B4CV; Arris, 5B4JE; and G4IBZ at 5BCV's QTH. Photo: xyl of G4IBZ

QTH CORNER

C56/6W1NX JA1LFR, K Kokubun, 4-22-6, Higiriyama, Kounan, Yokohama 233, Japan.
 FG/TK5BL/FS F6AJA, 515 Rue du Petit Hem, Ouvignies, F-59870, Marchiennes, France.
 J5WAD Now via UB5WAD.
 JR2FOE/JD1 JA4FWM, A Takahashi, 885 Kojima, Kurashiki, Okayama, Japan.
 KL7KF/KH3 KL7VZ, 1631 Wolverine Lane, Fairbanks, Alaska, 99701, USA.
 P40N N4PN, 367 Barbashela Dr, Stone Mountain, Ga, 30088, USA.
 VK0DA F O'Rourke, 6 Lionel Av, North Ryde, NSW 2113 Australia.
 VP8AQT G6KFR, D Jones, 19 Park End, Croughton, Brackley, Northants.
 VS6DO (CQWVWX) JA5DQH, Akito Nagi, 2552-28, Ishii, Myozai 779-32, Japan.
 XX9XX (see VS6DO).
 Y10BIF Box 7147, Baghdad, Iraq.
 5T5XX DL1VJ, Bernd Laengar, Schlossbergstr. 3, D-6603 Sulzbach Saar Altenwald, FR Germany.
 7Q7LW Helen Sampson, 57 Milford Court, Brighton Rd, Lancing, Sussex, BN15 8RN.

ALL TIME BAND TABLE—CURRENT COUNTRIES NO 6

Held over. Scores to reach G3GIQ by 8 February please.

1986 ALL BAND TABLE No 6

Final table held over to March issue. 1987 table starts in April issue.

Band reports

Only received from G5JL, G3GVV, G3PXT/M and RS30144 to whom—many thanks. As usual stations listed in italics were using cw.

1-8MHz 0200 UA9MA. 0500 EA9AM. 0600 W1,2,3,4,8,9.
 3-5MHz 0200 VP2MU 0600 CO1RK, J6DX, UA0ZC, W6-W7, 8P9AJ. 0700 VP2MM, ZL1ADY. 2000 JA4IKD, JY4MB, TA1E, 5B4TI. 2200 JY9RL.
 7MHz 0600 KP2N, VP2MA, 5N2KRC. 0700 7X2AX. 0800 J6DX, JA, WL7E, ZL3. 2200 8R1RPN, 9H1ED.

10MHz 0600 VK2QH, ZL4QO. 0800 JA, KL7PJ, UA9AS, VE6UX, VK6, W9, ZL3BJ. 0900 9M2FP. 1000 ZB21M. 1100 DL2GG/YV5. 1200 VK2BKH. 1700 AA6G, KR7Q. 1900 VK2, W2, W4. 2000 FG5XC, PZ1DV, VK2, ZS5BH. 2100 J78D. 2200 J6LAD/9Y.
 14MHz 0800 JA, PY. 0900 AL7CS, KH7K/DU, NL7IH, VK2,3,4, W7, 9N1MM. 1200 VK2RV. 1600 TA3B.
 21MHz 0900 HZ1HZ. 1000 V15JA. 1200 VK6s PM, VB. 1300 W8ILC/J6L, TA3C. 1400 N9AG/J6L. 1500 TA2G, S83H.
 28MHz 0900 VK6ODV.

Acknowledgements to the following for items extracted: the *DX Family Newsletter* (JH1KRC), *DXpress* (PA3CXC), *CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), *The Ex-G Radio Club Bulletin* (G13OEN/W6), *Long Skip* (VE3IPR), and *Lynx DX Group Bulletin* (EA2JGO).

Closing date for receipt of material for April issue is 20 February. ☐

HF F-layer propagation predictions for February 1987

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie 0000, 0200, 0400 etc.

The probability of signals being heard is given on a 0 (indicated by a dot) to a 9 scale; the higher the number the greater the probability, with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1-8MHz openings are indicated by a plus (+) sign in the 28 and 3-5MHz columns respectively.

Time / GMT	28MHz	24MHz	21MHz	18MHz	14MHz	10MHz	7MHz	3-5MHz
	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802
** EUROPE								
MOSCOW	.....	.....111...	.....2443...	.....46762...	.....177776...	21.566567511	873533335777	+++2....25++
MALTA	.....	.....111...	.....34442...	.....57665...	.....1877883...	34166567842	99764335888	+++4....25++
GIBRALTAR	.....	.....	.....2221...	.....1454...	.....677784...	121176667841	787654334787	+++2....24++
ICELAND	.....	.....	.....11...	.....331...	.....46752...	.....3666771...	341164445773	+++3....24++
** ASIA								
OSAKA	.....	.....	.....	.....11...	.....53...	.....153113...	.....21.12421	.....35.
HONGKONG	.....	.....	.....23...	.....451...	.....15641...	.....333221...	1....1.13534	.....353
BANGKOK	.....	.....122...	.....455...	.....5761...	.....14654...	1....133332.1	3....1.12556	.....35+
SINGAPORE	.....	.....2221...	.....4554...	.....157661...	.....136564...	1....133332.2	2....1.12556	.....354
NEW DELHI	.....	.....232...	.....4551...	.....15763...	.....23555...	31.1123331.2	73....12458	.....35+
TEHRAN	.....	.....3332...	.....5655...	.....266771...	.....54565...	521311235313	8731....12668	+++4....35+
COLOMBO	.....	.....3332...	.....5655...	.....156772...	.....22566...	1....1235413	32....12678	.....35+
BAHRAIN	.....	.....3432...	.....15665...	.....256771...	.....1.433565...	6322....235324	972....12678	.....35+
CYPRUS	.....	.....45441...	.....17773...	.....38888...	21.6666784.1	774643446866	996311124789	+++4....4+
ADEN	.....	.....4444...	.....156662...	.....255675...	1..4224672...	7.22....135745	962....2688	+++5....35+
** OCEANIA								
SUVA/S	.....	.....	.....	.....11...	.....244...	.....233332...	.....21.1123...	.....
SUVA/L	.....	.....	.....31...	.....621...	1..7531.32.	1.135322252.	.....221..23...	.....
WELLINGTON/S	.....	.....	.....1...	.....121...	.....14541...	.....433341...	.....121.123...	.....
WELLINGTON/L	.....	.....	.....	.....	.....11.62...23.	121531.1531	.....121..131.	.....
SYDNEY/S	.....	.....	.....3411...	.....5633...	.....276553...	.....2533351...	.....21.1351.	.....3.
SYDNEY/L	.....	.....	.....	.....2...1.	.....351...4.	.....5321.351	.....21..142.	.....2.
PERTH	.....	.....3331...	.....5653...	.....167752...	.....246566...	1....13258412	1....1.12663	.....35.
HONOLULU	.....	.....	.....	.....	.....	.....12124...	.....21.1122...	.....3.
** AFRICA								
SEYCHELLES	.....122...	.....2344...	.....145663...	.....245675...	1..3224672...	7.1....135745	931....2678	+++2....35+
MAURITIUS	.....2222...	.....44441...	.....66673...	.....255676...	1..2224673...	741....135755	841....2688	+++3....35+
NAIROBI	.....2333...	.....45551...	.....66674...	.....155577...	1..4222574...	7422....25765	983....2588	+++4....25+
HARARE	.....12341...	.....24563...	.....46676...	.....1555781...	11.33225761.	7722....25776	983....2588	+++4....25+
CAPETOWN	.....1442...	.....12664...	.....357771...	.....556683...	1..24334673.	65231..13786	9851....1488	+++2....5+
LAGOS	.....14543...	.....36665...	.....677772...	.....765674...	13.163236731	68243....3686	8884....488	+++5....5+
ASCENSION Is	.....3223...	.....154451...	.....376573...	.....665565...	32.7422364.	688241....376	88962....168	+++3....3+
DAKAR	.....3433...	.....56551...	.....277674...	.....5765661...	22.7533475.	578252....1456	87962....168	+++4....3+
LAS PALMAS	.....1212...	.....34341...	.....267673...	.....488786...	21.8766785.	588475434786	999742112479	+++5....5+
** S. AMERICA								
Stn SHETLAND	.....1...	.....1121...	.....13453...	.....35665...	22.4555443.	367253221222	455521....1	.....222
FALKLAND Is	.....123...	.....13451...	.....36663...	.....157665...	12.4653343.	47825321.123	588621....2	.....2554
R DE JANEIRO	.....1...	.....22121...	.....54243...	.....753451...	12..632233.	4782331..134	889621....15	+++4....2
BUENOS AIRES	.....1.2...	.....3141...	.....26364...	.....57455...	12.1653333.	3682432...23	689621....2	+++4....2
LTMA	.....1.1...	.....2221...	.....5443...	.....6554...	.....53222.	135.1.21...1	488521....1	2++4....
BOGOTA	.....	.....2121...	.....4443...	.....6544...	.....154222.	124.3231..12	588331....2	+++4....
** N. AMERICA								
BARBADOS	.....	.....2221...	.....5443...	.....26554...	.....553333.	134.232...33	787431....4	+++5....
JAMAICA	.....	.....	.....2332...	.....4544...	.....55322.	122.232...11	577231....2	+++4....
BERMUDA	.....	.....	.....2332...	.....4554...	.....155443.	12..3321132	677221....14	+++4....
NEW YORK	.....	.....	.....331...	.....2543...	.....45552.	1....1332231	576121....13	+++4....
MEXICO	.....	.....	.....321...	.....543...	.....5421...	1....11232...	266121....	+++5....
MONTREAL	.....	.....	.....221...	.....1443...	.....45552.	1....1332231	565111....13	+++4....
DENVER	.....	.....	.....	.....32...	.....3541...	.....3321...	254.2...1...	+++4....
LOS ANGELES	.....	.....	.....	.....31...	.....54...	.....2421...	133.21.11...	+++4....
VANCOUVER	.....	.....	.....	.....	.....23...	.....1431...	131.1..121...	+++5....
FAIRBANKS	.....	.....	.....	.....	.....	.....11241...	12..21112321	+++5....

The provisional mean sunspot number November 1986 issued by the Sunspot Index Data Centre, Brussels, was 14.7. The maximum daily sunspot number was 46 on 1 November, and the minimum was 0 on 12, 13, 26, 28 and 30 November. The predicted smoothed sunspot numbers for February, March, April and May 1987, are respectively: (classical method), 15, 16, 17 and 18; (SIDC adjusted values) 14, 16, 17 and 18.

VHF/UHF

Ken Willis, G8VR*

Transequatorial propagation

In a summary report of 50MHz activity, dated November 1986, Ray Cracknell, G2AHU, mentions some super dx worked by Japanese, Australian and New Zealand stations on 50MHz during the latter part of last year. The mode was tep, and Ray is remembered for his own achievements using this mode when he lived abroad operating as ZE1JV. For a full account of Rays experiments with tep, see *Radio Communication* for June/July 1980. The station at the other end of the link in those days was ZC4WR (5B4WR/G3UYO), both he and ZE1JV being nicely situated on either side of the magnetic equator to take advantage of this mode of propagation. In the UK, of course, we are not well-placed but it is of interest to know what can be worked when the right conditions exist for tep to be present.

JA1VOK (Chiba, Japan) provided the details of some tep contacts spread over three months in 1986. On 12 September, JE1TGN worked VK4FWX. A glance at a map or globe will show that these stations, too, are almost equidistant from the equator, either side of it. Two days later, JA1VOK worked VK6ZKG/4. On 21 October, JE1MBJ worked VK6YA, and over the next two days several signals from VK4 and ZL were copied in Japan as well as strong Australian Band 1 tv. All this activity took place in the early morning between 0430gmt and 0930gmt, and in the same time-bracket on 26 October JA1VOK worked VK4FXX and VK2XJ, followed next day by a contact with VK8ZMA in Alice Springs. Here again, a study of the map will show what superb dx this is. Following some VKs being heard in Japan on 1 November, JE1MBJ ended the season on a high note by working ZL2TPY on 50.11MHz. JA1VOK reports that these openings were in a period of rising solar flux and magnetic activity. Only severe magnetic storms (K index of six or more) appear to disrupt tep propagation, which is consistent with ZE1JV's results on 144MHz during International Quiet Sun Year.

IARU Region 1 conference

RSGB will be represented in all areas of interest to UK radio amateurs at the forthcoming IARU Region 1 conference to be held in the Netherlands in April. To cover vhf/uhf topics, G3WSN, the VHF Manager, and G3ZNU, chairman of the VHF Committee, will be attending, both very experienced negotiators. Already the vhf committee has studied a wide range of papers relevant to vhf/uhf matters which are among those being submitted to the conference by the UK.

Vhf topics include amateur television, contest procedures, alternative vhf net frequencies, repeater standards, crossband operation (for 50 & 70MHz operation), 50MHz band plan, 144MHz beacons, meteor-scatter procedures and fm channelling standards.

As well as presenting the UK proposals, delegates must also consider, on their merits, a large number of papers submitted by other member countries: be alert to note any proposals which conflict with our aims and plans; and to argue the UK case diplomatically when what we want appears to be at variance with the plans of other countries. RSGB is often accused of acting in a high-handed way when implementing decisions taken at such meetings, but it must not be overlooked that we are only part of the large body of radio amateurs in countries which comprise Region 1. If we are to be taken seriously, we must go along with any decision taken at these formal conferences, since the administration of amateur radio to ensure that jungle warfare does not prevail is a major role of the IARU. This does not preclude our taking action later to modify any procedures which appear not to be working well.

It is recognized that the RSGB generally submits the bulk of IARU Region 1 discussion papers, and we have an enviable reputation of achieving our objectives, possibly because our contributions tend to be well argued and professionally presented. As for being high-handed, in the absence of any input from RSGB members stating their views, the various committees, and in this case the VHF Committee, tries to act in a way which benefits the majority of UK vhf operators.

Having said that, it is appreciated that, mainly for lack of space, VHF Committee affairs do not get nearly enough publicity, and I must do everything possible to improve this.

*6 Lerryn Gardens, Broadstairs, Kent CT10 3BH.

Future events

The National Amateur Radio Convention is planned for 27/28 March at the National Exhibition Centre, Birmingham. The VHF Committee will, as usual, be manning a stand and providing lecturers for the occasion, and it is hoped that as many vhf/uhf addicts as possible will attend.

Our own annual event, the VHF Convention, is scheduled for 26 April at Sandown Park. The date falls on a Sunday, and last year's decision to hold it on that day proved very popular with traders who take stands at the convention, and presumably was just as acceptable to amateurs since the attendance once again broke all records. This year there will be the usual three-stream lecture program offering a wide variety of topics, while on the VHF Committee stand some demonstrations are planned to illustrate how not to operate a linear amplifier.

Recognizing the importance of conventions and exhibitions as the radio amateur population continues to increase, the VHF Committee has appointed an Exhibitions manager whose job it will be to ensure that everything goes smoothly. This arduous task has been accepted by Steve White, G3ZVW of London, N13. He is a long-time member of the Southgate ARS, serves on its committee and edits its monthly newsletter.

Further afield, but possibly of interest to our overseas readers, is the Nordic VHF-UHF-SHF meeting on 5 June at Mariehamn, Åland Island. Details are available from G8VR (see please) or from Peter Lytz, OH2AVP, Gesterbystigen 14E49, SF-02410 Kyrkslätt 2, Finland. Those UK operators who have attended meetings in this part of the globe in the past will testify to the warmth of welcome and hospitality offered by the host countries. Definitely not the place for those whose idea of a big night out is a small cooking sherry.

Finally, for those who like to get dates in their diaries really early, the Midlands VHF Convention has been tentatively arranged for 10 October this year, again at Telford.

Aurora

Ronald Adam, GM4ILS (Elgin), sent in a resumé of auroral activity which he caught during November and early December 1986. He recorded events on 4, 24, 25, 26, 29 and 30 November and 1 December, during all of which he made contacts. On 4 November he had 30 QSOs between 1520 and 1914gmt, the best being with OH2TI (KP20KE). Another big one was on 24 November between 1611 and 1930gmt when, among 17 other contacts, UR1ZA (KO19IA) was worked. Next day, 25 November, from 1435 to 1838 a further 36 stations were contacted, among them RQ2GAG (KO26AN); the other events were all less intense, and his log suggests that they did not penetrate far to the south as did the bigger auroras which he recorded. It was fortunate that some useful data arrived from Ron Livesey, director of the BAA Aurora Section, which can be related to the radio aurora information provided by GM4ILS. Ron Livesey's observers, all located quite far to the north of the British Isles, noted visual auroral conditions of various types on 3, 4, 5, 6, 10, 11, 12, 23, 24, 25, 26, 27, 28, 29, 30 and 31 November. As Ron said in his BAA interim report: "It will be noted that the auroral activity, except in storm conditions, is confined to the higher latitudes, as might be expected in the sunspot minimum period." His observers reported from such northern locations as Caithness, Orkney, Shetland, and even Alberta in Canada. His report also comments on the "storm conditions" which prevailed during the intense aurora of 12/13 September; "storm" in this context referring to magnetic activity. Next month I will refer to a simple magnetometer used by BAA observers to note changes in magnetic activity, a sort of "diy" aurora detection kit which amateurs might like to make for themselves. Elsewhere this month I mention some of the geomagnetic terms used in the GB2RS solar information newscasts.

Charlie Newton, G2FKZ, asks us to remember that one reason why not all visual auroras result in a radio event is that, whereas visual ones can be observed from any angle, radio auroras need to be "field aligned", so they can only be accessed by radio waves at certain angles. Consequently an aurora which produces good visual effects may be situated and of a form quite unsuited to a radio event. It also goes a long way towards explaining why certain locations can (or cannot) "see" the reflecting patches, and also why we always have to beam more or less to the north to get in on the act.

Footnote. A late report from Allan Duncan, GM4ZUK (Aberdeen), gave further details of the auroras of 24 and 25 November. With GM4AFF, he was operating on 144MHz from GM0FRT, the Aberdeen VHF Group station. The first part of the event started at 1650 on 24 November and lasted until about 1950 with them. There was apparently a second phase starting at 0010 for about an hour with virtually no activity on the band. Then on 25 November another event lasting three hours commenced around 1610gmt during which Allan worked 53 squares in 11 countries (including three USSR stations) which, as he said, was "a very extensive event and not the weak Scottish type as reported over GB2RS!"



VHF Forum at the Midland Convention. Rear, G3UXB (convention organizer); front, l to r, G4JLG, G3WSN, G3YGF and G2PFR

Meteor scatter

The Hastings Electronics & Radio Club mounted an interesting exercise during the Geminids, 12-14 December. Having earlier had a talk on the subject of meteor scatter communication, the club decided that members' confidence in the use of the mode would be increased by holding a "hands-on" exercise from its own headquarters during the shower. Some 10 schedules were set up by correspondence, and operations commenced on the evening of 12 December when signals from OH5LK (NU or KP30) were received within the first minute of the first period. Subsequently, with club members sitting around the operating position, some of them hearing their first-ever meteor reflections, every sked station which appeared was worked. These were OH5LK, OH1ZAA, LA9FY, OE6IWG, EA3DXU and EA3BTZ. Despite having written for skeds with AK square (still wanted by many dx stations), four of the 10 failed to turn up, wasting much of members' time during the small hours, but the event was a great success and is surely a very good way of showing the potentialities of the mode. In this case, cw only was used, with 2-5min periods, the equipment being a FT25RD with Mutek front-end, a single 4CX250R amplifier and a 14-element parabeam antenna atop a superb 60ft mast which the club has permanently at its headquarters.

As this is being written, it is too soon after the event to have received any reports, but it seemed to me that reflections were rather short, though strong at times, so things may not have been too good for ssb; but to make a statement like that ensures that reports of excellent ssb contacts will deluge the mail! There is still uncertainty over what period length to use on the cw random channel. There was no way of knowing, in many cases, whether the stations heard were transmitting for 2-5 or 5min, though most UK operators appeared to be continuing with the use of the longer period on this channel. Hopefully the IARU Conference will address itself to this issue in April and make a firm decision to be implemented without delay to resolve this matter. Anyone having views on it should write at once to the vhf manager, G3WSN, or to the VHF Committee.

Another astronomer has written to me. He is Dr John Mason, of West Barnham, W Sussex, who is assistant director of the Meteor Section of the British Astronomical Association. John monitors Radio Gdansk, Poland, on 70-31MHz using a four-element Yagi and a SX-200 receiver feeding a twin-channel chart recorder. He uses one channel to display one-minute timing pulses, and the other to record meteor burst signals received from Gdansk. It will be interesting to learn of his results for the Geminids (1986), and the Quadrantids last month, both of which he was planning to monitor when he wrote. John also sent a copy of a paper he presented to the ESLAB Symposium in Heidelberg in October 1986. This referred to the Giacobinid meteor stream (Draconids) in the previous year, 1985, when he recorded peak activity 3h 40m before the predicted time of arrival of the Earth at the path of the comet P/Giacobini-Zinner. The resulting shower on 8 October (1985), was short-lived, with an estimated 186 meteors being recorded between 0930 and 0935gmt, representing an hourly rate of 2,232 at the peak. By using techniques which simultaneously measured the sporadic meteor activity, John concluded that the peak shower rate was some 10 times the background meteor rate. For 1986, activity was predicted for 8/9 October though the parent comet had passed through the earth's orbit some 391 days earlier. John's observations on these dates showed only very weak activity between 0600 and 2200gmt on 8 October, with virtually none

on 9 October. By continuing to exchange information with astronomers, I am convinced that we radio amateurs have a lot to gain in understanding and predicting meteor activity.

Some late Geminids reports. On 144MHz, running only 80W to a nine-element antenna, Gerald, G4OIG (Northampton), completed a very long haul for this mode with 9HICG (JM75) on 13 December between 0600 and 0825gmt. This was the culmination of a series of tests of which more next month. Gerald also had a successful sked with OH5LK, but did even better on the cw random channel with contacts with 16WJB, TKSEP and OE3JPC, which netted him three new countries and four new squares in two days.

Also on 144MHz, Adrian, G4JBH (Yeovil), completed with 16WJB (JN72) and HG7KPL (JN97), both on ssb, between 1800 and 1900 on 13 December and gave them both a 38 report. He said that the remainder of his dozen or so skeds produced "No substantial reflections or completed contacts, and that activity around the ssb calling channel was 'chaotic and a waste of time'".

On 50MHz, G4IJE (Essex) had 16 completed contacts during the shower, with 1A6QBA, LA9UX, GM3WOJ, GM4YPZ and GM4FDT, some of these stations being worked three or four times. Paul reported many 10-20s bursts at S9, but reflections were generally not long. This was all on 50-350MHz (ssb random) which Paul urges more operators to monitor, both for showers and sporadic meteors.

An unusual expedition

Goaded by my frequent comments that we get little or no news of 432MHz operation, Clive Williamson, G4IEB, of the Stourbridge & District ARS has described how he, accompanied by Bob, G4XOM, and Julian, BRS 87212, took to the hills with some gear for this band on 30 November.

They started by setting up a station at Long Mynd (Shropshire, 450ft asl) in support of the Duke of Edinburgh Award hike, and provided "soap for the hikers and emergency back-up on cb". The soap we can understand. On switching on the 432MHz gear they encountered "a nice surprise—Syledis", finding it more effective than any beacons for confirming good band conditions. (Try living by the sea on the east coast, OM). After the work with the soap was done, they settled down for an all-night session on 432MHz using a Kenwood TR9500 into a 48 element multibeam, with power from a Briggs Stratton 1kW generator. Operating as G6OI/P, which proved to be an attractive call, from location IO82NN they worked 27 stations in DL, PA, F, ON and G, some of the latter being as far south as the Isle of Wight and Sussex. The euphoria diminished when they found that the lights in the minibus plus indiscriminate use of the cb rig had flattened the battery to the extent that they could not start the vehicle. (Maybe there is someone up there looking after amateurs after all.) Excited by the dx, they had overlooked the fact that the minibus battery could also have been kept charged with that 1kW generator. However, at 4am they pushed the bus onto the road and started it by the time-honoured method of pushing it downhill. Reaching a new location over the Welsh border, they recommenced operation as GW6OI/P and had further contacts including a cross-mode cw/ssb one with PA3CCT. Thanks for the information, Clive, and for proving that there is life above 144MHz for "ordinary" stations with simple equipment. But see next month when there will be further words about Syledis. Give me the beacons anytime.

VHF in South Africa

I always believed that South Africa was a hot-bed of vhf activity since there are various beacons in those parts which we use to check conditions, but a letter from Hal Lund, ZS6WB (Pretoria), dispelled the illusion. He says that they are just starting to promote the grid-squares system (why have we become lumbered with that USA way of expressing our simple "squares"?), to encourage more activity. To indicate the depth of the problem, they will start by giving awards for 15 squares on 50 and 144MHz, 10 on 432MHz, and five on 1,296MHz, with endorsements for every five additional squares on each band except 1,296, where only two are required for each update. I suppose we must take into account the vastly smaller number of ZS vhf operators than we have in Europe, but the targets do appear to be rather small.

To make matters worse, Hal says that many operators there use IC271H rigs or even IC-471s, with vertical antennas to access local repeaters (the *International VHF-FM Guide* published by G3UHK/G8AUU lists more than 40 ZS repeaters), and comments: "What a waste!". Recently there has been a small upsurge of interest in 50MHz meteor scatter with a few contacts being made on the band from ZS6 to ZS1,2 and 5. Hal is starting a campaign to encourage ms operation on 144MHz using the European system of high-speed cw. He comments somewhat wistfully that out of a total of 4,500 amateurs in the country, only about 100 have any real level of interest in vhf, while about 20 could be termed dedicated vhf enthusiasts.

These are mostly concentrated in the major cities such as Pretoria, Johannesburg, Durban, Port Elizabeth and Capetown. Let's hope Hal gets them all fired up before the peak of the solar cycle so that if some F2 propagation opens up the possibility of world-wide communication on 50MHz, someone will be listening. Also it is a pity that placed as they are to check transequatorial propagation, there are not more operators interested in weak-signal working.

Solar data

Under the heading "Solar Factual Data", information is broadcast weekly over GB2RS, and last December the relationship between critical and maximum usable frequencies was discussed briefly. G0FFD (Lancs) rightfully commented that the passage of radio waves through the ionosphere is really much more complex than my diagram may have suggested. However, I was simply making the point that measurements using signals transmitted vertically to intercept the ionosphere, which can be made relatively easily, yield results which can be related to waves entering the ionosphere at typical "dx angles" (low-angle radiation), the aim being to predict the maximum frequency which can be used for contacts via the ionosphere.

Solar information broadcasts often contain statements such as "a general decline in geomagnetic levels has continued", or "sub-storm levels are expected". The earth behaves as a giant magnet, and every three hours observatories around the world measure its magnetic field in three dimensions: horizontal, vertical and declination. The reading which shows the greatest variation is then selected to compute the three-hourly index—the so-called K-index which often features in solar data broadcasts. A more useful index, however, is the 24h A-index, which is derived from the K data but measured on a more extended scale to allow variations to be shown in greater detail. The relationship between the K and A indices is:

K	0	1	2	3	4	5	6	7	8	9
A	0	3	7	15	27	48	80	140	240	400

"Quiet conditions" prevail when, over a period of 24h, variations in the A index do not exceed 10 units. "Unsettled" indicates variations between 10 and 20 units. "Sub-storm" or "Minor storm" relate to 50 to 100 units, while "Severe storm" means 100 units and above. A disturbed ionosphere may signal poor conditions for hf band operators but may mean a possible aurora for the vhf man, though many other factors must be taken into account.

At one time, various observatories regularly transmitted ionospheric data in the hf bands. Today, due to economies, this practice has been largely discontinued, but the RSGB is fortunate to receive daily data from the Appleton Laboratory via telex, and weekly data from Boulder, Colorado, by air mail. Sometime in the future it may be possible to set up a solar information beacon transmitting data for all to copy.

For a sheet "Explanation of Solar & Propagation Information in GB2RS Bulletins", send an sae to the membership services dept at headquarters.

From here and there

Several readers have asked for details of the message format now being transmitted by the Gibraltar 50MHz beacon ZB2VHF from its new and higher location (VHF-UHF December 1986). If my old ears haven't deceived me, it has been sending "Beacon top of rock pse QSL ZB2VHF", but whether this is intended as a permanent feature is not known.

For those wishing to check their 70MHz receivers, GW3MHW reminds us that the Irish amateur news is read on 70·185MHz every Sunday at 1130 gm.

John Fitzgerald, G8XTJ, vhf publicity officer for the WAB awards, reports that the first Diamond awards for working 1500 areas have recently been issued for 144MHz. The first applicant was Laurie Segall, G6XLL (N London) with Hayden Barker, G6XVV (Rotherham) a close second. Later claims were accepted from G4WXX and G1NUS. The organizers pay tribute to the many mobile operators who activate rare areas for the benefit of WAB enthusiasts. G6CSY has claimed a 100 area award for 1296MHz (a first for the band) while swl Helen Rose of Harlow is the first to claim a "Heard 100 areas" award. For all WAB information please write to G4KSQ, QTHR.

Paul Turner, G4IJE, offers a little folklore based on his summer experiences with sporadic-E on 50 and 28MHz. He found that when 28MHz was open to Europe, there was usually some sort of propagation on 50MHz, but the area covered tended to be a good deal less on 50MHz than on the lower frequency. Tim Anderson, G1JWR (St Leonards) who has very sophisticated tv-dx equipment, has noticed similar effects on meteor bursts which yield identifiable pictures from remote stations during showers. On

E2 (48·25MHz) a 10s burst might contain two or more interfering pictures from quite different countries in Europe, while simultaneously on E9 (203·25MHz) only a single picture of much shorter duration would be observed. These examples only serve to demonstrate that whatever the cause of the ionization, lower frequencies are, of course, always reflected more easily, and require less ion density to interact with the medium, whether the action is in the E or F layers. It is also interesting that Tim regularly gets ms burst pictures in bands as high as 200MHz. □

SWL

*Bob Treacher, BRS 32525**

WITH THE LATE DELIVERY of the December issue, and the early copy date due to Christmas, items for this month's news are rather scarce. However, let's see what we have in store.

7MHz contests

Malcolm Harrington, BRS20249, has asked me to advise readers that the dates for the cw leg of the 7MHz contest in the October issue are wrong. The correct dates are 28 February and 1 March. The change has been made because the original dates are those normally reserved for the ARRL contest.

While writing about the 7MHz contests, and in view of the recent upsurge in swl participation of Society contests, it will not go amiss to say that the 7MHz ssb event is in need of a greater level of swl participation. Years come and go and only a small handful of swls can be guaranteed to take part. This year, it would be real shot in the arm if some of our newer members were to have a go. Many say that 7MHz is too noisy, full of bc QRM, devoid of amateur signals etc. However, during a contest, the band can be interesting. True, the number of British amateurs taking part needs to increase too, but during the early part of the contest many Europeans can be heard with strong signals. Admittedly, the later hours can be a bit of a slog and if no Gs are active through the night then that session can virtually be ignored (as in 1986). By daylight, the skip will favour the Europeans again, while also providing good dx to South America and the Pacific. Therefore make sure you start the contest at 1200gmt, go through until about 1900gmt, then get an early night and rise about 0500gmt. In that way you will achieve a good score, increase your knowledge of 7MHz propagation and will help to swell the swl entry to the event. I hope that these few words tempt a few more listeners to enter.

QSL habits

I noticed in the QSL Bureau manager's annual report a reference to swl QSL cards. I thought I would give G3DRN a chance to preach his words to those his comments are aimed at.

Details of the QSL Bureau's operating procedures are given in the leaflet which everyone receives on joining the Society. In it, Note 5 states . . . "Listeners are reminded . . . that their reports should contain sufficient information to be of genuine value to the transmitting amateurs concerned . . ."

G3DRN is realistic enough to know that when one takes up short wave listening, the tendency is to QSL everything in sight, but that once you are an old hand it is the really distant stations, the unusual, the special event, those testing equipment or having difficulty making contact, or a station heard during exceptional band conditions that attract the swl card. However, G3DRN has noted that recently, perhaps due to a lack of education, and the resurgence of the award, many swls have returned to the "QSL everything in sight regime".

G3DRN explains that it is very rare to see a swl card reporting an hf contact which covers a longer period than a few minutes, lists comparative reports of other stations heard or mentions propagation conditions. These are points to be noted. On the debit side, the benefits of QSLing a G on 3·5MHz or a European on 14MHz are few, and it is such reports which G3DRN suggests swls should try to avoid sending. G3DRN handles many thousands of cards each week and I hope that, following these few lines, he will see an improvement in the standard of cards being sent by swls to the bureau.

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1986 HF COUNTRIES TABLE (UPDATES ONLY)

Station	DXCC	28	21	14	7	3.5	1.8	Total
BRS8841	247	64	158	228	157	152	56	815
BRS25429	216	53	115	183	127	151	60	689
BRS87156	207	57	131	174	112	117	52	643
BRS32525	189	59	88	126	125	121	76	595
ORS45992	197	74	122	186	76	20	1	479
BRS52543	135	49	92	86	96	87	49	459
BRS20249	132	16	52	109	58	61	14	310
BRS88639	130	39	58	110	33	36	27	303

It also does no good writing to complain that you have had no QSL cards in return for yours. A nine-month wait is about the best you can hope for when sending a card via the bureau. It is not the fault of the bureau manager that your cards are not being answered. If the swl is a little more selective to whom he sends a card, and if the comments on the card give good information and show a real interest, you will find that amateur stations might feel more disposed to reply to your cards. The bureau may not be the quickest way of collecting QSL cards, but it is a cheap and fairly reliable way of getting a card as long as the outgoing swl card is informative, interesting and accurate.

Tropo

Just as we thought that we had put the vhf and uhf bands to sleep for the winter, a stable high-pressure system centred over DL which gave us a few cold, foggy days and nights also provided an added bonus for vhf types. The announcement about co-channel interference after the *Nine o'clock News* on 28 November saw the start of around 60h of good tropo conditions. The Friday evening in London produced EA1TA (VD58b) and F6DBI (YI) on 144MHz, while on 432MHz, DL2KBB was 59+20dB from DK square and a few ONs and PAOs were to be heard. The Saturday provided much good mid-distance dx both on 144 and 432MHz. EB1MS/P in XC square being the best dx. Many amateurs in western France were also audible. The best conditions were on the Sunday. 144MHz was simply wall-to-wall 59+ PAOs all day. Between the Dutchmen, some

1986 UHF/VHF TABLE

Station	Log	70MHz		144MHz		432MHz		Total
		Squares	DXCC	Squares	DXCC	Squares	DXCC	
BRS32525	JO01	0	0	130	30	67	16	243
BRS25429	IO93	0	0	89	21	49	14	173
BRS31976	JO01	7	1	106	28	0	0	142
BRS52543	IO83	27	6	49	15	27	9	133
F11ATZ	JN15	0	0	38	10	4	3	55
BRS62088	JO01	0	0	31	12	2	1	46

good dx was available—OZ5DI (JO65), OZ3ZW (JO54), OZ1KYM (JO45), SM7LNI (JO65) and OZ1BJF (Bornholm Is, JO75).

HF news

Little to report under this heading this time around. Malcolm, BRS20249, mentioned a YC0 and 8P6GG on 3.5MHz ssb, and T18ACS and hoards of JAs on 7MHz. Angela Sittin, BRS88639, sat the RAE in December and had a morse test booked for the end of last month. She listened during the cw leg of CQWW, but the speed of sending by some stations quickly sent her downstairs to get on with the housework! Robert Small, BRS8841's letter was one which arrived after an earlier deadline. He remarked on a lower 1986 score than his of 1985—something I predicted at the turn of 1986! Much dx had been heard by Robert, especially on 14MHz where VK0SJ on Macquarie Is was one of the more outstanding calls mentioned. On the QSL front, he could boast cards from BV0BG, BY4SZ, N8AQV/HP1, KB6DAW/KH2, P4/HB9TL, CG9ASJ and FK025AT.

Finale

To close, mention of the Derby & District 144MHz Contest to be held on 15 March. This is a new event, and one which has a listener section. Further details can be obtained by sending an sae to: The Secretary, 119 Green Lane, Derby DE1 1RZ.

News, views and comments for inclusion in the April issue should reach me no later than 10 February with late copy by 18 February.

MICROWAVES

Mike Dixon, G3PFR*

Welcome—1987

My apologies for the lack of a January column, due to pressure of other work during the run-up to Christmas. I hope that this month's offering will make up for it!

Operating news

Dave, G4FRE, sent in details of the microwave contacts made by the Square Bashers Expedition Group's operation from ZR (IO97) and YS (IO88) squares in August 1986. These are summarized below:

From	Worked 1-3GHz	Square	QRB (km)	Worked 2-3GHz	Square	QRB (km)
ZR	G4KIY	ZM	557	G4CBW	YN	492
	G4CBW	YN	492			
	G8PNN	ZP	246			
	G6BN	ZO	310			
	GM8MJV	YP	188			
	GB3BPO (hrd)	AM	633			
YS	G8PNN	ZP	352	G4CBW	YN	587
	GM6MGS/P	YR	144			
	G4CBW	YN	587			
	G4BYV	AM	679			
	G4KIY	ZM	669			
	GM8MJV	YP	264			
	DB0JO (hrd)	DL	1,022			

The equipment used was: 1.3GHz: FT221R + MM transverter + 180W output, MGF1402 masthead preamp, 1.2m skeleton dish; 2.3GHz: IC 202 + ssb transverter + 50W output, MGF1412-09 masthead preamp, 1.2m skeleton dish.

Gear for 3.4 and 10GHz was taken but, due to poor conditions and/or no activity or requests for QSOs, the gear did not come out of its packing at either location! Dave has already received the Group's 1.3GHz distance

*"Woodstock", Gaze Bank, Norley, Warrington, Cheshire WA6 8LI.

award for the contact with G4BYV—as he said, "there can't be too many 600km+ certificates for QSOs within the British Isles". The two sample cards are shown below: total contacts, all bands 1007, working out at £1 per QSO!

SCOTLAND GB2YS

GM4NXO — 50 MHZ

THE SQUARE BASHERS EXPEDITION GROUP
1986 EXPEDITION TO 'YS' SQUARE

REGION: HIGHLAND QTH LOCATOR: YS54c
WAB: ND 23 CAITHNESS. 13K SOUTH WICK

PSE/TKS FOR QSL VIA RSGB OR DIRECT TO
P.O. BOX 136 CARDIFF. CF4 6YL

TOTAL EXPEDITION COST > £1000 (i.e. £1 per QSO)

SCOTLAND GB2ZR

THE SQUARE BASHERS EXPEDITION GROUP
1986 EXPEDITION TO 'ZR' SQUARE

REGION: GRAMPIAN QTH LOCATOR: ZR42h
WAB: NK03 BANFF + BUCHAN
QTH: CRUDEN BAY

PSE/TKS FOR QSL VIA RSGB OR DIRECT TO
P.O. BOX 136 CARDIFF. CF4 6YL

TOTAL EXPEDITION COST > £1000 (i.e. £1 per QSO)

A local oscillator source for 1,152MHz

This local oscillator, due to G4DDK, was designed for use with 1.3GHz receive and transmit converters, although, as will be seen, it could be used on other bands as well. It is a compact design combining the Butler oscillator of the Microwave Committee uhf source with two active doublers to produce two outputs suitable for solidstate transverters. The spectral purity of the outputs is high. The good phase noise performance of the oscillator ensures minimum problems from reciprocal mixing, close to the carrier. At greater separation, low levels of spurious output minimize mixer response to out-of-band signals. In transmit converters this is also important to reduce the danger of radiating out-of-band signals.

Versions of this circuit have been built for frequencies in the range 1,136MHz (10.368GHz—144MHz i.f) to 1,557MHz (Meteosat—137MHz i.f), although it should be noted that some changes are required to component values, and it is important to retain the same multiplication ratios in the multiplier stages; ie the first multiplier stage after the oscillator (TR3) must be used as a doubler, otherwise there may be insufficient drive to the following stage to ensure reliable operation. In the Meteosat unit the Butler oscillator output was used as a quadrupler with a consequent reduction in the output to +10dBm.

The pcb can provide either a single output at about +13dBm or two outputs at +10dBm. When the two-output option is chosen, one of the outputs will have slightly inferior spectral purity, but provided this output is used to feed the receive converter this should not be important. The specified output may not be met if the unit is used at other than the design frequency.

Circuit description

The circuit and component values are shown in Fig 1. The oscillator circuit is the well-known Butler circuit with output at three times the crystal frequency.

Experience has shown that this circuit provides more reliable operation than the widely used J-fet circuit, using the J310 or P8000. In this unit the crystal operates at 96MHz, with the output from TR2 taken at 288MHz. Crystals anywhere in the range 90 to 100MHz can be used, with outputs between 270 and 300MHz. It may be possible to use other frequencies, but these have not been checked.

The next stage (TR3) is optimized as a frequency doubler, and the collector is tuned to the required frequency using a printed microstrip inductor and miniature trimmer capacitor. The collector is tapped onto the inductor at the high impedance end. Transistor output capacitance adds significantly to the total value required to resonate the circuit. This results in a low Q for this circuit, needing a second tuned circuit to achieve suppression of the doubler drive frequency. Coupling between the two circuits is almost entirely due to "stray" capacitance between the two trimmers. The type of trimmer chosen ensures that the right coupling is achieved. If physically larger trimmers are used, there may be too much coupling, leading to difficulty in resonating the circuits and poorer suppression of harmonics.

The second tuned circuit is capacitively coupled to the final doubler stage (TR4). This operates in the same manner as the previous stage, except that its output is tuned to 1,152MHz. Three tuned circuits ensure excellent suppression of unwanted harmonics.

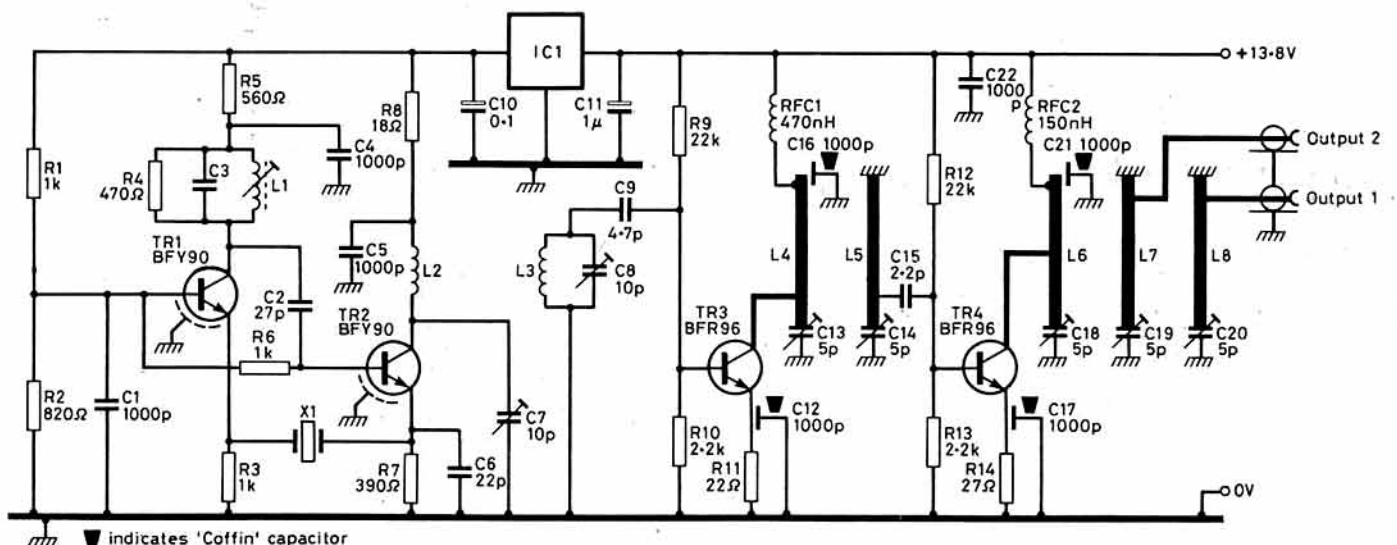
Local oscillator components list

TR1, 2	BFY90
TR3	BFY91
TR4	BFR96
D1	1N4001
IC1	78L08 8-8.2V regulator
X1	96MHz 5th or 7th order overtone HC 18/U
R1, 3, 6,	1k Ω
R2	820 Ω
R4	470 Ω
R5	560 Ω
R7	390 Ω
R8	18 Ω
R9, 12	22k Ω
R10, 13	2.2k Ω
R11	22 Ω
R14	27 Ω
(All 0.25W carbon film)	
C1, 4, 5, 22	1,000pF cp
C2	27pF cp
C3	15pF cp
C6	22pF cp
C7, 8	10pF Sky or Oxley CD 5/10
C9	4.7pF cp
C10	0.1 μ F 16V tb
C11	1 μ F 16V tb
C12, 16, 17, 21	1,000pF trapezoidal disc
C13, 14	5pF Sky or Oxley CD5/6
C15	2.2pF cp
C18, 19, 20	5pF Sky or Oxley CD5/2
C23	1,000pF feedthrough
(cp = ceramic plate; tb = tantalum bead)	
RFC1	0.47 μ H moulded axial lead choke, value not critical
RFC2	0.15 μ H ditto
RFC3	2t through two-hole bead (not critical)
L1	5.5t Toko S18 green coil, aluminium core
L2, 3	3t 22 swg (0.9mm) tinned copper, 3mm inside diameter; turns spaced one wire diameter. Spacing between coils 5mm. Height of coils 2.5mm above groundplane. Printed lines on pcb
L4, 5, 6, 7, 8	

Two equal outputs are obtained at the expense of some spectral purity at the output taken from the middle tuned line (see next month's figures). This approach has several advantages. It is relatively wide band, and virtually identical output levels are available anywhere in the range 1,136-1,300MHz. If the second output is not required, simply cut the track where it leaves the middle tuned line.

The operating voltage to the oscillator stage is stabilized by an 8V ic regulator.

Details of the construction, pcb and component layouts will be given next month, together with a photograph and notes on testing and performance. □



Circuit of the local oscillator

SATELLITES

Bob Phillips, G4IQQ*

Twenty-fifth anniversary

The 25th anniversary of the launch of Oscar 1 was celebrated on 12 December last year by a number of satellite related activities. For its part, AMSAT-UK's contribution should go some way to ensuring towards the continuation of the programme. This was a donation of £10,000 towards the cost of refurbishing the command station at the University of Surrey. For those who have had the opportunity to visit the station it will be evident that it has been set up to a very high standard and is of considerable credit to those involved.

Fuji Oscar 12

A series of tests was carried out on the digital transponder (mode JD) during the early part of November and these have shown a clean bill of health. One of the operating difficulties with FO-12 is that it has a negative power budget, that is the power consumed when the transponders are active is greater than that generated by the solar cells. The extensive mode JD trials are thought to have placed a significant load on the power sub-system and it was necessary to switch off the satellite for the last week of November. When the operating schedule for the satellite is established there is likely to be a period in each orbit to allow for battery re-charging.

An interim operating schedule was implemented during the middle of December as follows:

Sunday	mode JA	Thursday	mode JA
Monday	OFF	Friday	OFF
Tuesday	mode JA	Saturday	mode JD (alternate orbits)
Wednesday	mode JD (alternate orbits)		

RS satellites

The batteries on both RS5 and RS7 are now both in very poor condition but limited operation from both should be possible for some time yet.

Uosat

Further tests have been carried out on the Uosat Oscar 11 ccd imager but as yet the results have not been very good. The problem is felt to be in setting the correct exposure for the prevailing conditions of illumination.

Another area of work has been with the digitalker on UO-11. Checks on the vocabulary have been carried out and it is hoped to introduce the full telemetry readout in the future. One of the driving forces to getting the UO-11 digitalker operational was to maintain a service to schools now that the UO-9 orbit is no longer visible during normal school hours.

Oscar 10

The satellite returned to limited operational use around the end of November and has been providing mode B transponder use since that time. At the time of writing no schedule of operations had been established since no control programme had been loaded into the Integrated Housekeeping Unit computer. The condition of the batteries was not known but good signal reports have been received for much of the time. Users have been requested to use the satellite with extreme care and to ensure that only minimal up link power be used at all times. The telemetry beacons have not yet been re-activated so information on the status of the satellite can only be obtained from other sources such as the Uosat Oscar 11 bulletin transmissions.

Further work by the command station operators (DB2OS, ZL1AOX and VK5AGR) has identified several blocks of apparently useful computer memory and there is some hope that it may be possible to load a new control program to allow autonomous operation.

In anticipation that there will be at least a few more months of useful life in the satellite, I have re-introduced the satellite availability chart as shown in Fig 1. For newcomers to the column, the chart indicates the times of day for the entire month when the satellite will be visible from the southern part of the country. The diagonal dashed lines show the times of perigee ie when the satellite is at its closest point to the earth. Please note that the baseline of the chart has been offset to 0800hr so as to indicate the full extent of visibility for individual orbits.

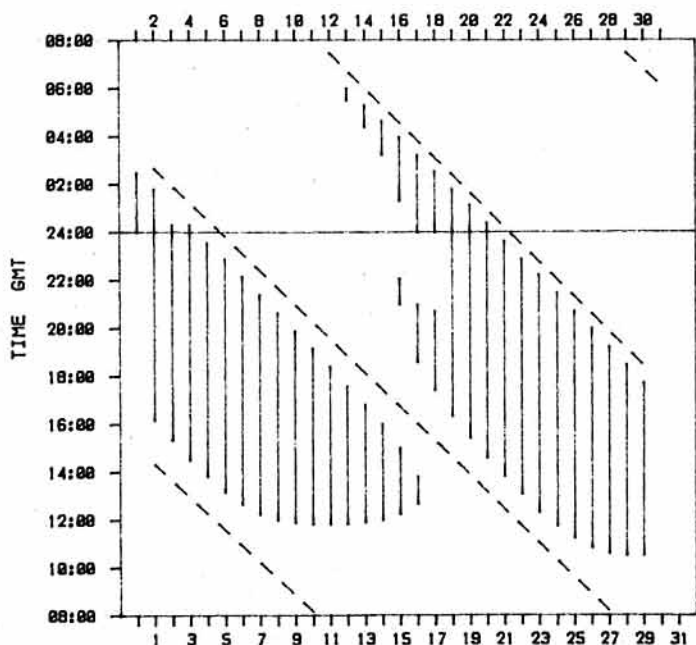


Fig 1 OSCAR 10 VISIBILITY (London area) - FEBRUARY 1987
— satellite in view — — — — — perigee (MA=0)

It is necessary to remember that Fig 1 shows the visibility of the satellite, it does not necessarily imply that the transponder will be active, but it does give you a good idea of when to look. The major elements of the orbit have changed quite significantly since I last gave a detailed report, in particular the argument of perigee has now moved round to approximately 180°. Access to the satellite will continue to improve over the next eight months with ever increasing elevation angles occurring during each orbit. One drawback, of course, is that there will be an increasing need to be able to elevate the antennas to maintain good signal levels.

Other news

The triennial conference of the IARU Region 1 is due to be held in April and there are several contributions concerning amateur satellite operation. The conference should provide a good opportunity for exchange of information and views concerning future activities. The latest information from ArianeSpace is that the earliest date for the launch of the next Ariane is not likely to be before late March or early April. This would indicate an August launch for the Phase 3C satellite. Following the recent problems with the memory chips on Oscar 10 a new set of chips have been installed in Phase 3C. These have a much higher resistance to radiation damage and should ensure longer lifetime for the next satellite. The information nets operated by AMSAT-UK continue on Sunday mornings 3780kHz at 1015gmt with G0AUK (G3AAJ) as net controller. These provide the best way of obtaining the most up to date information available and are of course open to all amateurs to join in.

Study on the next generation of amateur satellites is beginning to gain momentum. Jan King, W3GEY, recently outlined technical and operational scenarios for the Phase 4 series of satellites which will use the geostationary satellite orbit (GSO). Jan suggests that these satellites will need to have a much wider participation than the existing, relatively small group of enthusiasts. A whole range of potential applications is listed including fm telephony, digital and television. Communication via gateway stations is foreseen as one way to broaden participation but this view is not shared by others within the small band of satellite constructors. Frequency bands to be utilized are likely to include 145, 435, 1,260 and 2,400MHz. Let's hope the designers and constructors do not forget that many satellite operators start on mode A satellites and continue to derive a great deal of satisfaction from them.

AMSAT-UK has now confirmed that its second amateur satellite colloquium will be held on the weekend of 18/19 July 1987. Further details of the event will be made known in due course. If the 1986 event is anything to go by, early booking is advisable.

It has been reported that AMSAT-NA is to make a further change to its main publication. The *Satellite Journal* has been merged with the ARRL *Experimenter's Exchange*. The new publication entitled *QEX/SAT* will be known as a technical journal catering to both the amateur satellite enthusiast and amateur radio experimenter.

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DATA COMMS

Ian Wade, G3NRW*

Connect International

The monthly RSGB packet radio newsletter *Connect International* (CI) is now finding its feet, with three issues already out and the fourth in preparation. The quality of the material submitted by readers for inclusion in CI is very good—the only problem is squeezing it all into the 12 pages available each month!

To summarize what you are missing if you are not yet a CI subscriber: the October issue set the scene, with a report on digipeater licensing, a description of the new Pac-Comm DR-100/200 packet switches, news from UK packet groups, and a full listing of all known AX.25 stations in the UK (this listing is updated each month).

In November, the big news of course was the licensing of the first 14 UK digipeaters, and there were some excellent technical articles by Ed Harland, G3VPF, on the use of the tnc modem-disconnect socket (for interfacing an external modem to a tnc) and an AM7910-based modem design for the TNC-2. David Wicks, G3YYD, contributed an interesting piece, complete with detailed circuits, on running 9,600bps on standard fm radios; David was an early Amtor pioneer, collaborating with Peter Martinez, G3PLX, in the first on-air Amtor experiments several years ago. Also included were suggestions from readers on automatic packet routing and on 144MHz packet frequencies, plus an article explaining how a tnc can lock up when you stop to eat your dinner!

December's issue featured full circuit details on an add-on tone converter by Colin Cubitt, G4MQK, for converting the narrow shift tones used on the hf bands (1,800/1,600Hz) to the standard wide shift tones (1,200/2,200Hz). This unit should be very useful for hf operators whose tncs do not work particularly well with the narrow shift tones. One such tnc is the G0BSX design, so G0BSX users will certainly be interested in the article by Tim Forrester, G4WIM, describing an external modem, again based on the AM7910, which replaces the original XR2211/XR2206 modem.

Other items in December's issue include a full description of the AX.25 frame control codes (invaluable for understanding how AX.25 really works), plus details of the FO-12/JAS-1 satellite mailbox commands, and a contribution on packet routing by Mike Dennison, G3XDV, chairman of the RSGB Repeater Management Group (responsible for digipeater licensing). Finally, there is also an item by Malcolm Appleby, G3ZNU, chairman of the RSGB VHF Committee, explaining the reasons behind the choice of frequencies for 144MHz packet.

January's issue is now in preparation, and will include details of modifications to the TNC-2 to overcome some of the shortcomings in the original design, together with a useful PTT indicator for the tnc. Also included will be a design for a narrow-tones filter for the hf bands, and a contribution from Bob Redding, G3VMR, on transmitting packet by directly modulating the rf signal source, rather than by using tone generators.

A lot of mind-stimulating material here, but there is always room for more contributions at all levels, from beginners to advanced, so please keep it coming. A full year's subscription to CI is £7.20 for RSGB members in the UK and EEC; other subscription details from Circulation Dept, RSGB Headquarters.

AMRAC news

AMRAC membership is now (Mid-December) over 500, a remarkable growth from very small beginnings a little over a year ago, making it probably the most go-ahead packet group in the country. The December issue of their magazine, "AMRAC User" has just arrived, and as usual is packed with news, ideas and technical items. On the technical front, there is an interesting article on adjacent channel interference arising from over-deviation of fm radios (and what happens if you drive the audio into clipping), and details of a simple RS232 interface for the Commodore 64. There is also a design for a connect alarm, which beeps at you when someone connects to you—very useful if you don't happen to be looking at the screen at the crucial time! The main product review this time is of the G3LIV/G3WHO Amtor package for the BBC, and for beginners there is a brief article on getting started in data comms.

AMRAC have also carried out a survey of packet users, asking them a

wide range of questions on their equipment and operating procedures; results of the survey will be published soon. The first AMRAC National Packet Convention has now been relocated to London, and will take place on 21/22 March (the weekend before the RSGB Convention in Birmingham). More details from Phil Bridges, G6DLJ, on 0703 847754, or Prestel mbx 703847754. Oh, I nearly forgot; there is also a lament from AMRAC's chairman, Mark Johnson, G4ZRT. Seems he got a PK232 recently (it handles rty, Ascii, cw, Amtor and packet), and decided to try it out on rty. After several weeks of CQs and RYs, he still hasn't heard a single rty station on vhf to talk to. "Surely there must be some people who still use rty?" he wails. The tears are streaming down my cheeks!

Packet news

A new company, Siskin Electronics, has just been formed by Phil Bridges, G6DLJ, who will be importing the full range of Pac-Comm tncs from the United States, at very competitive prices. The range includes the new TNC-220, successor to the popular TNC-200. The 220 features two radio ports (for hf and vhf), an AM7910 single-chip modem, active hf band pass filter, modem disconnect header and optional tuning indicator.

Rod Hewitt, G6TTD, has the source code for the AX.25 protocol as implemented in the Z80-based VADCG tnc. This will be very useful material for anyone contemplating writing their own AX.25 tnc software. In addition, Rod has the specification of the V-2 protocol should anyone want a copy (possibly interesting background reading, but as AX.25 has virtually ousted V-2 throughout the world this specification is probably of little practical use—I don't know of anyone in Europe using V-2). Rod can be contacted on Telecom Gold 78:WQQ164 or Prestel 919999548.

Ray Taylor, G6TNZ, is acting administration officer of the newly formed Lincolnshire Packet Radio Group, and reports that on 1 December a number of AX.25 operators from the Lincolnshire and South Humberside areas met at the Scunthorpe Radio Club to discuss and plan the setting up of an AX.25 repeater. It is hoped to site the repeater in the Lincolnshire Wolds, and it will cover about the same geographical area as the speech repeater GB3LM in Lincoln.

Dublin data

From Gerry Lawlor, EI9FV, in Dublin comes a long letter about data comms in his part of the world. He says that the present situation is still fairly quiet, but likely to be more lively in the near future. There is quite a degree of rty capability around the country, but very little serious activity; "there are too many people with Spectrums and GIFTU programs, and not enough with decent terminal units". However, a number of ST5-type tns have been built over the past year, and a spattering of AMT-2 or TONO devices have appeared on the scene, so the situation may improve. The main interest of rty people seems to be copying the IRTS rty news bulletin on Sundays at 1015gmt on 3,600kHz, or on Mondays at 2030gmt on 145.300MHz.

Moving on to Amtor, there has been some progress in the past year or so. Previous to that there were only one or two stations operating intermittently, but now there are probably a dozen or so. Most are using Commodore 64s with MBA-TOR, but there are still a couple using the Kantronics software on VICs or 64s. Gerry is using a PLX Mk-II which he has modified to AMT-1 status. Most activity is on hf, with very little on 144MHz.

Packet is only just beginning to appear on the air, with Jim Malone, EI4N, the only station known to be active at present. However, a handful of new stations are equipped with PK-64 and G0BSX tncs and ready to go. Most interest is in 144MHz, mainly because of the limitations of the G0BSX modem which does not work too well at hf.

Hear all about it

John Wilson, GM6WQH, in the wilds of Balerno, Midlothian, has had a PK64 since last February, and is able to give talks on rty, Amtor and packet to local clubs. He is also interested in setting up a digipeater in the area. He can be contacted on 031-449 5043 . . . The Harpenden ARC will be giving a practical AX.25 demonstration on 17 February at the Silver Cup public house, St Albans Road, Harpenden. More details from E P Simmons, G1BJC, Batford Farm, Common Lane, Harpenden, Herts AL5 5DN . . . Martin Stubbs, G8IMB (of RSGB RMG), will be talking about packet to the City of Bristol RSGB Group on 23 February, at the Small Lecture Theatre, University of Bristol, University Walk, Clifton, Bristol, starting at 7.30pm. More information from G4SQQ on 0272 508451 . . . John Cooper, G3CXI, is a rty operator of long standing, and is available to give talks on rty to clubs within a 25 mile radius of Cheltenham.

If you are able to give talks on any aspect of data comms, or already have talks scheduled, please let me know in good time, so that I can publicise the details in this column and in *Connect International*. □

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RAYNET

Geoff Griffiths, G3STG*

Public Face

It is a sad fact that nowadays, with modern communication marvels forming such a large part of everyday life, the sight of a radio amateur enjoying his hobby is no longer a noteworthy event for the casual passer-by, or visitor to our homes. In years gone by, dinner guests or casual callers used to be ushered into the shack and carefully manoeuvred around all the feeders and cables to catch a glimpse of the latest transmitter, and to hear the tones of a fellow amateur in Bangkok or Birmingham appearing as if by magic out of thin air.

Nowadays our guests are, I fear, much more accustomed to the modern marvels of communication: Cellnet, satellite and all, and will merely say, "oh he's on cb is he", or politely stifle a yawn behind their hands, and rush back below to the tv and after dinner mints.

For many, the only contact that still brings a sense of the real excitement of amateur radio to Mr Public is when he sees a yellow jacketed Raynet member assisting a St John volunteer to call an ambulance to a casualty, or watching as progress reports on the latest car rally or motorcycle scramble mysteriously appear on a screen or teleprinter.

There is no doubt that the professional performance displayed by so many volunteers is most impressive to the chance viewer or listener, (or even a Chief Constable) and can form a very favourable and lasting impression of amateur radio as a whole. Quite a responsibility!

Work loads

Perhaps this is a good time of the year to look at what we were all up to in 1986. Between March and November, 704 separate operations were reported from groups in all 12 zones. May, June and September were the busiest months, and this is hardly surprising with all the fund-raising activities in support of feeding Africa in the early summer and the usual rash of galas, flower shows, gymkhanas, rallies and charity events.

Undoubtedly, organizers of all these types of affairs are now realizing the need for good communications for the safety of the public, and are calling upon Raynet members more and more.

Incidentally, the patterns of demand are quite interesting amongst those events reported, with the West Midlands (Z9) reporting most activity, closely followed by the Home Counties (Z6), East Anglia (Z4) and Scotland (Z12).

Exercise reports

But of course perhaps all your events were not reported. Trevor Emery has a few interesting points to make in these notes received recently:

"While at the Raynet Committee meeting in London on 22 November, I saw a large packet of completed Raynet report cards which had been sent in to HQ by groups from all over the country. What many members do not realize is that the information given on these cards is used to prepare a complete list of events in which Raynet has participated during the year. It is therefore quite easy to say that if your group has not sent in a report card for an event then nobody but your own group members can really appreciate that you all did indeed spend time and effort, perhaps in inclement weather, helping at some event or other.

"I also receive an interim copy of the computer readout of the events logged so far this year and on looking at my own county, found to my chagrin that not all our events had been reported. Even to a couple missing from my own group and I can only blame myself for that omission because, as group secretary I had written the cards out, put them in the file and forgotten to post them!

"While on the subject of Raynet report cards, there are two boxes in them which are quite frequently left empty. The "duration of event" and "approximate number of Raynet members involved" boxes provide an easy calculation of manhours spent on an event. Now this figure is, in itself, of little use—we don't charge anybody for our efforts, but it is a very quotable statistic when people ask "How much time does Raynet demand of a member?" It provides information for a reply such as "There are 4,800 members of Raynet in the UK and the average time spent by every Raynet

member on events was, say, 28 hours for any particular year."

It's always difficult to single out groups for individual mention, but here are just a few examples.

The Eastern Scottish Borders group operated in November during a six hour long communications operation between Berwickshire, Roxburghshire, Galashiels and the regional civil protection HQ. They also successfully operated a teleprinter link into Edinburgh.

The Sedgemoor, Taunton and Mendip Groups were helping set up the floats for the Bridgwater Carnival parade for six hours one weekend, and then provided five vehicles within the procession to help marshal the 118 floats.

Twelve members of Grampian Raynet worked very hard to provide safety communications for the Checkpoint Stages Rally. Some excitement was caused by the close approach to one operator of a competitor's car which left the ground; and then burst into flames when it failed to stop after completing the stage. Controllers should note that they need to think carefully about where they site their operators at this type of event!

At the July Air Day at the RN Air Station at Culdrose, a demonstration station put on by members of the Lizard and Helston Group was asked by the MoD police for assistance in clearing the visitors' traffic after very heavy rainfall. Excellent work was done in conjunction with the motoring organizations in bringing assistance to many members of the public in difficulty. Just a few days later, members of the same group were working with St John Ambulance members during the Kennack Sands half marathon.

North East Kent Raynet Group operated a control station at sea level during the Canterbury Triathlon, and I think are the only group this year to assist one casualty who was hit by a van, and another who suffered hypothermia after falling into the sea! Both are now well thanks to the group's efforts.

Training material

The Raynet Committee have asked Trevor Emery, G3KWU, to set up a Raynet Video Library so that groups can borrow tapes to show at meetings or even to demonstrate to "user services" and those "non-user" but just as essential services like the WRVS, what Raynet means and does. I'm glad to say, we should have four or five video tapes ready for distribution by the time these notes appear.

If your group has produced such a video and would like to share it with others could you please let Trevor (QTHR) know so that he can arrange to send you a blank tape for a copy. In this way the groups get to keep their own master copies intact! One other point, so far all the tapes held are recorded on the VHS system, but we can arrange to copy to Betamax if you wish. Details on how the video library system will operate will be published shortly via *Zonews*, but it will probably mean that groups wishing to have a copy will be asked to send a blank tape plus return address label and the correct return postage.

Living together

While speaking to a county controller from southern England a few days ago he reported that he had received a complaint from some of his neighbouring amateurs who, although not members of Raynet, still have the right to use the 144MHz band! Now, it would appear that several of these complainants are atv addicts and they get frustrated when the atv talk-back channel on 144.750MHz suddenly becomes filled with rty signals emanating from Raynet groups who may not necessarily be located close to them. We should remember that 144.750MHz is not a Raynet frequency and that all groups should make strenuous efforts to avoid using it except in the very direst emergency when it wouldn't do the slightest harm to ask if the channel is occupied first—and please remember to do your asking in plain language and not by using the ITA2 or any other code as nobody can read it without a machine or computer. We should also remember that rty is readable generally over much greater distances than speech and that its sphere of influence is therefore that much wider.

While talking about telegraphic methods of communicating such as rty, readers might like to know that the Raynet Committee have decided that the AX.25 protocol should be identified as a standard protocol by Raynet groups wishing to use this mode. The committee also agreed to prepare some notes of guidance for groups on frequencies to be used for this mode, and further information will be available shortly.

This is not to say that the Raynet Committee are abandoning rty—far from it; there are still a great number of groups who will continue to use that particular mode for a long time to come. Teleprinters 444 do not suffer from hemp! □

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Contest News

COMMONWEALTH CONTEST 1986 GOLDEN JUBILEE

THIS CONTEST was first held in the spring of 1931, and, with only a few missing years due to the second world war has provided thousands of amateurs throughout the world with a challenge and enjoyment which is unparalleled in the field of contests.

It was John Clarricoats, G6CL, and Arthur Watts, G6UN, who were the driving force during those early years, and much credit should go to them for the idea and its development to the present form.

The first contest was won by Trevor Evans, VK2NS, and since that time there have been many different winners, but only two of the 50 contests have been won from the UK. Fred Miles, G5ML, won the 1932 contest, and in 1950, when conditions were very poor, "Rusty" G5WP succeeded in grasping the Senior Rose Bowl from the likes of VK, VS6, ZL and VE.

G6CJ did accumulate the highest score in 1952 but, being a committee member, refused the award. A few other UK stations have come close, perhaps none more so than Al Slater, G3FXB, who in 1975 missed out by a mere 26 points! Incidentally, G5WP was still competing in the contest, after 38 years!

If conditions remain as they are, then this could favour UK stations. Could the 50th contest see a third UK winner?

**14-15 MARCH 1987
SEE YOU THERE**

Alan Gray, G4DJX

FIELD DAY EVENTS UPDATE

The HF Contests Committee is pleased to announce that substantial progress has been achieved in finalizing the draft rules for the IARU Region 1 CW Field Day. These will be broadly based on the current RSGB NFD rules, apart from some minor changes and the addition of an SWL section. The proposals for a country multiplier, low-power and single-manned sections, have been excluded from the main rules. An extra rule has been added which permits participating societies to add local rules, or make minor amendments to suit their particular national requirements.

While the acceptance of the Vienna proposals and the rules still have to be ratified at the April 1987 IARU Regional Conference in Holland, the overwhelming vote in favour of the event at the 1986 Vienna Working Group meeting and the excellent co-operation achieved between the key European societies, bodes well for the future. The addition of the 'local' rule will allow those countries who currently do not have the use of 1-8MHz to exclude it. It will also permit local variations in the use of multipliers, the addition of extra sections and other changes for the national aspects of the event. The overall IARU FD contest, with the common listing, will of course be based on the full IARU rules.

Although these notes and the 1987 NFD rules are being written some months before the conference, the proposed changes to the present NFD rules are so minimal that the HFCC has decided to adopt the proposals for the 1987 event and use the permitted 'local' rule to include established NFD conventions. While there are indications that there may not be much UK support for a SWL section, we have included it on an experimental basis.

The IARU rules propose a change to antenna heights in both sections, unlimited for the Open Section and 15m for the Restricted Section. The committee is sensitive to the attractions of the lower height, and for the 1987 event, will keep the antenna height for the Restricted Section to 10-7m, while the height for the Open Section will be marginally increased to 20m. If groups wish the antenna heights to be changed to correspond with the IARU proposals, this can be incorporated in the rules for subsequent events. We will also keep inspections as, although these are not required by IARU, several societies are known to include these in their NFD rules. Provided the Vienna recommendations are accepted by the conference, it is possible that there will be a common IARU listing for the event. If so, the RSGB will ensure that the results will be published as a national event and the tabulations sent to the IARU contest manager for overall listing. An announcement about the SSB FD will be made later.

Note that following allegations of abuse and difficulties of interpretation, Rule 4(a) has been changed so that an additional receiver is no longer allowed in the Open Section.

HF NFD 1987 rules

1. The general rules for RSGB HF contests, published in the "Operating Guide" supplement, *Rad Com* January 1987, will apply.
2. **Site notification.** Each group intending to compete must send details of the site to be used to: RSGB HF Contests Committee, c/o Mr D J Lawley, 220 Shipbourne Road, Tonbridge, Kent TN10 3EL, to arrive not later than Saturday 25 April 1987. Details must include the name of the person responsible for the entry; the address to which contest stationery should be sent; section to be entered; name of group; callsign(s) to be used; national grid reference and sufficient access information for an inspector to be able to locate the site.
3. **Date and time.** From 1500gmt Saturday 6 June 1987 to 1500gmt Sunday 7 June 1987.
4. **Sections.**

(a) **Open section.** One transmitter and one receiver (or one transceiver). There is no restriction on the number or type of antennas, but the maximum height must not exceed 65ft, (20m).

(b) **Restricted section.** One transmitter and one receiver (or one transceiver) with one antenna which must be a single element such as a dipole, vertical,

long wire etc, having not more than two elevated support points and not exceeding 35ft (10.7m) above ground at its highest point.

Notes: (i) Stand-by equipment is allowed, but it may not be connected to the power source when the main equipment is in use. (ii) It is not permitted to use permanent buildings or structures as support points for antennas. (iii) Each portable station must operate from the same site for the duration of the contest and may not be located in permanent buildings or use the public mains supply. (iv) Power for all equipment may only be derived from a portable generator on the site, or from solar cells, accumulators or batteries. Float charging must only be from a portable generator. (v) No equipment or antennas may be installed or erected on the site prior to 24 hours before the start of the contest. This does not apply to storage of equipment. (vi) All stations are subject to inspection by representatives of the HF Contests Committee. The inspector's brief will be to ensure that the rules and spirit of the contest are being observed. Should the inspector be unable to locate the site due to inadequate or incorrect information, the entry will be disallowed. In the event of a last minute change of site, it is the responsibility of the members of the group to make suitable arrangements for the inspector to find the new site. The inspector must be given immediate access to all parts of the site with the right to stay as long as desired, and the ability to return at any time during the contest. The inspector may also visit in the 24 hours before the start of the contest. The presence on site of any amplifier or modified commercial equipment capable of excess power, will result in the entry being disallowed, and in the event of such an infringement being proven, all operators listed as being associated with the group in operation of the station will be barred from entering any RSGB contest organized by the HF Contests Committee for five years.

5. **Bands and mode.** CW (A1A) only on the 1-8, 3-5, 7, 14, 21 and 28MHz bands. Contest preferred segments shall be used where such exist.

6. **Exchange.** RST and serial number starting from 001.

7. **Scoring.** Each station may be worked once on each band, but points must not be claimed for contacts made by a competing station with members of its own group. Points will be scored as follows:

Fixed stations in Europe (including the British Isles)	2 points
Fixed stations outside Europe	3 points
Portable and mobile stations in Europe (including the British Isles)	4 points
Portable and mobile stations outside Europe	6 points

The contacts on 1-8MHz and 28MHz should be scored as above and the totals multiplied by two to obtain the band score for the RSGB listing. An IARU Region 1 listing will be collated by the Region 1 contest manager, and the totals in this list will not include the above factor.

8. **Documentation.** Packs of contest stationery will be sent in May to the person making the notification under rule 2. Entries are to be in accordance with general rules 7 and 8 with the following additions: (i) Separate logs must be used for each band, each with a band cover sheet. (ii) A cover sheet, form HFC2, summarizing the overall entry, must be included. (iii) Duplicate contacts must be marked as such without any claim for points. Unmarked duplicates for which points have been claimed will be penalized at 10 times the claimed score and logs containing in excess of five, regardless of band, may be disqualified.

9. **Name and address for entries.** This will be notified when the stationery is sent in May. Overseas check logs should be sent to PO Box 73, Lichfield, Staffs WS15 6JJ, UK.

10. **Closing date for entries.** Entries must be postmarked no later than Monday 22 June 1987.

11. **Trophies.**

(a) The National Field Day Trophy to the station having the highest checked score, regardless of section.

(b) The Bristol Trophy to the station having the highest checked score in the other section.

(c) The Gravesend Trophy to the station having the highest checked score in the section having the highest number of entries.

(d) Certificates of merit to the stations having the three highest checked scores in each section.

(e) The Scottish NFD Trophy to the Scottish station having the highest checked score.

(f) The Frank Hoosen G3YF Trophy to the station having the highest checked score on the 14MHz band.

(g) Certificates of merit to the groups in each section with the highest checked scores on each band.

12. **Check logs.** While overseas stations are not eligible to enter NFD, check logs are very welcome. A certificate will be awarded to the overseas station in each continent whose check log shows the most points contributed to competitors.

SWL SECTION

1. The general rules for RSGB hf receiving contests, published in the "Operating Guide" supplement, *Rad Com* January 1987, will apply.

2. Holders of UK Class B transmitting licences may enter the receiving section.

3. Rules 1, 3, 5, 9, 10 from the transmitting section will apply.

4. **Logging.** Only portable or mobile stations may be logged, and such stations may only appear once in the column headed "station heard" on each band. The callsign of the stations being worked may only be repeated once in every five contacts logged. Entrants should log the callsign of the station heard, RST and serial number given by that station, and the callsign of the station being worked. Points should be claimed as in the transmitting section.

5. **Awards.** Subject to a minimum of 10 entries, certificates of merit will be awarded to the leading three entries. If less than 10 entries are received, awards will be at the discretion of the HF Contests Committee.

28MHz CW Cumulatives 1986 results

Entries for the five sessions in September/October were well down on previous 28MHz cw events and only 28 logs were submitted for checking. Conditions were very mixed and included short periods of tropo, sporadic-E and aurora propagation during the sessions and most entrants were able to make extended inter-UK contacts without difficulty and a few competitors worked into southern Europe (YU, SV, I, TK, TA and LZ). G6LX (check-log) made 54 contacts during the first session, including GW, GI and GM and four European countries. There was only one dx contact logged (with S America) but several entrants reported hearing a 5B4 calling CQ G, but were unable to make a QSO.

The winner was once again G4BLX operating from Ditchling in East Sussex, with G3TCT second and G0AGE third. The majority of entrants used rotary beam antennas with the three-element tri-band Yagi being the most popular.

As predicted, the adjacent county rule was not liked and many entrants have asked that this basis for bonus points is not used in future contests. There was a certain amount of confusion about whether or not a county was adjacent and several scores had to be adjusted (some up and some down). Two stations operating within Greater London, used SRY as their county code and in consequence claimed the wrong adjacent counties. The committee will take another look at the scoring system after the phone section has been adjudicated.

G4RWW

TRANSMITTING SECTION									
Posn	Call sign	County	29 Sept	7 Oct	15 Oct	23 Oct	31 Oct	Total	(Best 3)
1	G4BLX*	SXE	—	263	220	—	183	666	
2	G3TCT*	SRY	169	173	161	—	—	503	
3	G0AGE*	BFD	159	156	—	140	ck	455	
4	G4WON	NOT	ck	146	172	ck	102	420	
5	G4OGB	HBS	137	168	100	ck	ck	405	
6	G3NOM	DYS	—	165	146	—	82	385	
7	G0AEV	WLT	130	120	133	ck	ck	383	
8	G2HLU	BRK	ck	137	108	93	ck	338	
9	G4WVX	BKS	—	—	129	112	95	336	
10	G0BON	BRK	—	—	134	89	86	309	
11	G3BXS	BRK	ck	96	108	ck	85	289	
12	G3MCX	LDN	ck	ck	114	86	88	288	
13	G3SJK	SRY†	57	133	—	—	83	273	
14	G4YFN	BRK	81	57	109	—	—	247	
15	GW4HSH	GNW	ck	70	103	54	ck	227	
16	G4NFX	HBS	77	67	75	—	—	219	
17	G3JYP	CBA	—	82	63	57	—	202	
18	G3CWL	SRY	ck	75	86	—	39	200	
19	G4OBK	LNH	57	80	60	ck	ck	197	
20	G4SUO	SRY†	ck	50	47	77	—	174	
21	G3ILO	GLR	ck	59	46	ck	49	154	
22	G4KKZ	CNL	44	81	27	ck	—	152	
23	G3VYI	SRY	45	37	61	—	—	143	
24	G3WRR	LDN	38	49	—	49	ck	136	
25	G4PTE	KNT	26	18	28	—	ck	72	
—	G3WP	ESX	ck	ck	ck	ck	ck	ck	
—	G6LX	LDN	ck	ck	ck	—	—	ck	

RECEIVING SECTION

1	RS20249	LDN	41	78	53	—	ck	172
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*Certificate winner

†Wrong county code sent (see text)

1987 1-8MHz Town & County Contest rules

In the 1986 contest only five per cent of those who were active sent in entries or check-logs. This is a very poor return and the HF Contests Committee had felt that it was probably not worth continuing the event unless there was a greater interest. Following the promise of more support, the committee has decided to hold the 1987 event, but warns that the future of this contest will depend on the support it receives this time.

1. **Sections.** Single-operator entrants only. All entrants must be resident in the UK (G, GD, GI, GJ, GM, GU or GW) and be fully paid-up members of the RSGB.

(a) Transmitting Section: Holders of Class A UK transmitting licences.

(b) Receiving Section: SWL entrants including holders of Class B transmitting licences.

Transmitting entrants must operate within the terms of their licence.

2. **Period.** From 2100 to 2400gmt Saturday 21 March 1987.

3. **Band/mode.** 1,915—2,000kHz, phone only.

4. **Contest exchange.**

Transmitting Section. RS and serial number (starting with 001) together with the operator's town and three-letter county code as published in the "Operating Guide", *Rad Com* January 1987. In the case of "country" entrants the nearest town in the same county should be given. Scottish entrants should give their town and regional code. There is no restriction on working overseas stations (log RS/Serial No).

Receiving Section: Log the same information and should note that the station heard may only be logged once. The call signs of the stations being worked may only repeat once in every three contacts logged.

5. **Scoring.** Three points for each completed contact plus a bonus of five points for the first contact with each British county/region and for the first contact with each overseas country. Receiving entrants score on the same basis as transmitting entrants (see Rule 6 below).

6. **Logs.** All logs must follow the standard RSGB format. Transmitting logs should be headed: date/time, call sign worked, RST/No sent, RST/No received, town/county(country) received, bonus, points. Receiving logs are to be headed: date/time (gmt), call sign of station heard, RST/serial number/town/

county sent by that station, call sign of station being worked, bonus, points. All entrants should note that duplicate contacts (or duplicate receiving entries) must be clearly marked without claim for points (unmarked duplicates will be penalized at a rate of 10 times the number of points/bonus claimed for the contact). Each entry must be accompanied by a cover sheet and the following signed declaration: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest and agree that the decision of the Council of the RSGB shall be final in all cases of dispute".

7. **Data Protection Act.** Entrants should note that the contest adjudicator may enter information from their logs into a micro-computer for the sole purpose of checking for duplicate contacts and preparing contest tabulations. If any entrant objects to this, they must clearly state their objection on the cover-sheet so that the adjudicator can hand-process their information.

8. **Entries.** Logs must be sent to: HF Contests Committee, c/o G4RWW, 279 Addiscombe Road, Croydon CRO 7HY, not later than 15 days after the end of the contest.

9. **Awards.** Certificates of merit will be awarded to the leading three UK transmitting entrants. Certificates for the leading swl entrants will be awarded at the discretion of the committee depending on the number of entries received.

Low Power Contest 1987 rules

1. **Aim of contest.** To encourage QRP operation.

2. **Eligible entrants.** Single-operator stations only. UK entrants must be fully paid-up members of RSGB.

3. **When.** Sunday 19 April. 0700-1100gmt.

4. **Sections.** (a) British Isles stations using 5W input or less.

(b) Overseas stations using 5W input or less.

5. **Frequencies.** 3-5 and 7MHz bands only.

6. **Mode.** CW (A1A) only.

7. **Contest call and exchange.** CQ QRP. Exchange RST and serial number starting at 001, plus input power (eg 599001 3W).

8. **Scoring.** 15 points for each completed contact with another QRP station. Five points for all other contacts. Overseas stations may only claim points for UK contacts.

9. **Logs.** Separate logs must be submitted for each band. All exchanges should be shown.

10. **Declaration.** Each entry must be accompanied by the following declaration: "I declare that my station was operated in accordance with the rules and spirit of the contest and in the event of any dispute the decision of the Council of the RSGB will be final." The declaration must be signed and dated.

11. **Address for logs.** RSGB HF Contests Committee, c/o Mrs H Clayton-Smith, 115 Marshalswick Lane, St Albans, Herts, AL1 4UU.

12. **Closing date for logs.** Logs must be postmarked no later than 11 May 1987.

13. **Awards.** The 1930 Committee Cup will be awarded to the leading station in Section (a). Certificates of merit will be awarded to the leading three stations in each section, and to the highest placed entrant in each section using 1W input or less.

Slade and Coventry Double Night DF Event results

After heavy rain on Friday, Saturday 15 November started off with sunshine and remained fine right through to midnight, an excellent day for antenna erection and an excellent night for df competitors. The turnout for this event was disappointing—only seven teams signing in at the start at Barr Beacon.

At 1920gmt signals were heard from transmitter "A" G2ASF but transmitter "B" was completely swamped by two very strong signals. An approximate bearing of 190° was given and a distance of more than 10km.

All competitors went for transmitter "A" first, where G4KZU was hidden in a small wood with the antenna surrounding the wood. At one point a tee off the antenna crossed a small stream where a tree had fallen across it. Several hardy competitors crossed to the other side only to find a stick tied to the end of it!

The organizer was stationed near to transmitter "B" G3SRS, keeping an eye on the car park. By 2200 at least a dozen cars had driven in and switched off their headlights, but no competitors! Afraid of being arrested as a peeping tom he made his way to the hill overlooking the transmitter site, manned by G4CFB, only to find that most competitors had found it by walking across the golf course and up the hill; Brian Bristow being the first in.

After the contest, competitors and transmitter crews got together at the Frankley Service Station (M5 Southbound) where prizes and the Slade Shield were presented.

Thanks are due to Norman Rathbone, Phillip Arnold and Bill Mays for their tremendous effort.

Time of arrival				
Posn	Name	Club	Stn A	Stn B
1	B Bristow	Mid-Thames	2119	2214
2	G Whenham	Coventry	2120	2240
3	Kee Chan	S Manchester	2118	2241
4	D Holland	S Manchester	2201	2257
5	C Wells	S Manchester	2206	2313
6	W Pechey	Mid-Thames	2119	2315
7	T Gage	Mid-Thames	2119	—

South Manchester Quad Night DF Event

Date: 28 February 1987

Map: OS 109, 1:50,000 series (Manchester)

Start: 1900gmt for first transmission at 1920gmt

Assembly: Sale Moor Community Centre, Norris Road, Sale, Cheshire NGR 798909

Competitors requiring supper after the event should advise Mr D Holland, 32 Woodville Drive, Sale, Cheshire M33 1NF, tel 061-973 1837 (Home) or 061-224 5650 (Office), by 23 February 1987.

Mid-Thames Triple Night DF Event results

Seventeen teams assembled on a very clear and cool October evening at Peppard Common for the start of the event.

Following a period of panic, due to the late arrival of the starter, good signals were reported from all three stations.

Station A G4CUE/P was located 20km south of the start in a wood near Mortimer West End. The antenna was designed to draw competitors towards some power lines and away from the transmitter but failed to deceive most of the competitors.

Station B G3UJO/P was located 11km north of the start near woods at Northend. Again the antenna was erected adjacent to overhead power lines but with the added attraction of being a spiral. This configuration caused considerable problems for some teams.

Station C G4MDF/P was located 6km south west of the start. The station was hidden in the middle of some thorn bushes on a housing estate with an antenna which climbed 70ft up an oak tree. Flat batteries plagued this transmitter and after two changes it was forced to close down before the end of the contest.

A total of 43 sat down for a three course hot meal at the Scout Hut at Crays Pond where Brian Bristow gave an entertaining description of how he won the contest for the second year running!

Posn	Name	Club	Stn A	Time of arrival	Stn B	Stn C
1	B Bristow	Mid-Thames	2057	2249	2208	—
2	D Holland	S Manchester	2058	2302	2205	—
3	C Plummer	Mid-Thames	2055	2323	2247	—
4	A Simmons	Mid-Thames	2055	2248	2249	—
5	I Butson	Colchester	2054	2329	2329	—
6	P Lisle	Mid-Thames	2057	2250	2350	—
7	R Shepherd	Mid-Thames	2057	2322	2355	—
8	C Merry	Dartford Heath	2054	—	2216	—
9	D Yorke	S Manchester	2041	2249	—	—
10	B Poole	Mid-Thames	2114	2322	—	—
11	T Gage	Mid-Thames	2053	—	2346	—
12	C Wells	S Manchester	2119	—	2347	—
13	G Foster	Stratford	2100	—	—	—
14	M Ellis	S Manchester	2141	—	—	—
15	G Whenham	Coventry	2202	—	—	—
16	D Newman	Northampton	2209	—	—	—
17	M Walton	Mid-Thames	2302	—	—	—

Ropoco 2 1986 results

The contest attracted a greater number of entrants this year and consequently scores were higher. Obviously more entrants are paying attention to accuracy in their sending and receiving, the number of perfect logs doubled to ten, an excellent performance by these operators. Roger Western, G3SXW, wins the G3XTJ memorial trophy with his perfect log of 73 QSOs. The overall winner is Jim Kellaway, G3RTE who almost had a perfect log, losing just three points from one receive error. Some of the postcodes being sent just had to be heard to be believed! One, TT5LE12B, was generated as early as the eighth minute. Thank you to all who participated, and the HFCC hopes to see you again next year battling with the dreaded rpgos (rouge postcode generating operators).

G4DJX

TRANSMIT SECTION									
Posn	Callsign	QSOs	Lost	Score	Posn	Callsign	QSOs	Lost	Score
1	G3RTE	77	3	767	26	G4OGB	61	113	497
2	G3SXW	73	0	730	27	G0CLP/A	51	29	481
3	G4BWP	72	10	710	28	G4ODV	48	3	477
4	G4FAM	69	0	690	29	G4KWI	48	6	474
5	G3RZP	70	12	688	30	G4UMS	51	39	471
6	G3NOM	69	3	687	31	G2HLU	47	0	470
7	G0EOW	68	0	680	32	G3MCK	44	0	440
8	G3WPF	68	6	674	33	G4PKU	43	9	421
9	GW3WVG	66	3	657	34	G4WYG	42	16	404
10	G4BUO	65	3	647	35	G4HFZ	40	0	400
11	G3SWH	64	6	634	36	G0BEU	40	3	397
12	G3NKS	64	6	634	37	G3JJZ	50	106	394
13	G3JJG	63	0	630	38	G3COR	33	16	314
14	G4BOU	63	18	612	39	G3MCX	31	3	307
15	G3TXF	58	0	580	40	G4DJX	30	0	300
16	G4WQN	58	3	577	41	GM4OSS	30	9	291
17	G3GC	58	22	558	42	G4KLO	29	3	287
18	G4ARI	56	22	538	43	G4SLE	33	47	283
19	G4MUL	54	6	534	44	G4KTI	28	6	274
20	G4OTV	54	12	528	45	GM3UM	27	10	260
21	G3MA	55	22	528	46	G4GIR	25	0	250
22	G4IUI	54	19	521	47	G4PUR	24	9	231
23	G4UOL	55	34	516	48	G3GMM	25	36	214
24	G4OOS	53	19	511	49	GW4KJ	18	16	164
	G4KGG	53	19	511	Totals		2,457	727	23,843

Disqualified: G5LP, General rules 2 and 15. No proof of contact.

Club News

The following is the latest information received by RRs from the RSGB affiliated societies, clubs and groups in time for inclusion in this issue. Basic unchanged information on other affiliated organizations will be published again in July 1987.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the April issue should reach them by 11 February, and for the May issue by 5 March.

Club programmes are given in order of date, subject, time and place of meeting. All callsigns of club secretaries and other contacts are QTHR (correct in the current RSGB Call Book) unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

REGION 1—RR B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ. Tel 051-722 3644.

Accrington (North-west Repeater Group)—The group maintains GB3RF and GB3PF. Plans for another 432MHz repeater are in progress. Third Thursday of each month, 8pm. The Globe Bowling Club, Willows Lane, Accrington. Sec G0DTI.

Barnoldswick (Rolls Royce ARC, G3RR)—4 Feb (Social night, Harry Garlick), 4 March (Construction contest). Morse classes every Monday at 7.30pm and every Wednesday. Second and third Wednesdays are shack nights. The Rolls-Royce Sports and Social Club, Barnoldswick. Sec G4ILG, tel 0282 812288.

Carlisle (C&DARS)—Mondays, 7pm. The Scout HQ, Trinity School, Carlisle. Please note new venue. Details G3XWA, tel 27463.

Fylde (FARS)—3 Feb ("Amateur television" Part 2), 17 ("Direction finding with simple equipment"), G3AEP, G8GG, 3 March ("The cause of auroras" Part 1, G2FKZ), 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel 725717.

Leyland (CLARC G0FDX)—16 Feb (RSGB film), 2 March (Noggin and natter), 8pm. The Priory Club, Broadfield Drive, Leyland. Details G4OBK, tel Chorley 74451.

Liverpool (L&DARS)—3 Feb (Quiz with St Helens ARC), 10 ("Face behind the callsign"), 17 ("Transport" Part 2, G1JEI), 24 ("Experiences in

the RAF", G1VEH), 8pm. The Churchill Conservative Club, Church Rd, Liverpool 15. Sec Lynn, tel 728 8811.

Macclesfield (M&DARS)—3 Feb (Construction evening), 13 ("Lowdown on hi-fi", G0DMU), 17 (Committee meeting), 24 (Open meeting), 3 March (Construction evening), 8pm. The Fermain Club, Oxford Rd, Macclesfield. Sec G1NUS, tel 0625 24534.

Manchester (SMRC)—13 Feb ("Fax", G4NRO), 6 (Video lecture, W5LFL), 8pm. Sale Moor Community Centre, Norris Rd, Sale. Details G2AKR.

Ormskirk (O&DARC)—5 Feb (Fire & lightning talk, Lancashire Fire Brigade), 5 March (First aid, Anne Edwards. Also contest season planning), 8pm. Ormskirk Community Centre. Details G1KDF, tel 0695 74868.

Penrith (EVRS)—19 Feb ("Computer programs", G4XET), 8pm. The Ullswater Centre, Penrith or The Crown Hotel, Eamont Bridge. Details G4XPO, tel Culgaith 462.

Stockport (SRS)—11 Feb (Junk sale), 18 (Informal night at the bar), 28 (Contest operation), 8pm. The Blossoms Hotel, junction of Bramhall Rd and the A6. Please note new venue. Details G4FFW, tel 061-224 7880.

Thornton Cleveleys (TCARS)—2 Feb (Question and answer session), 9 & 23 (Informal and club on air), 16 ("Grinding your own crystals", G0ETV), 7.45pm. 1st Norbreck Scout HQ, Carr Rd off Fleetwood Rd, Bismham, Blackpool. Details G4BFH, tel 0253 853554.

Wigan (W&DARC)—25 Feb (Visit by regional rep), 7.30pm. St Judes Catholic Club, Poolstock Lane, Wigan. Sec G0DTY, tel 0942 47416.

Wirral (WARS)—4 Feb (President's night), 18 ("Packet radio and Amtor", G3UFO), 4 March (Surplus sale for club funds), 8pm. Ivy farm, Arrowe Park. Sec G3VEB.

If your club is not mentioned, it is because I have no details of current events. Please read beginning of "Club News" for info and deadlines. I still get info too late for publication.

I wish to thank South Cheshire ARS for a most enjoyable evening at their annual social, and Stockport RS for their kind invitation which had to be declined due to a prior engagement. Also, to

the clubs who send me their newsletters and magazines, many thanks. RR1

REGION 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, Beverley, N Humberside HU17 7LX. Tel 0401 50397.

Halifax (H&DARS G2UG)—17 Feb (Junk sale) Running Man ph. Details G0DLM, tel 0422 202306.

Keighley (KARS RS 84851)—10 Feb (Informal), 24 (Alignment evening with G3TQA), 8pm. Victoria Hotel. Details G1IGH, tel 0274 496222.

Pontefract (P&DARS G3FYO)—12 Feb (Natter night), 19 (Raynet AGM). Carleton Community Centre. Details G0AAO, tel 0977 43101.

Spenn Valley (SVARS G3SVC)—5 Feb ("Satellite tv", G8HUA), 19 ("Bee keeping", G4PHR), 8pm. Old Bank WMC. Details G4YHT, tel 0924 499397.

Todmorden (T&DARS G4WYT)—2 Feb (AGM), 16 (Chat night), 8pm. Queen Hotel. Details G1GZB, tel 0706 817572.

UK FM Group (Northern G8KFM)—1 Feb (Monthly meeting), 7.30pm. Royal Hotel, Barnsley. Details G4UNA.

Wawne (Raynet Group G4UWE)—2 Feb (Communication test with other groups), 12 (County Raynet controllers meeting), 16 (Wawne training meeting). EP Section, Meaux Rd. Details G4EJP, tel 0401 50397.

White Rose (WRARS G3XEP)—11 Feb (Video: "World at your fingertips"). Moortown RUFC. Details G4ATZ, tel 0937 842790.

York (YRC G4YRC)—10 Feb (Shuttle video), 24 (ORP night). Ashcroft Hotel. Details G1FTA, tel 0904 704634.

REGION 3—RR G Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT. Tel 0203 616941.

Coventry (CARS)—6 Feb (Quiz night), 13, 27 (Night on the air), 20 (Mini lectures), 8pm. Scout HQ, 121 St Nicholas St, Radford, Coventry. Sec G3UOL, tel 414684.

Evesham (ERAC)—5 Feb ("Secondhand equipment", A Kelly). Details G4UXX, tel Evesham 831508.

Halesowen (MEB RC)—10 Feb ("Computing in amateur radio", G4LWF), 24 (General meeting), 8pm. MEB Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel. 021-747 8784.

Shrewsbury (Salop ARS)—5 Feb (Packet radio), 12 (Natter night), 19 (Mobile operating), 26 (HF on the air), 8pm. Old Bucks Head, Frankwell, Shrewsbury. Sec G0E1Y, tel 0743 67799.

Stratford-upon-Avon (SuA ARC)—9 Feb ("Converting commercial equipment", G8HRI), 23 ("RSGB", G3VPE), 7.30pm. Baptist Church, Payton St S-u-A. Sec G8OVC, tel Stratford 750584.

Wolverhampton (WARS)—3 Feb ("Electric power distribution", Part 2, G4WAS), 10 (Activity meeting), 17 (Visit to Springfield Brewery), 24 (Open forum), 8pm. Electricity Sports Club, St Marks Rd, Chapel Ash. Sec K Jenkinson, tel 0902 24870.

Would all club secs please keep me informed of your club activities if you want publicity. I cannot get news into this column unless you get it to me before the published deadline. Too much is coming far too late and, in an effort to use it, we have been missing the deadline by which the editor must receive it. In future news that does not reach me in time will not be used. **RR3**

REGION 4—RR M Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey DE3 2BJ. Tel Derby (0332) 556875.

Derby (DADARS)—4 Feb (Junk sale). Morse classes Tuesdays 7pm. 119 Green Lane, Derby. Sec G3KQF, tel Derby 772361.

Leicester (LRS)—2 Feb (50MHz, the first year in retrospect), 9 (Committee meeting/activity night), 16 (VHF/HF amplifier workshop), 23 (Lecture, G4GVC), 30 (Hands on test equipment evening), 8pm. Gilroes Cottage, Groby Road, Leicester. Sec G4PDZ, tel Leicester 871086.

Lincoln (LSWC)—4 Feb (Committee meeting, cw activity night), 11 ("10 GHz tv", G0BTA & G6IGM), 18 (CW/RAE activity night), 21–28 Feb (GBORAG at Bishop Grosseteste College rag week), 25 (Junk sale), 8pm. City Engineers Club, Waterside South, Lincoln. Sec G4STO, tel Gainsborough 788356.

Mansfield (MARS)—5 Feb ("Satellite Update", G4CUO), 17 (Packet radio), 8pm. Victoria Social Club, Mansfield. Sec G1DZH.

Matlock (TorARA)—10 Feb ("Commercial satellite operation", G4UWK), 24 Feb ("Amateur television", G6SKO) 7.30pm. Greyhound Hotel, Cromford, Matlock. Sec G0FWI, tel Matlock 3503.

Melton Mowbray (MMARS)—20 Feb ("Fault finding", G3JHS), 8pm. St Johns Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec G3NVK, tel Melton Mowbray 63369.

Workshop (WARS)—10 Feb (Night on the air with G3RCW), 24 Feb (Power supplies, G8VHB), 8pm. Woodhouse Inn, Woodend, Rhodesia, Workshop. Sec G4ZUN, tel Workshop 486614.

REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or at work on 0582 21151.

Cambridge University (CUWS)—2 Feb (Speaker meeting), 16 ("Sun spots", Martin Atherton), 8.30pm. Seminar Room 2 and 3, Trinity Hall College. Details G60QA, Selwyn College, Cambridge.

Daventry (DRC)—3 Feb (Visit by RR5). Meetings now held each Wednesday at the St John's Ambulance Brigade Rooms. Details G0DPA, tel 0327 703105.

Milton Keynes (MK&DARS)—9 Feb ("Technical aspects and demo of the electronic organ", Chappells of Bond Street), "The Meeting Place", Hodge Lea, North Milton Keynes. Sec G0ERE, tel Cranfield 750629.

Nene Valley (NVR)—18 Feb (Visit by RR5). 8pm. The Prince of Wales ph, Finedon. Sec G6UWS, tel Wellingborough 71189.

Shefford (S&DARS)—5 Feb ("Diodes", G8AFN), 12 (Foul weather quiz), 19 (Club project surgery), 26 (Junk sale). The Church Hall, Amphil Road, Shefford. Sec G4PSO, tel Hitchin 57946.

REGION 6—RR N P Taylor, G4HLX, 87 Hunters Field, Stanford in the Vale, Faringdon, Oxon SN7 8ND. Tel 03677 503.

Abingdon (A Contest Club)—Feb meeting (AGM). Details G4PSU.

Aylesbury (A Vale Repeater Group)—18 Feb (AGM), 8pm. Stone Village Hall, Stone, nr

Aylesbury. Talk-in GB3VA, GB3AV & S22. Details G8BQH, tel 0296 641783.

Maidenhead (M&DARS)—5 Feb ("Interference", G4OHX, test gear available), 17 ("Removal, for reuse, of components from pc boards", G3VTS), 7.30pm. Red Cross Hall, The Crescent, Maidenhead. Sec G8RYW.

Newbury (N&DARS)—10 Feb ("Data communication in amateur radio", G1JOV), 7.30pm. Newbury Technical College. Sec G3VOW, tel Newbury 43048.

Oxford (O&DARS)—11 Feb (Natter night), 25 (tba. 7.45pm. Oxford Civil Service Sports Association Club, Government Buildings (entrance through gates marked "Driving Tests"), Marston Rd, Oxford. Sec G4PUU.

Slough (Burnham Beeches RC)—2 Feb (Surplus equipment sale), 16 ("Weather satellites"), 2 March (AGM), 8pm. Haymill Community Centre, 112 Burnham Lane, Slough. Details G6EIL, tel Maidenhead 25720.

REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ. Tel 0372 372587.

Ashford (Echelford ARS)—9 Feb ("WAB", G4ULM), 26 (Constructional evening), 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ, tel Sunbury 82823.

Cray Valley (CVRS)—5 Feb ("Operation Raleigh and Pacific crossing", G4TAW), 19 (Natter night), 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. Details G3TAA.

Croydon (SRCC)—2 Feb (Sid Morley Memorial Lecture, "Aerial Farm"), 2 Mar (Surplus equipment sale), 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS, tel 01-657 0454.

Crystal Palace (CP&DRS)—21 Feb (AGM and construction contest), 8pm. All Saints Parish Room, Beulah Hill, Upper Norwood, SE19. Sec G3FZL, tel 01-699 6940.

Sutton and Cheam (S&CRS)—20 Feb (Video: "QRP"), 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Sec G4FKA, tel Epsom 21439.

Thames Valley (TVARTS)—3 Feb ("Receiver noise", G3ENI), 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton. Sec G3ENI.

Wimbledon (W&DRS)—13 Feb (Mini lecture), 27 ("IBA DBS broadcasting", G3VA), 7.30pm. St Andrews Church Hall, Herbert Road, Wimbledon SW19. Sec G3DWW, tel 01-540 2180.

REGION 8—RR M Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE. Tel 0795 70132.

Dover (SE Kent YMCA ARC)—4 Feb (Natter night), 11 (Films), 18 (Natter night), 25 ("Air Traffic Control"), 4 March (Natter night), 8pm. Dover YMCA, Godwynhurst, Leyburne Road, Dover. Details John H Dobson, tel Dover 211636. (Results of Quiz held on 26 Nov between Thanet RC, East Kent RS, & Dover RC: Dover 147 points, East Kent 118, Thanet 83).

Eastbourne (Southdown ARS)—2 Feb ("VHF amplifiers", G3WZT), 2 March (Surplus equipment sale), 8pm. Chaseley Home, Southcliff, Eastbourne. Various courses held Tuesday evenings, and Friday is chat night. Leisure Centre, Vicarage Lane, Hailsham. Details G4XNL, tel Eastbourne 638653.

Gillingham (Bredhurst R&TS)—5 Feb (Amateur radio in the Soviet Union, 19 (Demo of antique broadcast radio receivers—Tony Skinner), 28 (Rainham radio rally), 5 March ("Homebrewing station test equipment", G3VTT), 8pm. Parkwood Community Centre, Parkwood Green, Wigmore, Gillingham. Details G0AMZ, tel Medway 376991.

Hastings (HERC)—18 Feb (Update on video image processing), 7.30pm. West Hill Community Centre. Various activities other nights. Details G4NVQ tel Hastings 420608.

Maidstone (MYMCAARS)—6 Feb ("EMC interference", G3ORP), 13 & 27 (Natter night with RAE & cw), Feb 20 (Video), YMCA Sportscentre, Melrose Close, Maidstone. Details G0BUW, tel 0622 30544.

Horsham (HARC)—5 March (Spring junk sale, 8pm), Guide Hall, Denne Road, Horsham. Details, G4UDU, tel Hassocks 5517.

Worthing (W&DARC)—4 & 18 Feb (Ragchew evening), 11 ("WADARC 1986: The video", G8VEH), Feb 25 (tba), 4 March (Ragchew evening), 7.30pm. Lancing Parish Hall, South Street, Lancing, West Sussex. Details G4SWH, WAD-ARC, PO Box 599, Worthing, BN14 7TT.

REGION 9—RR A H Hammett, Rosehill, Ladock, Truro, Cornwall TR2 4PQ. Tel 0726-882 758.

Exeter (EARS)—9 Feb ("The experiences of a BBC engineer"), 7.30pm. Community Centre, St Davids Hill, Exeter. Details G3YBK.

Exmouth (EARC)—11 Feb (AGM), 7.30pm. The Scout Hut, Marpool Hill, Exmouth. Details G4RUT.

Newton Abbott (Torbay ARS)—28 Feb (Business meeting and slide lecture on wild life, Andrew Cooper), 7.30pm. ECC Social Club, Ringslade Road, Highweek, Newton Abbott. Details G4SBH.

Redruth (CRAC)—5 Feb ("A beginner's guide to antennas", G3NPB), 9 (Computer section, "The pc and its clones"), 19 (Construction evening), 7.30pm. Treleigh Church Hall, Redruth. Details G4ZUL.

It is proposed to hold a meeting of Region 9 members and their friends on 12 April at Sparkwell Village Hall, just east of Plymouth, at 10.30am. There will be lectures and a general discussion on what the amateur can do for the amateur. Meals are available and there are several interesting places in the vicinity for the family. Contact G8XTE if an overnight stay has to be arranged.

Will all clubs who wish to have details of their meetings published let me have them eight weeks before publication date. Some details have been omitted in the past as they arrived late. **RR9.**

REGION 10—D H Phillips, GW4KQ, 17 Pentre Gardens, Grangetown, Cardiff CF1 7QJ. Tel 0222 35648.

Barry (BCoFERS)—26 Feb (Final rally briefing) 7.30pm. Beginners and advanced cw classes on club nights. The Annex, Weycocks Cross, Barry. Details GW4NBY, tel 0656 62867.

Cardiff (CRSGBG)—9 Feb ("Slow scan tv"), 7.30pm. Pant Mawr Hotel, Pant Mawr Estate, Whitchurch, Cardiff. Details GW0CUM, tel 04463 3212.

Swansea (SARS)—19 Feb ("RSGB aims and objectives", GW4KQ), 7.30pm. Lecture Room "N" Applied Sciences building, Swansea University. Details GW4HSH, tel 0792 404422.

REGION 11—RR B H Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Colwyn Bay (Conwy Valley ARC)—12 Feb (Talk by GW3JGA), 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Sec GW4KGI, tel 0745 823674.

REGION 12—RR M R Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire PH16 5HH. Tel 0796 2140. Prestel 107962140.

Aberdeen (ARC)—6 Feb (Junk sale), 13 (Debate: "Amateur radio would be improved if all repeaters were closed down tomorrow"), 20 ("DXing on vhf/uhf with a less than average station", GM4OBD), 27 ("A newcomers guide to 70MHz", GM4ZUK), 6 March (Junk sale), 7.30pm. 35 Thistle Lane, Aberdeen. Sec GM4GXD, tel Pitcaple 251.

Dundee (Kingsway Tech ARC)—3 Feb (Video "New Zealand RDF—The Happy Fliers"), 10 (Construction night), 17 (Video "Satellite communications"), 24 (Construction night), 3 March (Video "Two pioneers of radio, G6CJ and G2DX"), 7.30pm. Kingsway Technical College Annex, Grayham Street. Sec GM1KJE, tel Dundee 646673.

Kirriemuir (Strathmuir & District ARC)—2 Feb (Illustrated talk by GM4AWA), 7.30pm. 46 High Street, Kirriemuir. Sec GM3ZXE, 19 Inver Tce, Muirhead, By Dundee.

REGION 13—RR A J Scott, 2 Manderston Grove, Duns, Berwickshire TD11 3PP. Tel 0361 83221.

Berwick on Tweed (Border ARS—GM0BRS)—6 Feb (Slides by G1GIT), 20 ("DXCC", G3YOG), 6 March (Mini lectures start), 7 (Club members visit Blue Star rally), 7.30pm. St John Ambulance Halls, Church St, Berwick on Tweed. Sec GM1IRN, tel 0289 82491.

Glenrothes (G&DARC—GM4GRC)—4 Feb ("QRP part 1", GM4HBG), 11 ("QRP part 2, operating", GM4HBG), 18 (Activity night), 25 (RSGB film), 7.30pm. Provosts Lane, Leslie, Fife. Sec GM1NTQ, tel 0592 744672.

REGION 14—RR T G Wylie, GM4FDM, 3 Kings Crescent, Elderslie PA5 9AD. Tel Johnstone (0505) 22749.

Ayr (AARG)—Meets alternate Fridays in the Community Leisure Centre, 24 Wellington Square, Ayr. Details GM3THI, tel 0292 42313.

Cumnock (CDARG)—Meets on the first Thursday of the month in the Netherthird Community Centre, Cumnock, South Ayrshire. Details GM1SXZ, tel 0290 38786.

Dumfries (DGREC)—First and third Mondays of the month. Cargenholm Hotel, New Abbey Road, Dumfries. Details GM4NNK, tel Dumfries 64957.

Dumfries (MARK)—Meets every second Wednesday Tam O'Shanter Inn, Queensbury Street, Dumfries. Details GM4NNC.

Dunoon (D&DARC)—The Community Centre, Edward Street, Dunoon Fridays 7.30pm. Details GM0BUL, tel 0369 84217.

Falkirk (FARC)—Meets in the Grange Centre, Redding Road, Brightons by Falkirk. Details GM4MBC.

Glasgow (WOSARS)—6 & 20 Feb (Informal), 13 ("Weather satellites", GM4JYZ), 27 ("Lowe Electronics Ltd", GM3SAN), 154 Ingram Street, Glasgow. CW tuition available. Details GM0EFH, tel 041-959 4786.

Greenock (GDARC)—Meets every Friday at 22 Inverkip Street, Greenock. Details GM0ADF, tel 25075.

Helensburgh (HARC)—Meets every Thursday 7.30pm. The Cairndhu House, Rhu Road, Helensburgh. Other week night for computer buffs. Details Mr J Thomson, 37 Grant Street, Helensburgh.

Irvine (CDARC)—Meets every Thursday in The Magnus Centre, Irvine. Details GM0ECU.

Kilmarnock (KLARC)—Meets every second Tuesday in The Glenfield Social Club, Queens Drive, Kilmarnock. Details GM0DJG.

Loch Lomond (LLARC)—Meets Tuesdays in The Bonhill High Dykes Primary School. Details GM4LKL.

Mid Argyll (MAARC)—Meets on the first Monday in the month in The Stag Hotel, Lochgilphead. Details GM4VXA 0546 3173.

Motherwell (MLARS)—27 Feb ("BBC site survey department", Trevor Madoc-Jones). The Wrangholm Hall Community Centre, New Stevenson, Motherwell. RAE tuition and cw available. Details GM1SSA.

Stranraer (WARC)—Meets every Thursday. The Community Centre, Lewis Street, Stranraer. Details GM4BAE, tel Stranraer 2876.

REGION 16—RR A Owen, G4HMF, 102 Constable Rd, Ipswich, Suffolk IP4 2XA.

Braintree (B&DARS)—2 & 16 Feb ("Reminiscences of a presidential year", G3VPK). 8pm. The Community Centre, Victoria Rd (next Bus Station), Braintree. Details G1NBV, tel 0376 44908.

Chelmsford (CARS)—3 Feb (Rig testing, G8MRO). 7.30pm. Marconi College, Arbour Lane, Chelmsford. Details G4KQE, tel 0376 83094.

Colchester (CRA)—5 Feb ("By private aeroplane to south of France", G3CO), 19 (Visit to Radio Essex). 7.30pm. Colchester Institute, Sheepen Rd, Colchester, CO3 3LL. Details G3FIJ, tel 0206 851189.

Felixstowe (F&DARS)—9 Feb (Social), 16 (Visit Raynet control), 23 (Social). 8pm. The Scout Hut, Bath Rd, Felixstowe. Details G4YQC, tel 0473 642595.

Ipswich (IRC)—11 Feb (Candle making, Mrs Smith). 8pm. Rose and Crown ph, Norwich Rd, Ipswich. Details G4IFF, tel 0473 44047.

Loughton (L&DRAS)—13 Feb (Electrical safety, G6FWT), 27 (RSGB films). 8pm. Debden Community Centre, Loughton Hall, Rectory Lane, Loughton. Details G4FKI.

Norwich (NARC)—4 Feb (A night on the air). 8pm. Valley Drive Community Centre, 79 Plumstead Rd, Norwich. Details G4RKK, tel Wymondham 606979.

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL. Tel 0703 812435.

Amateur Radio and Computer Club (AMRAC)—6 Feb (Open meeting). 8pm. Botleigh Grange Hotel, Botley, Hants. Sec G6DLJ, tel 0703 847754. (Also Prestel Mailbox 703847754).

Andover (ARAC)—Results of AGM. Chairman G3LSL, Treasurer G4OZL. 4 Feb (Junk sale), 18 (Quiz with Salisbury Club). 8pm. Wolversdene Club, Andover. Club net, 8pm. Tuesday evenings S18—GOARC/A. Sec Sarah Attrill, tel Salisbury 56389.

Basingstoke (BARC)—2 Feb ("The use of test equipment", BARC Members), 2 March ("Wireless from the beginning", G3CBU). 7.30pm. Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G1OQV, tel 0256 59664.

Eastleigh (Itchen Valley ARC)—Please note that the club now meets on the second and fourth Fridays in each month at 7.30pm. The Scout Hut, Brickfield Lane, Chandlers Ford. Sec G1IPQ, tel 0703 736784.

Liphook (Three Counties ARC)—4 Feb ("Weather Satellites", Boyce Jeffries), 18 (Natter night), 4 March ("EMC", G3AEZ). 8pm. The Railway Hotel, Liphook. Sec G0BTU, tel Petersfield 66489.

New Forest Repeater Group (GB3NF)—For information, or to join the group and help support the repeater, please contact G6DLJ, tel (0703) 847754.

Poole (PARS)—27 Feb ("Solar Cycle 21", RSGB audio/visual presentation). 7.30pm. Commanders House, Constitution Hill Rd, Poole. Sec G4XYX.

Portsmouth Hill Repeater Group (GB3PH)—For information, or to join the group and help support the repeater, please contact Mr A L G Price, tel (0329) 281852.

South Dorset Repeater Group (GB3SD & GB3DP)—For information, or to join the group and help support the repeater, please contact G0EYV, tel (0305) 771517.

UK FM Southern Repeater Holding Group (GB3SN)—For information, or to join the group and help support the repeater, please contact Mrs Jan Steele, tel Fleet 613311.

Waterside (WSWC)—24 Feb (Talk by G4OZT). 7.30pm. Community Centre, Blackfield, Southampton. Sec G0BPA, tel (0703) 893937.

Weymouth (SDRS)—3 Feb ("The Atom", G4VYT), 3 March ("Bring and buy sale"). 7.30pm. The Civilian Mess, Army Camp, Camp Rd, Wyke Regis, Weymouth. Sec G0FIT, tel Dorchester 67596.

REGION 19—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park London E12 5EQ. Tel 01-989 6741.

Borehamwood (BEARS)—10 Feb (Club project). 7.30pm. Organ Hall Club, Bairstow Close, Borehamwood. Details G0DDJ, tel 01-207 3809.

Chiswick (ABCARC)—17 Feb ("Propagation by meteor scatter", G6UZV). 7.30pm. Town Hall, High Road, Chiswick, London W4. Sec G3GEH. Tel 01-992 3778.

Ealing (E&DARS)—17 Feb ("The ins and outs of the 6522 VLA", G3GIQ). Community Centre, 71A

Northcroft Road, London W13. Sec G4SCR, tel 01-997 1416.

Ealing (W Middlesex, G1WMG)—Tuesdays, 8pm. Drayton Court Hotel, The Avenue, Ealing W13. The group is dedicated to raising funds for the Royal Star & Garter. Details G1DDR.

Edgware (EDARC)—12 Feb ("EMC", G4IUZ), 26 (Informal, G4IUZ). 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec G4RMD, tel Hatfield 64342.

Harpenden (HARC)—3 Feb ("AX25 on the Beeb", G4OAV), 17 (Practical AX25 night). Morse classes every Sunday by G0CXP and G0CPN. 8pm. The Silver Cup ph, Harpenden. Details G1BJC, tel 05827 2455.

St Albans (Verulam ARC)—10 Feb (Activity evening), 24 ("Radio control of models", Ian Bradbury), RAFA HQ, New Kent Road, St Albans, Herts. Sec G4OBH, tel St Albans 52003.

Southgate (SARC)—12 Feb ("Computer tech", G4KZO), 19 (Informal), 7.45pm. Holy Trinity Church Hall, Green Lanes, Winchmore Hill, London N12. Details G4YLL, tel 0992 30051.

Welwyn (WHARS)—2 Feb ("Computer programming", Lemsford Village Hall, Brocket Road, Lemsford. 16 (Club project). 9th WGC Scouts Hut HQ. 8pm. Net on 144.375MHz Mon. at 8pm. Sec G0AII, tel 0707 335162.

Westminster (Civil Service ARS)—2 Feb (Talk and practical demo of fault finding, G4RFC). Lunch time. CS Recreation Centre, Monck St, Westminster, SW1.

Westminster (New Scotland Yard ARS)—Not open to the public. Club station active from time to time; call signs G4NSY and G6NSY. Details Sec, NSY Amateur Radio Society, Room 99, New Scotland Yard, Broadway, London SW1 0BG.

REGION 20—C R Hollister, 34 Battersby Way, Henbury, Bristol BS10 7SU. Tel 0272 508451.

Bristol (BRSGBG)—23 Feb ("Packet radio", G8IMB). 7.30pm. Small Lecture Theatre, Queens Building, University of Bristol, University Walk, Clifton, Bristol. Details G4SQQ, tel 0272 508451.

Bristol FM TV Group—Constructing proposed Bristol 1.3GHz tv repeater. Details G4ZQF, tel 0272 699947.

Bristol (NBARC)—6 Feb (Committee meeting and activity evening), 13 (Lecture & demo, G4ZQF and G8VPG of the Bristol FM TV Group), 20 (432MHz activity evening), 27 (VHF activity evening). 7pm. Self Help Enterprise, 7 Braemar Cres, Northville, Bristol. Details G4YQQ, tel 0272 690404.

Bristol (SBARC)—4 Feb ("Can I repair it?", G4VBU), 11 (432MHz activity evening, G1AVB), 18 (Magazine exchange evening, G1HFJ), 25 Feb (HF activity evening, G3XED). 7.30pm. Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details G4RZY, tel 0272 834282.

Cheltenham (CARA)—6 Feb ("Steepleholme Expedition", G4MOH), 20 (Activity evening), 7.30pm. Charlton Kings Library, Cheltenham. Details G4VXE, tel 0242 36723.

Weston-super-Mare (WsmARS)—9 Feb (Talk by Mendip Repeater Group), 23 (Constructors night). 7.30pm. The Bristol Hotel, Locking Road, Weston-super-Mare. Details G1DJW, tel 0934 514429.

Yeovil (Y&DARC)—12 Feb ("The L Match", G3MYM), 19 ("Direction finding for the amateur", G3GC), 26 (Activity evening), 5 March ("Grey line propagation", G3MYM). 7.30pm. The Recreation Centre, Chilton Grove, Yeovil. Details G3GC, tel 0935 75533.

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EVERYTHING MUST GO so will consider offers. Yaesu FT757, £595. Welz SP 15m swr/pwr 1.8-150MHz, £25. Turner expander 500 mic, £10. BNOS 12/25A psu, £100. SEM tranzmatch with ezitune, £60. Morsen ZX81 interface/terminal unit sends and decodes rtty and cw, £25 (cost £150 new). Himound HK702 key on marble base, £20. All immac condx. Also Shure 444 mic, £10. ZX81 printer, ZX tapelader filter plus many games tapes, £10 the lot. Dipole of delight HP 7/14/21/28, only 2 months old, £15. 2off aluminium heavy gauge scaffold poles, £10 ea. Fibreglass pole approx 5', £3. Set of heavy duty wall brackets, £5. Special OS map approx 6'x4' showing only WAB squares, rateable districts, counties & towns, £5. 11m whip on magmount, £2. Robin, G4WJL, NOT QTHR, tel: Egham 36693.

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HELIX 10m plus conns, £30. 23-ele Tonna 23cm, £15 14m H100 new, £7. Proper N-type plugs for H100, £2.50. 4CX350A unused, £30. IBM printer, £20. Anthony, G8YUE, tel: 01-568 0994.

APPLE2 Eurolus 64k. All manuals, 12" green monitor, fan, cards: grappier+, CCS7710A serial, 80columb auto/change, Z80, RGB, Apple disk controller and 2 drives, super-ratt rtty, mail P box, Visicale, Visiterm, ASCII express, screenwriter, CPM, more software, £575. G4GLP, QTHR, tel: Camberley 24706.

HALF PRICE FT1 all options, £1,200. FT780R, £300. MHL432/30L linear, £84. MMC435/600 cvtr, £20. HTV435 ATV tx, £100. Last chance otherwise dealers will get in p/exch deal, so no time wasters please Ron, G3BKL, QTHR, tel: 0980 862489.

PYE PF2 3-chann tx/rx RB4 SUB fitted c/w BC10A chgr and ccts, £60 ono. G8CAC, QTHR, tel: 04557 3026, evenings.

TS120S hf tcvr with PS30 psu, ex condx, £320. IC202S tcvr, vgc, £90. TR2300 fm tcvr, nicads, vgc £100. MM144 25W linear, £50. MM144 100W linear,

£100. see please for list of smaller items. G4AZA, QTHR, tel: 0865 739596.

HEATHKIT RA-1 rx with manual and construction guide. Also Hallicrafters S-36 rx. Offers please? G4PFY, QTHR, tel: 02357 66458.

ICOM 271E 25W 2m base stn, int psu, mint, orig pkg instruction manual, £775 ono. Bell, G4OEDR, QTHR, tel: 041-887 0321 9am-5pm or Bridge of Weir 612497 evenings.

TRIO KENWOOD tcvr 830S with remote vfo 230 digital memory, mic, handbook, £750, G3ZY0, QTHR, tel: 01 363 3363.

DATONG D70 morse tutor, new condx, £40 incl postage. G6EPT, QTHR, 0827 898024.

TRIO 440S with ssb filter, mic, PS50, SP430 service manual, separate auto atu (AT 250) covers 160-10m, cost £1600+, prefer no split, sell for around £1,280. Reason for sale, going back to university but not desparate. Demo welcome. Paul Leach, tel: 0625 610852.

HRO-MX psu 9 coils 1 B/S coil UX-base valves serviced, £50. G3IGM, QTH, tel: 01-992 1602.

FT290R c/w nicads chgr soft case rubber duck antenna 25W linear 7/8 whip gutter mount unmoded and boxed ex condx, £275 ovno. G0CAK, QTHR, Martin tel: Gilchester (0734) 700617.

DAWE OUTPUT METER type 610B, £20. 28/144 MM tvtr, hardly used, £100. KW 10 FM tcvr, £15. International call book 1985, £10. Trio SP901, new £20. A11 plus postage. G4YUG, tel: 0473 830147.

TEN TEC CORSAIR with optional 8-pole IF filter and matching psu, mint condx, £895. Yaesu FL2100B hf linear, ex order, £450. G4UVS, tel: 0432 269585, after 7pm.

YAESU FT290R tcvr multi-mode muTek nicads chgr, mobile mount, soft carrying case, flexiwhip, vgc, £250. Yaesu FT780R tcvr multi-mode 70cm vgc, £325. Both c/w manuals and orig boxes. G3YBK, QTHR, (Exeter) tel: 0392 78710.

MUTEK 6m tvtr, 2m IF, never used transmit. Also 3-ele met beam, still in bag, £200. Buyer collects G6ETA, QTHR, (Chestfield, Kent), tel: 022779 3262, evenings only please.

AMTOR TERMINAL. Self contained c/w keyboard, £50. ZX Spectrum plus, mint condx, best offer? WANTED: VFO for TS120S. G4EVP, QTHR, tel: Stafford 840872.

MORSE TUTOR: Microwave modules talking tutor that really worked for me. Gwpm to 20wpm version, vgc. £50. G0CCQ, QTHR G1FH0. Tel: 01-854 6422 or write via QTHR.

KW600 LINEAR, vgc, £175. KW204 tx, vgc, £125. Carr extra. G3GMY, QTHR.

ICOM 471E, vgc, hardly used. Matches the 271E and boxed, £650. GIAAM, QTHR, tel: Newhaven (East Sussex) 515243.

TS130S hf tcvr, YK88C YK88SN filters, PS30 psu, MC355 mic, FC707 atu, Hi-Q balun, £650. BBC micro, twin 5.25" 80TK drives, Solidisk 4meg board, £400. "G3LIV" Amtor/rtty terminal unit for BBC with rtty/amtors ROMs, £100. G4IAC, QTHR, tel: 06755 2745

TRIO DFC 230 vfo, £40. SSTV monitor, £50. WANTED: PS20 psu for TS120V. G4IUT, tel: 0952 79792.

FRG7700 rx with memories, £300 ono. FT790 nicads, chgr, case, YHA44, £395. KEF 104AB spkrs, £100. 2m 5-ele Yagi, £15. 2m 6-ele quad, £20. G1SHV, tel: 01-941 6519.

APPLE 2 48K c/w disk drive firmware card pal encoder card hardware for transmitting and receiving morse and various software offers. Icom IC 202S with nicads, vgc, £90. MMC 435/600 tv cvtr exc, £20. G8TLU, QTHR, tel: Toddington 2760.

FT790R, gd condx, with case, mic, half wave whip, £290. Phone for details. G0CV0, tel: 01-777 8089.

TRIO TS711E, perfect condx, boxed, £595 ono. Swap or p/exch hf rig. Can deliver. G3XX0, QTHR, tel: 091 4782965 (day) or 2746723 (night).

ICOM IC-R70 communications rx ham and gen/cov cw, rtty, ssb, am, fm, dual 10Hz step digital vfo, band pass tuning. Used only few times. Boxed, as new, unmarked, £450 ono. Howard, tel: 0394 460 474

TEN-TEC CORSAIR, immac, includes 8-pole ssb filter 500Hz cw filter c/w Shure 414A fist mic and BNOS 25A psu with Ten-tec 18A cut-out. Reluctant sale, £850 plus carr. G3MXN, QTHR, tel: 0698 683306 any time.

726R 2m 70cm 1yr old + cw filter, £900. G0EJK, tel: Blackburn 673184, 9am-4pm or Adlington, Lancs 480500, evenings.

FT107H tcvr memories plus all bands fitted cw filter internal psu solidstate scanning mic, boxed with manual, £475 plus delivery. G4UPJ, tel: Whitstable 274947 or 263456.

YAESU FT101Z, one of the last models made, fan, mic, ex condx, £425. Also Yaesu FT707, vgc, £325. G40BB, QTHR, tel: Oxford 61866.

TS820 100W ssb/cw tcvr fitted 500Hz cw filter, Shure handheld mic handbook, service manual. Swap for FT775 prefer fitted cw filter and with mains psu. G3BMO, NOT QTHR, tel: York 54579.

2m ssb/fm/cw tcvr FT290 with 30W Daiwa pa, ex condx. Offers around £270? Will separate. G0FDV, tel: Luton 423495.

DATONG morse tutor, gd condx with instructions and earpiece, £30. Also Datong rf speech clipper board £10. G4TXK, QTHR, tel: Leeds 864297.

YAESU FL2100Z hf linear amp, gd condx, £425. Altron AT31 3-section crank-up tiltover tower with auto brake winch and head unit, £300. Commander 400 rotator with controller and some cable, £50. Buyers collect. G3PCG (Somerset), tel: 098 47 281.

SILENT KEY SALE. Trio 930S tcvr new. Trio R2000 gen/cov vhf cvtr new. Alphatronics matmos computer monitor printer microtext disk drives word processor new. Plus list. Send sae to G4SVR or tel: 061 941 3930 (Cheshire).

R820, extended coverage by Lowes, high perf rx, £395. TS670 quad band tcvr inc 6m, £550 (list £843). Linears MM144-50S, £65. MM432-50, £95. Trio AT230, £120. All equip mint, boxed. G2FZU, QTHR, (Notts), tel: Southwell 813847.

4CX1500B, £25. WZGN 2m Amp 2x 4CX250B contest proven, £120. 60ft half inch Helix with N connectors, £40. N connectors for FHJ4, £3. LDF5, £8. 4CX250Bs, £2.50. 4CX350A, £6. 5K600A, £4. 5K640A, £3. 2CH 200W relay, £15. Thompson, tel: 0656 5225, evenings only.

SONY ICF7600D rx as new c/w psu, antenna, manual, box, exch for 70cm or 2m handheld or sell, £110. John, G1UZN, QTHR, tel: 061 792 1122.

CODAR CR70 rx with PR40, £20. Search 9 Cuna 2m rx, £20. Search 9 Daiwa marine rx, £20. All vgc. Both Searches fitted xtals, suitable Thames Estuary area John, tel: Southend-on-Sea 523305.

ICOM 735 with psu, mint condx, £770 ono. Icom 3200 dual band fm mobile with dual band antenna, £420 ono. Complete rtty stn, BBC B, sideways ROM incl rtty, monitor, quality printer, terminal, console, valued £900, £600 ono. Taylor, tel: 0227 276004.

VERSATOWER 60' telescopic mast, h/duty ham rotator and head unit, new auto brake winches and wires, £425. G6LAI, QTHR, tel: 0604 880503.

RSCB Bulletin/Rad Com July 1952 to December 1979 (November 1958 missing), £35. SW Magazine June 1961 to May 1979 (October 1967 missing), £18.

Buyer to collect or would deliver within 25 miles.
G2ARU, QTHR (West Sussex), tel: Eastergate 3488.

TS8305 c/w matching vfo and spkr, £750, still u/g.
Kenwood TS770E 2m/70cm, £500, both as new condx.
Paul, G4UDH, NOT QTHR, tel: 0782 561175, after 6pm

QUAD 4-ele Jaybeam, nearly new, £19. 30W fm 2m amp
tatty, £15. Solartron CD1400 'scope, wkg but needs
attention, £35. Buyers collect or plus carr.
Morley, tel: 0252 876277, anytime (ansaphone).

TS9405 (atu), £1,550. TL922, £890. HC2000, £260.
KP200, £110, as new condx. M Ohta, COCEO, QTHR,
tel: 01-267 7000 ext 366 9am-7pm or 01-349 9556
7pm-11pm.

KW204 ssb/cw tx, Eddystone EA12 amateur bands rx,
KW atu all in vgc, £400 ono. G4DFV, NOT QTHR,
tel: Mansfield 27380.

SILENT KEY SALE. Sommerkamp tcvrs: FT2272D hf,
TS280 fm 2m. Antennas: 2m: 8-ele, 5/8 magmount.
70cm: HB9CV. MM435/600 cvtr. Telequipment: 551B
scope, Telegen TV1812 pattern generators, psu.
Multimeter GDO key. Various coaxes/leads/adaptors.
WILL NOT SPLIT, £550. Buyer collects (Lancs).
Details G4FRE, tel: 0394 271622.

WANTED.....

2m FM RIG: Icom 2E or similar handheld most
suitable, but anything considered. Gus, GMOAT1,
NOT QTHR, tel: Leeds 736236.

EDDYSTONE EC10. State price & condition. G3HCT,
QTHR.

HF TCVR 9-bands, prefer valved PA. Offer exchange
Yamaha YP-40 electric piano, 6.5-octave c/w stand,
16 voices, 2y old, cost £850. Comparable s/hand
value or cash either way. G3FRB, QTHR, tel: 0322
79368.

FT2252D or IC251E c/w muTek front-end. Must be in
gd condx. Good price paid for good example. Also
Eimac 4C250B valve, new or used. G1HOL, QTHR,
tel: 0403 55011.

FT221R in gd condx. Price to CM30TF, QTHR,
tel: 05814 247.

TRAILER TOWER or source of same. Can repair, can
collect, must be reasonable. Also for ATV contest
group: anything to do with 24cm TV, inc tx/rx gear
antennas, inc dishes, QRO gear - valves amps
designs etc. Ron Bentham, G4SHC, QTHR, tel: 0706
350748.

CUSHCRAFT R3 ant mini products C4 ant altron mini
beam. G3NQG, tel: (09952) 5590.

SP 930 KENWOOD. Hansen FS50 HP swr pwr meter
1.8-60MHz 20/200/2000W. Harvey, G4YNI, QTHR,
tel: 061 740 7708.

FT102 FC102 FT107M FC107 or similar to build up hf
stn complete or separate equipment. Cash waiting.
Will collect. FOR SALE: FTONE, £950 or exchange.
Gordon, COCCA, QTHR, tel: 0272 832177.

1920s CLIP IN GRID leaks/resistors. 2V valves.
Early rx and xtal set. Horn or reed spkr. Ebonite
panel. G2CVY, QTHR, tel: 0271 43355.

TS700C, FT221R, or similar base stn. Also 2m
handheld, modern scope and swr/pwr meter. Any
condx considered. G3IUV, QTHR, tel: Bristol 692995

MICROWAVE MODULES HMT 70/28 4m tvtr. G3ZFZ,
tel: 0229 44147, after 5pm.

ICOM IC251E 2m multimode base stn. Must be gd
condx and in wkg order. Also "Antec" boot mounted
antenna for 70cm mobile. Roy, GU8TGP, QTHR,
tel: 0481 47918.

HOMEBREW VALVE cw txs about 15-20W o/p. Member of
the valve club and newcomer to morse would like to
purchase any older home built gear suitable for
use in morse shack. Larry, G6EPT, QTHR, tel: 0827
898024.

ITT M5 uhf Starphone 5-chann tx and 5-chann rx
xtal oscillator boards. Also a service manual or a
copy of the manual for the Starphone. G4RFC, QTHR,
tel: 01-858 3579.

MEL "AUDIO SQUELCH UNIT" or handbook/any info
urgently required. Also Texas Instruments model
709 portable terminal, any Racal tactical items,
loan or purchase of manuals for Kaypro 10 portable
micro. Bob, 120 Birmingham Rd, Redditch, Worcs
B97 6EP.

YAESU 726R BASE STN. Must be in wkg order c/w base
stn mic if possible. G1SCK, QTHR, tel: Southampton
455777. I work shifts so keep ringing, night or
day.

SONY BETAMAX SL-C7 video rcdr for spares, c.1980
on. Fair price paid. Cond not important. G0DSK,
QTHR, tel: Sandwich (Kent) 617775.

RTTY PROGRAM for Amstrad CPC6128 computer or info
where to obtain same. Required for friend in Spain
G4XQA, QTHR, tel: Warrington 64166.

4CX250B VALVE, unused, also base and chimney, any
of above will help. 3 xtals 8.600MHz, 8.700MHz,
8.775 MHz, any type or size gratefully accepted.
State price. Ron, G3VCJ, QTHR, tel: 042 43 4726.

ALSO

Mr B Abbott, G4UML
Mr J H Arthur, RS46052, in July 1986
Mr R Barsby, G6ZHE, in August 1986
Mr J N Brooksbank, G1MAJ
Mr E H Butcher, G3CUH
Mr A J Capper, G6JUD on 10 November 1986
Mr A J W Clark, RS87144
Mr E V C Clinch, GW6VNA
Mr V G Downham, G4BMX
Mr R A Elliott, RS50565, on 10 August 1986
Mr S L Evans, G2FPN, in March 1986
Mr R W Fisher, G2DZN, on 7 November 1986
Mr G J Fowler, G3UQQ
Mr W E Greenslade, G8MGR, on 1 June 1986
Mr D L Hallsworth, G4DDG, on 18 August 1986
Mr R W Harris, G6LAA, in August 1986
Mr C L Harrison, G3YD, on 30 August 1986
Mr G F Holmes, G0BLD, on 6 November 1986
Mr W D Hope, G4VNZ
Mr A L Horner, G1FDG, on 16 July 1986
Mr J Howells, GW4SRJ, on 12 October 1986
Mr D Hunt, G4UDP, on 14 September 1986
Mr R G Jack, GW3BKE, on 27 November 1986
Mr A H Jackson, G4KMZ, on 12 August 1986
Mr M L Jago, G8JHU, on 29 June 1986
Mr D R Jones, GW3CDT, in June 1986
Mr J E Kilton, RS34668
Mr C J Last, G4MHI, on 13 August 1986
Mr C J Leach, G8KXD, on 26 September 1986
Mr D M Lewis, GW3IEM
Mr E McMahon, G4HFE, on 30 May 1986
Mr C F Marjoram, G3GHP, on 25 July 1986
Mr S F Marsh, RS43687
Mr W E Massey, RS87853, on 6 September 1986
Mr N V Morgan, G6WUZ
Mr C Morris, G3UVN, on 19 June 1986
Mr D Newman, BR531918, on 7 December 1986
Mr R T Newman, RS52472, in January 1986
Mr W H Nuttall, G2AGP, on 19 July 1986
Mr J C Oag, RS84495
Mr F Owen, RS87415, on 23 September 1986
Mr L R Pallet, G8THI, on 30 October 1986
Mr A C Parker, G6JWB, on 28 June 1986
Mr C A Peacey, G6JTP, in August
Mr J Penzer, RS36439, on 9 October
Mr G A Powell, RS88440
Mr I F Prank, G8ZUA, on 7 August
Mr A Roberts, G3DSI, on 10 January
Mr T Roberts, GW3YTO, on 3 August
Mr P V Saunders, G4JRX
Mr F Severn, G1LLK, on 16 September
Mr G Sharpe, G3UXU
Mr A J Smart, G3TCK
Mr D Snow, G6JRD, in December 1985
Mr F Staples, G1NDT

RADIO COMMUNICATION February 1987

OBITUARIES

The Society records with regret the deaths of the following radio amateurs:

Mr L J Billing, G3GQS

Jack Billing died in late October 1986 at the age of 85. A keen dxer until his health failed, he had regular daily contacts with Australian and other stations.

Mr J Blenkey, G4CPU

Jack Blenkey died on 6 December 1986. He served with the RAF as a radio operator in Burma during the war, and always used cw.

Mr J Duckworth, G3BKS

Mr J Duckworth died on 27 November 1986. He was well-known on 28MHz, particularly on the local and international 10/10 nets.

Mr J Egerton, BR51945

John Egerton died on 14 November 1986. He was a "white stick" operator and keen listener on hf bands.

Mr W Elliot, G0AMN

Wilf Elliot died on 20 November 1986 aged 73. First licensed in 1982 as G6YQG, he was a very active member of the Exmouth ARC.

Mr R W Fisher, G2DZN

Dick Fisher, a proud possessor of an RSGB 50-year badge, died on 7 November 1986 aged 78. During the war he served with the RAF as a radio operator. He was interested in amateur radio all his life and was an active member of the Isle of Wight ARS.

Mr S C Hobbs, G3ZKK

Sam Hobbs died on 26 September 1986. He had been interested in amateur radio since his youth, and during the war served as an army radio instructor. He became licensed in 1970.

Mr R S Howard, G8RSH

Sam Howard died on 28 November 1986 aged 82. Interested in radio from an early age, he obtained his amateur television licence in 1955. He was a founder member of the Maidenhead & DARC in 1965, having previously been a member of the Portsmouth RS.

Mr R Howel, G3KRH

Dick Howel died on 7 November 1986 aged 76. He was particularly keen on the hf bands, on which he was active until his death.

Mr E Lewis, G3POR

Ted Lewis died on 16 November 1986. He was a

very active dx operator in the 'sixties but was inactive for several years until re-equipping for 144MHz operation.

Mrs R Mackay, G3YL

Ruth Mackay died in early December 1986 at the age of 72. As Ruth Jebb she was licensed as G3YL in 1935 at the age of 21 and was one of that famous trio of lady amateurs, of which Connie Hall, G8YL, and the late Nellie Corry, G2YL, were the other members. Her interest in radio led her to read science at Exeter University, and during the war she worked at the Telecommunications Research Establishment (later renamed Royal Radar Establishment) at Malvern, where she was the only woman engaged at such a high level of technical work.

Mr G W Robinson, G1HDV

"Little George" Robinson died on 19 October 1986 aged 67. Although only licensed for two years, he was very active both as secretary of the Hazelrigg ARS and a member of Raynet.

Mr F Rutter, G2FMF/K3AW

Frank Rutter died in May 1986. He was one of the "Early Birds" in 1939 and served in the RAF throughout the second world war. He joined Westinghouse in the USA and served them until retirement. He was well known in the USA for his version of the "Aerial Circus".

Mr J C Sargent, G3CMN

Jack Sargent died on 28 September. He was first licensed in 1947, and until his retirement was a GPO radio interference officer. A founder-member of the Hastings E & RC, and introduced several local amateurs to the hobby. A side interest was listening to mf dx broadcast stations.

Mr F Scales, G2FNS

Frank Scales died on 24 October 1986. He served with the RAF Reserve during the war and later as an instructor at Cranwell. He built all his own equipment and latterly operated only on 3.5MHz.

Mr G R Wigg, G6JF

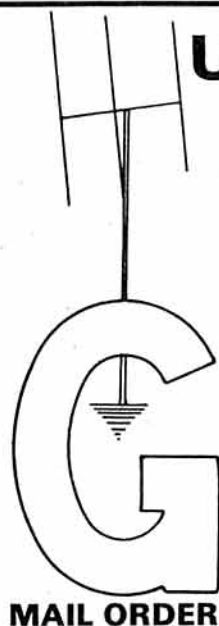
Reggie Wigg, who died in his 84th year on 27 September 1986, had held a First Class PMG certificate since the 'twenties. He was active on all modes, had been on rty since 1962, and more recently had moved into Amtor.

Mr R Woods, G1NQF

Ron Woods died on 4 November 1986. Although he had only been licensed since 1985, he had a lifelong interest in radio. A keen member of the Bredhurst R & TS, he was active on 144 and 432MHz.

Mr F Yoxall, RS8716

Frank Yoxall died in a road accident at the age of 28 on 17 September 1986. He was an enthusiastic swf studying for the RAE, and was a committee member of the Vale of White Horse ARS.



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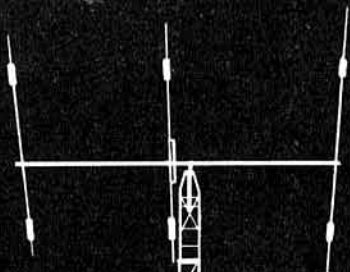
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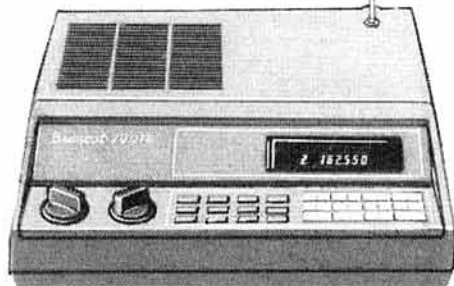
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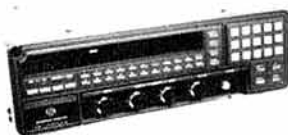
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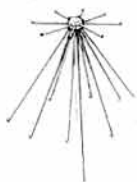


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480 pages. £21.00 or DM 60.- ISBN 3-924509-87-5

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References

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Roger Brett Hughes GW6KHQ, B.Sc., A.M.I.E.E., F.I.M.A., United Kingdom - 15 March 1986
"... your Guide to Utility Stations is excellent! The clarity and attention to detail being superb. I am lecturing in Computer Science at Montgomery College of F. E. in Newton, Powys. I do a lot of work on data communications and I find your books very helpful."

George Wood, DX Editor of Radio Sweden International, in SCDX Bulletin 1869 of 03 December 1985

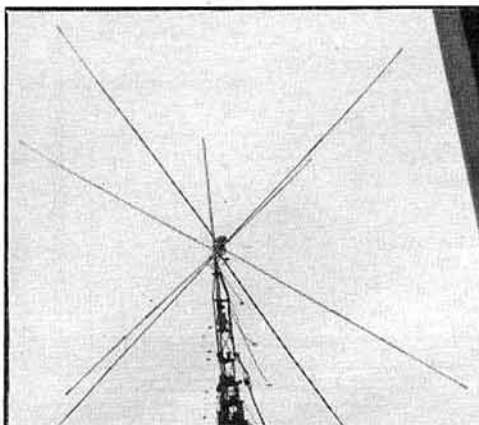
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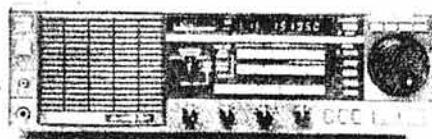
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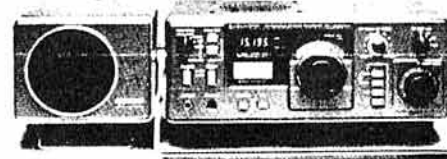


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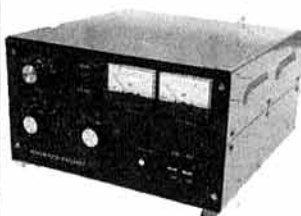
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All prices include delivery (UK only) and VAT at 15%. Independent reviews shown in (brackets).

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DC144/28 Receive 2-metres on your 28MHz receiver. Again it is the "fine print" performance which makes this the best of its type. (SWM Aug. 82, Rad. Com, April 82) **£39.67**

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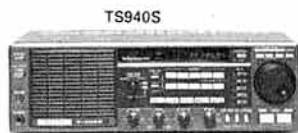


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