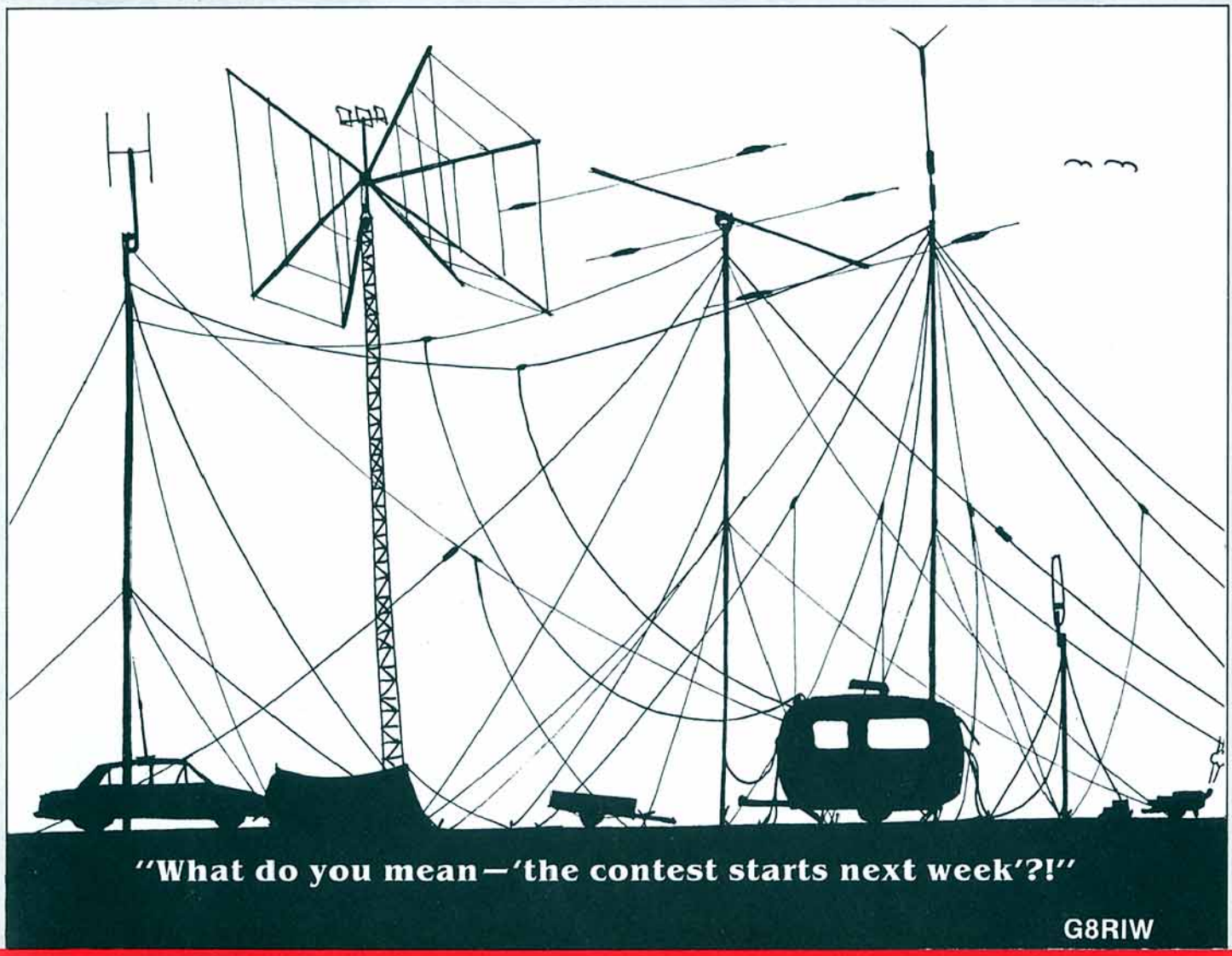
RADio COMmunication

October 1986

IN THIS ISSUE—HF AND VHF NFD RESULTS



"What do you mean—'the contest starts next week'?!"

G8RIW

Journal of the Radio Society of Great Britain

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FT-23
200ch 5Wトランシーバー(Ni-Cd電池パックFNB-11使用時) ホイップアンテナ,ハンドストラップ,単4乾電池ケース付き JARL登録機種・登録番号 Y 106

近日発売

トーンエンコーダー内蔵

超小型430MHz帯FMハンディ
FT-73
1000ch 5Wトランシーバー(Ni-Cd電池パックFNB-11使用時) 88.5Hzトーンエンコーダー内蔵,ホイップアンテナ,ハンドストラップ,単4乾電池ケース付き
JARL登録機種・登録番号 Y 107

●クラス最小, 55W×28D×122Hmm(付属単4乾電池ケースまたはFNB-9使用時)の超小型サイズ●単3乾電池ケースや3種類のNi-Cd電池パックをオプションで準備●高性能CPUを搭載,このサイズ初の多機能タイプ●周波数/メモリーはアップダウンキーとメインダイヤルいずれでも操作可能●トーン情報,リピーターシフトも記憶できる10chメモリー搭載(うち7chは送受信で別周波数の記憶も可能)●見やすい液晶表示板に周波数,S/POなどの運用データを集中表示 ●受信スケルチ時に動作するオートパワーセーブ機能搭載,省エネ受信に抜群の効果●パワーモジュール採用,送信出力5Wのハイパワー運用も可能(FNB-11使用時)●本体部には信頼性の高いダイキャストフレーム採用●多少の雨でも使用できる防滴構造(JIS防滴II型相当)●使いやすいBNC型アンテナコネクター採用●88.5Hz トーンエンコーダー内蔵(FT-73),さらにオプションのトーンスケルチ/エンコーダーユニット・FTS-12搭載時はキーボード上からトーン情報のコントロール可能●豊富なオプションを準備

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61年9月のサンスポット予想 郵政省電波研究所編集[電波予報]参考9

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CONTENTS

Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication*, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

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.

A contribution will only be considered for publication on the understanding that the person submitting it is the original author and owner of the whole copyright, and that on acceptance for publication such copyright will become the property of the RSGB in consideration of the above-mentioned payment by the RSGB to the contributor.

The editor will be pleased to send intending authors a manuscript preparation guide and to give any other advice and assistance requested.

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TS830S

The TRIO TS830S is for the operator who wants a dedicated amateur bands only transceiver, who is used to and wants a pair of 6146B valves in the PA stage and who wants a compact rig which has its own built in power supply. The TS830S is for the radio amateur who requires a rig capable of rising above today's crowded band conditions, a rig that has, as standard, the necessary features that will produce consistently good contacts where other lesser equipment would fail. The TRIO TS830S, a proven rig with an impeccable pedigree.

The TRIO TS830S covers on USB, LSB and CW the full amateur bands from 160 through to 10 metres.

Convenient to use, the transceiver has its own in-built power supply.

VBT (variable bandwidth tuning) enables the operator at will to vary the IF filter passband and establish optimum IF bandwidth relative to the interference being experienced.

The IF shift control allows the IF passband to be moved up or down in frequency without having to retune the receiver. Hence, an unwanted signal, present in the IF passband, may be attenuated significantly by moving the passband in the appropriate direction.

As the IF shift and VBT are independently adjustable they can, to advantage, be used together.

The tunable notch filter in the TS830S is a high-Q active circuit in the 455 kHz second IF. Sharp, deep notch characteristics will eliminate a strong interfering carrier within the passband of the receiver station.

The RF speech processor in the TS830S provides added audio punch and increases the average SSB output whilst suppressing sideband splatter. Compression levels can be monitored and controlled from the front panel.

To cope with pulse type noise (such as ignition), the transceiver has a noise blanker.

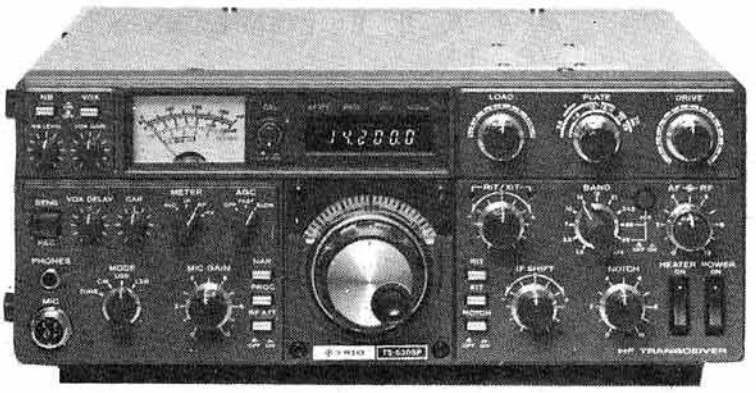
For perfect listening, a tone control adjusts receiver audio response to suit operating conditions.

Both RIT and XIT (receiver as well as transmitter incremental tuning) are included to aid operating, XIT being a distinct advantage when calling a station that is listening "off frequency".

It is possible to monitor the transmitted audio in order to assess the effects of the speech processor: a most useful feature ensuring perfect signal reports.

TS830S HF transceiver . . .£981.59 inc VAT, carriage £7.00.

TS530SP



The TRIO TS530SP HF transceiver is similar to the TS830S in that it also uses a pair of 6146B valves in its PA stage. The transceiver has been designed for the amateur who has no need for the additional facilities that are part of the TS830S but who still requires a high level of performance from his equipment.

The TRIO TS530SP covers the amateur bands from 160 through to 10 metres. Modes of operation are USB, LSB and CW.

Operating from 240 volts AC the transceiver has its own internal power supply.

IF shift is built into the TS530SP to allow the IF passband to be moved around the received sign and away from interfering signals and sideband splatter. Even greater selectivity is achieved when an optional YK88SN (1.8 kHz), YK88C (500 Hz) or YK88CN (270 Hz) filter is installed.

A tunable notch filter is built into the audio circuit of the TS530SP.

The speech processor in the TS530SP combines an audio compression amplifier with a change of ALC time constant for extra audio punch and increased average SSB output.

To cope with pulse type noise (such as ignition), the transceiver has a noise blanker.

Both RIT and XIT (receiver as well as transmitter incremental tuning) are included to aid operating, XIT being a distinct advantage when calling a station that is listening "off frequency".

TS530SP HF transceiver . . . £849.82 inc VAT, carriage £7.00.

TS940S

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, CW, 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

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

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

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 150 kHz to 30 MHz. Modes of operation are USB, LSB, CW, AM with FM optional.

TS430S . . . **867.68 inc VAT£**, carriage £7.00.

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE
Telephone 0629 2817, 2430, 4057, 4995.

send £1 for complete mail order catalogue.

TR751E

There has been a TRIO two metre multi-mode mobile transceiver for the last six years. Beginning with the successful TR9000 and continuing with the TR9130, amateurs have always found the series to be reliable and above all easy to operate, especially whilst mobile. Advances in technology have enabled TRIO to further improve on the TR9130. The result is the TR751E, a new generation of multi-mode mobile transceiver.

The TR751E is the first multi-mode mobile transceiver that can be set to select the correct mode whilst scanning the band. By setting the rig to vfo and selecting AUTO mode before pressing the SCAN button, the TR751E will move up or down the band changing both mode and step rate according to the band plan.

The transceiver has two VFO's and 10 memory channels. Memory held information on both frequency and mode of operation is easily transferred to either vfo.

The TR751E can be set to scan between user programmed limits or around them depending on the frequency set when the scan is started. When AUTO mode is set the transceiver will select the correct mode as it scans.

Operating on 13.8 volts DC, power output from the transceiver is 25 watts (high) and approximately 5 watts (low). The low power setting applies to all modes.

The TR751E is perfect for base station use. When operating on SSB, signals can easily be found using the frequency step set to 5 kHz, fine tuning quickly achieved by switching to the 50 Hz rate. Operation is also ideal on FM, the rig stepping in either 12.5 or 5 kHz steps. Full repeater facilities are also available including reverse repeater. Receiver performance is excellent, our first sample amazed us, FM, 0.14uV for 12dB SINAD and SSB, 0.09uV for 10dB S+N/N.

As an option, the TR751E can be fitted with DCL. Compatible with the DCS system, DCL (Digital Channel Link) enables your rig to automatically QSY to an open channel.

For the blind operator the TRIO TR751E is perfect. As each mode is selected a tone gives the appropriate morse letter (F for FM, U for USB, etc) and when fitted with the optional VSI board, a digitally encoded girl's voice will announce on request the operating frequency.

In addition, the TR751E has an illuminated analogue S/RF meter, all mode squelch, MHz select keys, a noise blanker, semi break-in CW with side tone, RIT, memory channel up/down keys and a frequency lock. A mobile mount and up/down microphone are also included with the transceiver.

TR751E £580.70 inc VAT, carriage £7.00
MU1 (DCL modem) £28.95 inc VAT, carriage £7.00

HOKUSHIN aerials.

FOR BASE STATION USE

HF5	**80 to 10 metre vertical,** no radials required when ground mounted . . . **£83.39 inc vat,** carriage £7.00.
HF5R	**Radial kit** for use with HF5 when mounted on chimney or gable end . . . **£54.81 inc vat,** carriage £7.00.
GPV5	**Two metre base station colinear,** 6.5 dB gain, 3.1 metres high . . . **£54.92 inc vat,** carriage £7.00.
GPV23	as above but 3 section colinear, 7.8 dB gain, 4.45 metres high . . . **£51.97 inc vat,** carriage £7.00.
GPV7	**Seventy centimetre triple 5/8 base station colinear,** 6.8 dB gain . . . **£45.59 inc vat,** carriage £7.00.
GPV720	**Dual band (144/430 MHz) base station aerial . . . £45.68 inc vat,** carriage £7.00.

FOR MOBILE USE

2E	**Two metres 5/8 whip,** 3.4 dB gain, foldover base . . . **£14.55 inc vat,** carriage £2.00.
2NE	**Two metres 7/8 whip,** 4.5 dB gain, foldover base . . . **£24.23 inc vat,** carriage £2.00.
OSCAR430	**Seventy centimetre triple 5/8 whip,** 6.3 dB gain . . . **£27.72 inc vat,** carriage £2.00.
OSCAR720	**Dual band (144/430 MHz) whip** . . . **£24.59 inc vat,** carriage £2.00.
HS770	**144/430 MHz diplexer** for use with OSCAR720 . . . **£18.02 inc vat,** carriage £1.50.
GSS	**Gutter mount** (requires RG4M cable assembly) . . . **£6.26 inc vat,** carriage £1.25.
RG4M	**Cable assembly** for GSS base, complete with SO239 and PL259 plug . . . **£6.26 inc vat,** carriage £1.00.
12B	**Car wing mount** with SO239 top and bottom . . . **£5.73 inc vat,** carriage £1.00.
HSTMB	**Car boot mount** including cable and PL259 . . . **£15.42 inc vat,** carriage £1.50.
MA200S	**High quality mag mount** with cable and strong protective cover to prevent paintwork damage . . . **£22.90 inc vat,** carriage £2.00.

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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. . .**£327.77 inc vat**, carriage £7.00.

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

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.

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

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

In London.
the shop manager is Andy, G4DHQ,
the address, 223/225 Field End Road, Eastcote, Middlesex, 01-429 3256.
telephone 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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ICOM

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.
	CW	250Hz	FL-53A	FL-63	Signal loss with FL-63 is 4dB less than FL-32.
	AM	5.2KHz	–	FL-33	PBT control is not effective when FL-33 is selected.
IC-745	CW	500Hz	FL-52A	FL-45	Add FL-52A before adding FL-45.
	CW	250Hz	FL-53A	FL-54	Add FL-53A before adding FL-54.
	SSB	2.4KHz	FL-44A	–	High skirt selectivity SSB filter. Replaces standard ceramic filter.
IC-735	CW	500Hz	–	FL-32	
	CW	250Hz	–	FL-63	Signal loss with FL-63 is 4dB less than FL-32.

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

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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.

These receivers are available seperately 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.

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.

IC-R71E.

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.

TWO FOR THE ROAD.

The very latest IC-28E 2m. FM mini-mobile from ICOM.

This new 2 metre band transceiver is just 140mm (W) x 50mm (H) x 133mm (D) and will fit nearly anywhere in your vehicle or shack. Power output is 25 watts or 5 watts low power and is supplied complete with an internal loudspeaker.

The large front panel LCD readout is designed for wide angle viewing with an automatic dimmer circuit to control the back lighting of the display for day or night operation.

The front layout is very simple, all the controls are easy to select making mobile operation safe. The IC-28E contains 21 memory channels with duplex and memory skip functions. All memories and frequencies can be scanned by using the HM-15 microphone provided. Also available is the IC-28H with the same features but with a 45 watt output power.

Options include IC-PS45 13.8v 8A power supply, SP8 and SP10 external speakers, HS15 flexible mobile microphone and PTT switchbox.

Rx Range 138-174 MHz.

IC-290D/490E Mobiles

These SSB, CW, FM transceivers are ideal for mobile or base station operation. The IC-290D for 2 metres produces 25 watts/5 watts low power. The IC-490E for 70 centimetres produces 10 watts/1 watt low power. Both transceivers have a range of operating features, these include 5 memory channels, dual V.F.O.'s and a priority channel to automatically check your most used frequency. Squelch on FM and SSB to allow silent scanning whilst searching for signals, slow or fast AGC for SSB and CW and a noise blanker to suppress pulse type QRM. Sidetone is provided on CW.

Memory and full or programmable band scan with internal switches to stop on busy or empty channels. Programmable offsets are included for odd frequency splits.

Options include: IC-PS45 13.8v 8A power supply, IC-BU1 memory back up battery unit, IC-SP8 and SP10 mobile speakers.

British TELECOM Approved Dealer for Mobile Phone Division

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ICOM

IC-3200E Dual-band

If you are a newly licensed or just undecided about which band to first operate, then the ICOM IC-3200E is just the answer. This is a dual-band (144-146/430-440MHz) F.M. transceiver ideally suited for the mobile operator. The IC-3200E has a built in duplexer and can operate on one antenna for both VHF and UHF, and with 25 watts of output power on both bands (the low power can be adjusted from 1 to 10 watts) you can never be far from a contact whether simplex or 2m/70cm repeater.
The IC-3200E employs a function key for low priority operations to simplify the front panel and a new LCD display which is easy to read in bright sunlight, 10 memory channels will show operating frequencies simplex or duplex, and four scanning systems memory, band, program and priority scan.

IC-271 & 471 Multimode Base stations

ICOM can introduce you to a whole new world via the world-communication satellite OSCAR. Did you know that you can Tx to OSCAR on the 430-440 MHz IC-471 and Rx on the 2m IC-271.
By making simple modifications, you can track the VFO's of the Rx and Tx either normally or reverse. This is unique to these ICOM rigs and therefore very useful for OSCAR 10 communications. Digital A.F.C. can also be provided for UOSAT etc. This will give automatic tracking of the receiver with digital readout of the doppler shift. The easy modifications needed to give you this unique communications opportunity are published in the December '84 issue of OSCAR NEWS. Back issues of OSCAR NEWS can be obtained from AMSAT (UK), LONDON E12 5EQ.
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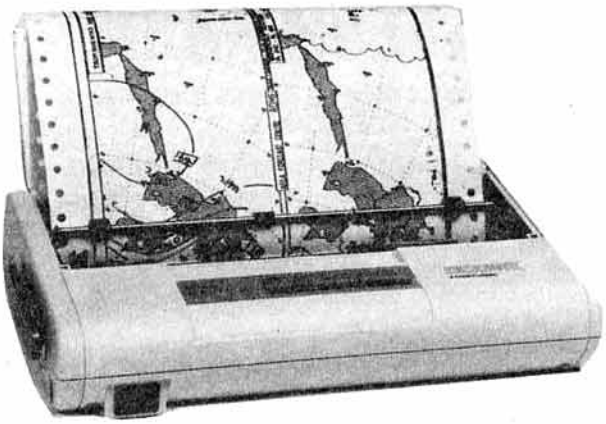

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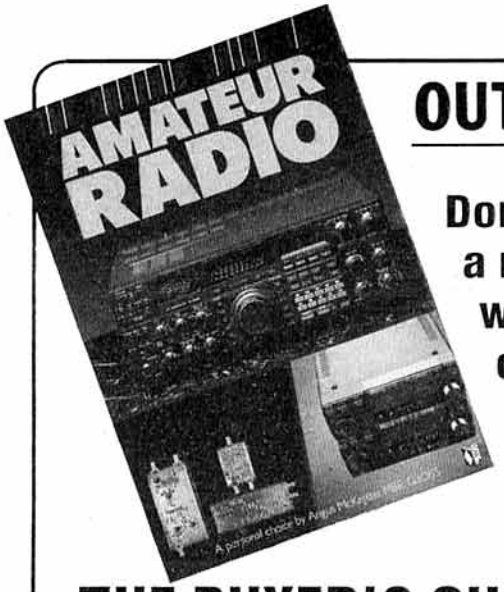

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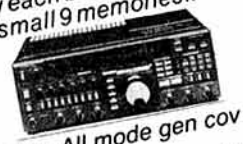

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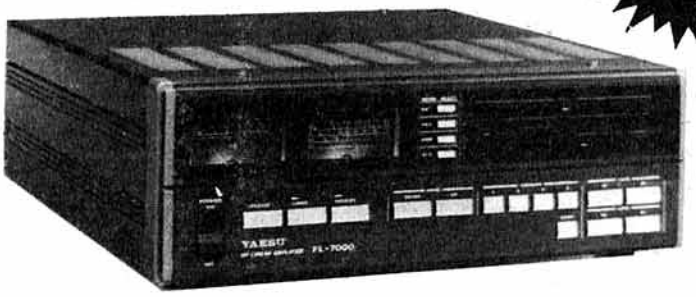

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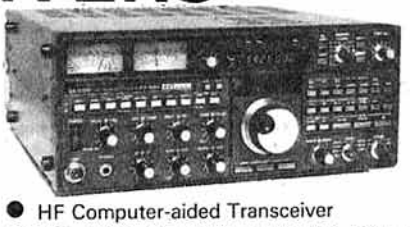

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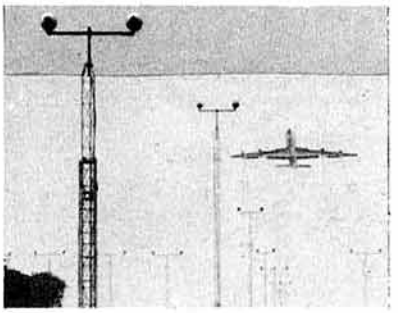

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HK804 straight key	£102.00
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103BA 3 el 20m Yagi	£263.00
103BA 4 el 20m Yagi	£425.00
103BA 5 el 20m Yagi	£500.00
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TH2MK3 3 el 10-20	£283.00
EX14 5 el 10-20m	£506.00
QK710 40M kit Ex14	£145.00
TH5MK2 5 el 10-20m	£655.00
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CX600NJ 4 'N'	£71.40
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268E 70cm 6dB¼	£32.80
358 70cm 6.3dB¼	£33.73
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GPV144DX 2m vrt s/s 6.4dB¼	£53.15
GPV5S2m vrt h.duty 64.dB¼	£45.50
GP2M grnd plane 3.4	£24.00
SQ144 SWS quad vert	£67.95
GP432X 70cm vrt 13.4	£47.50
GP714 70cm vrt 10dBi	£93.95
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MML432/100	£334.00
MMG144V	£37.90
MMT144/28R	£236.90
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MMC50/28S	£35.65
MMC432/28S	£39.90
MMC432/144S	£39.90
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FS500H	1.8-60MHz	20/200/2000W	Pep	£89.50
FS500V	50-150MHz	20/200W	Pep	£89.50
FS300V	50-150MHz	20/200W		£53.50
FS601M	1.8-30MHz	20/200W	Pep	£62.15
FS603M	430-440MHz	5/20W	Pep	£62.15
FS210	1.8-150MHz	20/200W	Auto/SWR	£65.50
FS301M	2-30MHz	20/200W		£42.25
FS301MH	2-30MHz	20u/2000W		£42.25
FS711H	2-30MHz	20/200W	Head/Display	£43.65
FS711V	50-150MHz	20/200W	Head/Display	£43.65
FS711U	430-440MHz	5/20W	Head/Display	£43.65
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FS5S	1.8-150MHz	20/200/2000W	HF	£42.75
SWR3E	3.5-150MHz	20/200/1000W	HF	£28.75
SWR50B	3.5-150MHz	Twin Meter		£36.75
FS20DL	3-150MHz	1/10W		£43.65
FS20D	3-150MHz	5/20W		£43.65

JD

JD110	1.5-150MHz	10/100W	£16.50

SMC

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T3-170L	3.5-170MHz	Relative	Twin Meter	£22.20

T3-170L

FS500

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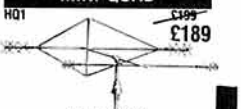

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RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

Founded 1913 Incorporated 1926 Limited by guarantee A member society of the International Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the general manager, from whom full details of Society services may also be obtained.

Headquarters and registered office: **Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE**
Telephone 0707 59015. Telex 25280 (RSGBHQ G)
Secretary and chief executive: D A Evans, G3OUF

EDITORIAL

UPGRADING THE HQ ADMINISTRATION

The last decade has seen many changes in the Society, both in its size —from 19,600 members in 1976 to the present 37,500 members; its turnover—which has increased from £106,000 to today's £1,085,000; and the ever-increasing number of tasks it faces. It is inevitable that the administrative structure has had to change to cope with the very substantial amount of work which the Society now undertakes.

And change it has: from the old manual membership records to the computerised system with 16 terminals (which incidentally can reduce the time taken for routine administrative tasks by a factor of 10); from a small terraced building in Central London to the more modern self-contained headquarters at Potters Bar, which is now allowing the integration of all Society activities into one building; and the change in the type of staff, from primarily clerical to largely technical and other specialised personnel.

It seems to be a fact of life that the administration of most institutions is always under great pressure, one never seems to be able to afford additional staff until the situation becomes desperate. The RSGB is no exception: in fact, the situation has become particularly difficult over the last two years because of the ever-broadening scope of the Society's involvement in amateur radio. For example: morse testing, DataBox and Prestel, packet radio, improved *Call Book*, Government reviews involving the use of the radio spectrum, plus problems in existing areas such as emc and antenna planning, all of which have a vital influence on the future of amateur radio.

To cope with this situation, Council has agreed to an upgrading of the HQ organization; the main feature is the dividing of the workload between the chief executive/secretary's office and the membership services/support services groups, of which the latter, the larger section, is responsible for all routine amateur radio and commercial activities, based on established principles and policies. These groups will be managed by Mr Michael Blood, who has been appointed to occupy the newly-created post of headquarters manager and who joined the staff on 15 September 1986. The support services group involves the data processing, accounts, circulation and despatch, and advertising areas, while the membership services group encompasses publications (*Radio Communication* and books), news and all the many and varied services to members.

The major objective of this change is to free the chief executive and his secretariat of as much routine work as possible in order to allow them to concentrate on Council and committee work and the innovative aspects of amateur radio. The list of tasks to be tackled is extensive. For example: emc, common working frequencies and common licensing standards, which can only be tackled at the international level by IARU. At national level: there are many matters under discussion with the DTI; we need to do more for the newcomer; we need to progress the organization of amateur radio at local level; we need to integrate our efforts with the educational system etc.

While the responsibilities associated with non-routine and routine work are different, there will have to be considerable exchanges between the two. This, I believe, will simply happen. There will be a number of new matters of policy arising from "routine" business. At the same time, as the innovative business becomes established, it will simply pass over to become part of the normal administrative business of the Society. I feel sure the changes will be most successful and that the overall effect will be an enhancement of the Society's effort to improve amateur radio both nationally and internationally.

David Evans, G3OUF

Amateur Radio News

RSGB PRESIDENT 1987

At its meeting on 18 January 1986, Council elected Mrs Joan Heathershaw, G4CHH, to be the Society's President in 1987.

G5KW A new vice-president of the RSGB

At a meeting of Council held on 9 August 1986, members were unanimous in electing Major K E S Ellis, G5KW, as a vice-president of the Society. Under Article 13 of the Society's Articles of Association, "Corporate members who have rendered outstanding services to the Society are eligible to be elected as vice-presidents".

Ken Ellis first received an experimental transmitting licence in 1924. Artificial aerial licence 2ALP followed in 1927, and the full G5KW licence in 1930. He joined the Society in 1933, and was granted life membership in 1945. As a major in the Royal Signals, one of his appointments was as senior technical officer to the Middle East Broadcasting Service which enabled him to take amateur radio to many parts of the world. He held callsigns SU1KE, SU5KW, ZC4NX, ZC6NX, HZ1KE and, perhaps the most famous of all, MD5KW.

From the earliest days he pioneered the use of vhf and specialized in 50 and 60MHz operation, achieving many "firsts" in this part of the spectrum. He was the first to establish a vhf beacon in the Suez Canal Zone. He is still remembered for organising war-time amateur radio conventions in Cairo, attended by amateurs serving in the armed forces of many different countries. During 1950, while serving on the British Military Mission to Saudi Arabia, he was able to provide emergency communication facilities via amateur radio for King Feisal, when the monarch's son lay injured in Paris with no other form of communication available. This led to King Feisal's sons both being instructed by G5KW to the point where they received callsigns HZ1AF and HZ1TA. For these services G5KW was presented with a set of royal robes and jewelled dagger.

In more recent years, Ken Ellis served on Council and several RSGB committees, and during the International Geophysical Year 1957-8, he built, operated and maintained at his own expense a 144MHz beacon which was installed at his home in Kent.

A founder member of the 6-Metre Group, Ken is still very active on his favourite 50MHz band, and continues to provide interesting propagation information—some of it obtained under very primitive conditions while operating portable over long periods from Lands End. Prior to the issue of 50MHz transmitting permits in this country, G5KW used 28/50MHz crossband to great effect, working all six continents, 39 different countries and 48 of the states of the USA—a foretaste of what the band may offer when the next solar cycle approaches its peak.

RSGB database on Prestel

Since 1 August 1986, the RSGB has had its own amateur radio database on Prestel, starting at Page 8107.

At the time of writing, there are some 500 frames of information on many aspects of amateur radio, and the diversity and volume is increasing almost daily. Topics covered range from introduction to amateur radio for beginners to band plans and RSGB services.

The "What's New" page, 810750, will inform you of the latest updates, and in case you have not logged-on for a while, previous "What's New" pages are kept up for your benefit.

Information to go up on Prestel can be sent either via mailbox using RSGB's mailbox number, 070759015, or via RSGB's DataBox.

For those RSGB members who do not subscribe to Prestel, the Society's own DataBox is available, free of charge, on 0707 52242. The choice is yours.

Callsigns in a muddle

Mr C E Pollard, 3 Hillside, Sidbury, Sidmouth, Devon EX100QZ, advises the following errors in the item "CQ6ER QSLs and awards" (*Rad Com* September p622): CQ6ER should read CO6ER, and G3PDX/N6UH should read G3DPX/N6UH.

10-UK wound up

Due to changes of circumstance the organizers of 10-UK have given up any involvement in this now-defunct organization. An amount of £230.17 remains as a balance of the 10-UK funds. Provided that no objections are received by January 1987, it is proposed that this sum, less any expenses (postage etc) be donated to the RAIBC. If there are any objections, kindly advise J D Harris, 21 Waltham Way, Frinton on Sea, Essex CO13 9JE.

Converting the FT707"

The author of the article "Conversion of the FT707 for top band" (*Rad Com* July 1986 p482 and September 1986 p640), Mr M J Grierson, G3TSO, advises that:

1. In Fig 5, under "Modification required to Toko coil", line 3 should read "Rewind 16 turns from pin 2-pin 3".
2. G3BBD has informed him that if the existing Yaesu 24MHz coils are rewound for 1·8MHz, a total number of 40 turns should be used for T10, T25 and T26 (PB2093) and T16, T17, T32 and T33 (PB2201) resonated with a 330pF capacitor; 32 turns as suggested will resonate with a 450pF capacitor. The extra turns required are due to the lower permeability of the 24MHz coil cores than those of the Toko or Yaesu 1·8MHz coils.

RAE Courses 1986-7

(see also *Rad Com* August p550 and September p623)

Although most of these courses have already commenced, it may still be possible to join them.

Amersham. Amersham College. Tuesdays 7pm. Commenced 16 September. Details G3NCL.
Biggin Hill. Charles Darwin School. Wednesdays 8pm. Commenced 17 September. Details G4AVV, tel 01-656 3949.
Brentford. Brentford School for Girls, Clifden Road, Brentford. Thursdays 7.30pm.
Bristol. Brunel Technical College, Ashley Down Road, Bristol. Mondays, theory: Thursdays, practical. Details tel 0272 41241 ext 64.
Canterbury. Canterbury College of Technology. Mondays 6.30-8.30pm. Commencing 6 October. Details G40QD at the college or G3LCK.
Derby. Derby College of Further Education, Wilmorton, Derby. Two courses: RAE and Advanced. Details G4MLL at college, tel 73012, ext 52.
Hemel Hempstead. Dacorum College of Further Education. Mondays 2-4pm. and 6.30-9.30pm. Commenced 8 September. Details G4BIT.
Knottingley. Knottingley High School, W Yorks. Commenced 15 September. Details G3HCW.
Loughborough. Loughborough Technical College, Radmoor, Loughborough. Tuesdays 7-9pm. Commenced 16 September. Details tel 0509 215831, or G3OMK.

RSGB MIDLANDS VHF CONVENTION 1986

Madeley Court Centre, Telford, Shropshire
(Send sae to G3UBX for map. Talk-in)
From 11am, 11 October 1986

LECTURE PROGRAMME

1330-1345 Opening address by Keith Fisher, G3WSN.
1345-1455 "The Cellnet System—a technical view", Malcolm Appleby, G3ZNU.
1455-1605 "10GHz amateur television", Peter Blakeborough, G3PYB.
1605-1715 "Meteor scatter—the reliable mode" Ken Willis, G8VR.
1715-1900 VHF forum: Keith Fisher, G3WSN, RSGB vhf manager; Julian Gannaway, G3YGF, RSGB Licensing Advisory Committee chairman; Mike Dixon, G3PFR, RSGB Microwave Committee chairman; Dave Yorke, G4JLG, RSGB vhf Contests Committee.

The forum will be followed by an evening buffet with bar until 10pm.
There will be lunch-time catering (snacks and bar).
A measurement facility providing most required measurements up to 18GHz should be available. Details from the organizers, let them know if you want any unusual measurements.
There will be a small trade show, bring-and-buy stall and bookstall.

ADMISSION £1.20 **EVENING BUFFET £5 (by advance booking)**
Details etc from: J P H Burden, G3UBX, 18 Langley Road, Merry Hill, Wolverhampton WV3 7LH

Manchester. Hulton High School, Longshaw Drive, Little Hulton, Worsley, Manchester. Wednesdays 7.15pm. Commenced 24 September. Details G6EBR, tel 0942 883729.
Manchester. Pendlebury High School, Cromwell Road, Swinton. Mondays 7.30pm. Commenced end September. Details G4HYE, tel 061-794 3706, or tel 061-794 5798.
Portsmouth. Education Centre, Drayton Road, North End, Portsmouth. Tuesdays and Thursdays 6.30-8.30pm. Details G6NZ, tel Portsmouth 819968, or tel Cosham 375075.
Princes Risborough. Princes Risborough Adult Education Centre. Thursdays, commenced 25 September. Details G3NCL.
Rhondda. Rhondda College of Further Education. Details tel 0443 (Tonypandy) 432187.
Stanmore. Stanmore Sixth Form College, Elm Park, Stanmore, Middx. Details Adult Studies Dept, Harrow College of FE, Hatch End, Middx.
Stockport. Reddish Vale Evening Centre, Reddish Vale Road, Stockport. Mondays 7-9pm. Details tel 061-477 3544, ext 237 (9am-4pm) ask for Dave Wood.
Welwyn Garden City. The venue has been changed to the college campus instead of the Ayslecroft Centre, and the commencing time has been changed to 6.30pm.

Morse Courses

Amersham. Amersham College. Mondays 8pm. Commenced 15 September. Details G3NCL.
Brentford. Brentford School for Girls, Clifden Road, Brentford. Wednesdays, 7.30pm.
Bristol. Brunel Technical College. Tuesdays. Details tel 0272 41241 ext 64.
Canterbury. Canterbury College of Technology. Wednesdays 6.30-8.30pm. Commencing 1 October. Details G40QD at the college, or G3LCK.
Leeds. Airedale & Wharfedale College of FE, Horsforth. Tuesdays and Wednesdays. Details tel 0532 581723, or G3FCW tel 0532 585044.
Leeds. Garforth Comprehensive School, Lidgett Green, Garforth, Leeds. Tuesdays, 7-9pm. Details G3TEE, tel Leeds 554190.
Manchester. Pendlebury High School, Cromwell Road, Swinton. Tuesdays, 7.30pm. Details G4HYE, tel 061-794 3706, or tel 061-794 5798.
Princes Risborough. Princes Risborough Adult Education Centre. Thursdays 7.30pm. Commenced 25 September. Details G3NCL.
Stockport. Reddish Vale Evening Centre, Reddish Vale Road, Stockport. Thursdays 7-9pm. Details tel 061-477 3544 ext 237 (9am-4pm) ask for Dave Wood.

Mobile Rallies Calendar

5 October
Great Lumley AR Rally, Community Centre, Great Lumley, Chester-Le-Street. Open 11am (10.30am for disabled). Talk-in S22 and RB0 (GB3NT). Details G4MSF, tel 091 4693955.
5 October
Wakefield Mobile Rally, Outwood Grange School, Potovens Lane, Wakefield. Open 11am (10.30am for disabled). Free admission, easy parking. Talk-in on S22, GB3WU. Dealer enquiries and further details G4RCH, tel Leeds 536633 or G3SPX, tel Wakefield 828520.
12 October
Carmarthen ARS Rally, St Peter's Civic Hall, Nott Square, Carmarthen. Open 10.30am-5pm. Talk-in on S22. Free parking. Details GW3GUE, tel 026-783 460.
19 October
ELOHEX 86. The Hornsea ARC's amateur radio, computer and electronics exhibition, Floral Hall, Hornsea. 10am-5pm. Talk-in on S22 G4EKT. Details G4YTV, tel 0401-62498.
19 October
South Bristol ARC present the Second Bristol Radio Rally at Hartcliffe Youth Centre, Hareclive Avenue, Hartcliffe, Bristol. Open 10am-5pm. Talk-in and special event station, GB2BRR. Details G1LDJ, tel 0272 667179.
26 October
Aycliffe & Shildon ARC "Ham-day", Elm Road, Working Mens Club, Shildon, Co Durham. Talk-in S22. Open 11am-5pm. Details G4OHZ, tel 0325 314638.
1 November
North Devon Radio Rally, Bradworthy Memorial Hall (near Holsworthy). 10.30am-5pm. Talk-in on144MHz ssb. Details G8MXI.
9 November
Bridgend & DARS Rally, Bridgend Recreation & Leisure Centre, Angel St, Bridgend, Mid-Glam. Open 10am for disabled, 10.30am for public. Talk-in on S22. Details GW1OUP, tel 0656 723508.
23 November
West Manchester RC Mobile Rally, Pembroke Halls, Walkden, Worsley, Gtr Manchester. Details G1IOO, tel 0204 24104 evenings.
7 December
Verulam Christmas Rally, The City Hall, St Albans. Open 11am-5pm. Talk-in on S22 and SU8. Details G4JKS, tel St Albans 59318.
14 December
Leeds & DARS Annual Christmas Rally, Pudsey Civic Centre, Dawsons Corner, Pudsey. Open 11am (10.30am for disabled). Talk-in on S22. Trade enquiries G4WYD, tel 0274 685039, details G1EBS, tel 0274 665355.
27 January 1987
Oldham Mobile Rally, Queen Elizabeth Hall, Civic Centre, West Street, Oldham. Opens 11am (10.45 for disabled). Talk-in on S22. Details G4ZEP, tel 061 624 7354. To book morse test, contact RSGB HQ.
9 February 1987
Bury RS Hamfeast 1987, Mosses Youth and Community Centre (only minutes from the M66), Cecil St, Bury, Lancs. Details available from G1PKO, tel 061-764 5018.
28 February 1987
Rainham Radio Rally, Bredhurst R&TS, Parkwood Community Centre, Deanwood Drive, Rainham, Gillingham, Kent. Five minutes from junction 4 on M2. Talk-in on S22, GB4RRR. Opens 10am. Free car park. Admission 50p. Details G1LKE, tel Medway (0634) 362154.
8 March 1987
Wythall Radio Club Rally, Wythall Park, Silver Street, Wythall, north of Birmingham on A435. Opens 12 noon. Talk-in on S22. Admission 50p; OAPs and children free. Details G0EYO, tel 021-430 7267.
15 March 1987
South Essex ARS Mobile Rally, The Paddocks Community Centre, Canvey Island, Essex. Open 10.30am. Talk-in on S22. Details G4FMK, tel 0268 683805.
5 April 1987
Pontefract & DARS Components Fair, Carleton Community Centre, Pontefract, midway between Pontefract and Darrington just off the A1. Open 11am-4pm. Details G0AAO , tel 0977 43101.
24 May 1987
Maidstone Mobile Rally, Maidstone YMCA Sportscentre, Melrose Close, Maidstone. Details G6FZD, tel 0622 50709.
14 June 1987
Elvaston Castle Mobile Radio Rally, Elvaston Castle Country Park, 8km SE of Derby on B5010. Talk-in by GB2ECR on 144 and 432MHz. Details G4PZY, tel 0332 767994; G4CTZ, tel 0332 799452; or club HQ, tel 0332 755900.
12 July 1987
Worcester & DARC "Droitwich" Rally, High School, Droitwich. Details G0AOC.
27 September 1987
Harlow Mobile Rally, Harlow Sportscentre. Details G4KVR, tel 0279 22365 (day); G3UEG, tel 0279 27788 (evng).

Special Event Stations

1 May-26 October, GB4NGF, GB8NGF, GB2NGF
North Staffs ARS are operating three special events stations, for the National Garden Festival, Stoke-on-Trent. GB4 and GB8 will be on the Festival site, GB2 is located at the QTH of G4XEE. Open 11am-8pm. Transmission on all bands using cw, rtty and tv. Special QSL cards. Details G6MLI, tel 0782 332657.
1 April-31 December, GB2RIP
Celebrates 1,100 anniversary of the granting of the Charter by King Alfred the Great to the city of Ripon. Station on air most evenings on hf cw/ssb, 144MHz fm. Other modes/bands as equipment becomes available. QSL via RSGB. WAB-SE37, Maidenhead 1094FD. Details G0CLY.
October, GB40CV
This station will be operational during the month to celebrate the 40th anniversary of the Cray Valley Radio Society. Special QSL cards. Details G3TAA.
October, GB2SGJ
To celebrate 50 years of Scunthorpe's royal charter, the Scunthorpe ARC will activate the station throughout the month on hf, 144 and (possibly) 432MHz. Details G4ZGJ.
2-5 October, GB4FFY
During Freshers Week ("Faffy Week"), the University of Bristol ARS will operate this station on hf, 145MHz fm, and 144MHz ssb from the Students' Union, Queen's Road, Bristol. Details G6GVI, tel 0272 303030, ext 3309.
2-4 October
21, 22 November, GB2IY, GB8SIR
Smith Industries RS will operate this station from Bishops Cleeve, Cheltenham. From 10am to 4pm on 2, 3 October, and from 1 to 6pm on 4 October. The Saturday is the company's open day for Industry Year. Transmissions mainly on 3·5, 14 and 144MHz. Details G4YIX.
3, 4 October, GB2EHZ
On a "communications day" being held by East Herts College, this station will be operational on hf and vhf for 24h commencing noon 3 October. Details G0BTX, tel 01-804 6992, or the college tel Hoddesdon 466451 ext 55.
8-13 October, GB0MUL
WQ Square, Island of Mull, of west coast of Scotland. Operated by radio amateurs from the Glasgow area on all hf bands, 144MHz ssb and 430MHz. WAB NM45. Details GM0AAJ, tel 041-339 6445, day.
11-18 October, GB8AAW
G Ridgeway, G8UYD, will operate this station and intends to gain sponsorships per contact prior to going on the air. Operation on 144MHz ssb, fm and rtty, also 432MHz ssb. All day and evenings 11, 12 and 18th, evenings only 11-17th.
12 October, GB2FBC
During BBC Radio Newcastle's Open Day at the Broadcasting Centre at Fenham near the city centre, the Tyneside ARS will operate this station from the Newsroom on hf and 144MHz. Details G4KOT, tel 091-234 1148.
17-19 October, GB2JAM
G4UDR will operate this station on behalf of the West Wirral Scouts, sponsored by Merseyside Police. Details G4UDR, tel 051 709 6010 ext 4860 (Bromborough).
17-19 October, GB4OYC
Station QRV 1800gmt 16 October to 2400gmt 19 October to start the Yeovil ARC's 41st year. Operation from the club HQ on 3·5 to 432MHz, cw and ssb. Details G4JBH, tel 0935 23873.
18 October, GB0DMS
From the 134th Derby (Mackworth) Scout HQ, Leytonstone Drive, Mackworth Estate, Derby, this station will be operated by G1DCH, G4XPF and G4XPE between 10am and 5pm on hf and 144MHz.
18, 19 October, GB4WIS
Operational 0800-2000 on 3·5-28MHz, possibly rtty, also possibly 144MHz ssb and/or simplex. Details G4UQN.
18, 19 October, GB2XSG
South Dorset RS together with Crossways Scout Group will operate this station from the Crossways Village Hall, Crossways, Dorchester, Dorset. Transmissions on hf and vhf using sstv and phone. Special QSL cards. Details G4VBY, tel 0305 853408.
25, 26 October, GB2EMR
On the occasion of the International Endurocross Motor Cycle Races, from Beach Lawns, Weston-super-Mare. Operated 10am-5pm each day by members of the Weston-super-Mare RS. Transmissions on hf, 144 and 432MHz. Details G1DJW, tel 0934 514429.
31 October-2 November, GB21RC
This station wil be part of an amateur radio feature during the Suffolk Scouts Corroboree to be held at the Eurosports Village, Shotley, Suffolk. GB2IRC will be operated by the Ipswich RC from late evening 31 October to late afternoon 2 November, and it will be looking particularly, but not exclusively, for contact with stations having Scouting connections. Details G4IFF.
3-9 November, GB4PW
Operation of this station has been cancelled for security reasons on the advice of the Royal British Legion HQ secretary.

Other Events

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.
5 October
Welsh Amateur Radio Convention, Oakdale Community College, Blackwood, Gwent. Details GW3KYA, tel 0495 225825.
11 October
RSGB Midlands VHF Convention, Madeley Court Centre, Telford, Shropshire. Details G3UBX.

17/18 October
Cleveland RAFARS invites all RAFARS members to the Cranwell ARTS golden jubilee dinner at the St George Hotel, Tees-side Airport at 7.30pm on 17 October. Tickets: £8.50. On 18 October, the RAFARS agm will be held at the same venue: 11am for lunch; 2pm for business. Details from G0BIA, tel 0642 486474.

24, 25 October
Leicester Amateur Radio Exhibition; Granby Halls, Leicester. Details G4PDZ, tel (day) Leicester 553293, (evng) Leicester 871086.

6 December
RSGB AGM, Institution of Electrical Engineers, Savoy Place, London WC2R 0BL.

15 March 1987
NARSA 25th Amateur Radio & Electronics Exhibition, Belle Vue, Manchester. Enquiries to G6CGF, tel 051-830 5790.

28/29 March 1987
RSGB National Amateur Radio Convention, National Exhibition Centre, Birmingham.

OBITUARIES

The Society records with regret the deaths of the following radio amateurs:

Mr A A Bickers, G3TIH
Alex Bickers died on 27 April. He had been an active radio amateur for over 55 years, and enjoyed all aspects of the hobby and the friendships which it engendered.

Mr S Bishop, G8OFY
Stuart Bishop was a keen and enthusiastic amateur, and was known and respected in the Mansfield area where he lived.

Mr A J Bizzell, GW1MTD
Andrew Bizzell, who died on 28 April, was 19 years old and was studying for his morse test. He was a member of Llanelli ARS, and joined the RSGB a year ago. He enjoyed the hobby immensely and made many friends.

Mr E E Carrington, G4INR
Ted Carrington died on 19 May. He was licensed as G8ODD in 1978, and took over from G6QM as "train driver" of the 7-10 Net via the GB3MH repeater for about seven years.

Mr T Chamberlain, G3FSK
Tom Chamberlain, who died on 25 May, was a radio operator in the Royal Navy during the second world war, and always used cw. He donated equipment to his club, the Hinckley Radio Club, although he was not an active member, and will be remembered as a quiet, unassuming and helpful man.

Mr J W Courtenay, G3FVY
John Courtenay died on 9 June. He was first licensed in 1950, and will be remembered for the help he gave fellow amateurs and for his meticulous home-construction of equipment.

Mr R Crispin, RS36807
Ron Crispin died on 16 September 1985. He had retired a number of years ago from a PO research station, but was still a keen constructor.

Mr R Crowther, G3FJU
Ron Crowther, who died on 5 June, was a member of the RNARS.

Mr E L Devereaux, G3CCZ
Eric (Dev) Devereaux died on 26 June, aged 58. He was licensed as G3CCZ in the late 'forties, and also operated from overseas as VP3CZ and VP5CZ during the 'sixties. His main interest was always cw, and he supported his local contest group in HF NFD and other events. He also worked vhf, as well as using the amateur radio satellites, and when not operating was also keen on construction. His last project had been an atv system.

Mr V G Downham, G4BMX
George Downham died on 9 July, aged 65. He had been interested in radio and electronics since the 'forties, although he only obtained his licence in 1972. Since then he had maintained contacts on all bands around the world, and in particular with Canada.

Mr G T Fowler, G3CTD
Mr Fowler, who died on 22 April, was 77 years old. He had been a member of the society for many years and was very proud of his membership.

Mr D C Free, G3NBP
Doug Free died on 13 July, aged 62. Until his death he had been active on the hf bands.

Mr A Gardner, G3HRV
Alf Gardner died on 10 June at the age of 84. He was well known in the Manchester area on 3·5 and 144 MHz.

Mr L Green, G3AOW
Leonard Green died on 10 May, aged 77. In 1927 he became a Marconi Marine operator, and later joined Ferrantis. During the second world war he was a radio instructor for the RAF at Bolton Technical College. At the time of his death, he was working on a biography of his father, G6OW, including his work in early transatlantic tests.

Mr T Griffin, G3GUV
Tom Griffin, who died on 10 May, was an RSARS member and a keen cw operator. His main interest was QRP operating on the hf bands. He helped form a QRP construction group in the Darlington area last year, with work going on over a 144MHz fm net and circuits sent to interested hf operators. In memory of G3GUV, the group has now called itself Griffin QRP.

Mr B Haywood, G3MKR
Bernard Haywood died on 20 May. He was first licensed in 1957, although he had previously been involved with the RAF listening watch. During the second world war he had been a signaller in the Parachute Regiment, and was one of those who parachuted into Arnhem. He was a founder member of the Macclesfield RS, and despite some physical disability continued to use morse on the hf bands. His major interests were in signals and associated networks, and he was a member of RSARS and RAFARS.

Mr A H Howard, GW3TCE
Harry Howard died on 1 June, aged 69. Although he had been an active amateur for over 20 years he was more interested in constructing than operating. Most of his QSOs were with his licensed sons VE3MTH and GM4EGX, or with local close friends. He was always willing to give help and encouragement to other amateurs, and had been developing an interest in satellite communication.

Mr S Hughes, G8VHW
Sid Hughes, who died on 6 April, was caretaker, acting secretary, treasurer, and one of the founders of the GB3AH repeater. He was a keen member of Raynet, one-time group controller for the Breckland area, and group registration secretary at the time of his death.

Mr E F Jackson, G3JYJ
Eric Jackson, who died on 3 June, was first licensed in 1952. He had been keenly interested in wireless since the age of 12, when he impressed disbelieving parents with early news of an airship disaster gained through a home-built crystal set. He loved morse best, but also enjoyed rtty. He was an honorary member of the Pas de Calais section and was active on both cw and phone until restricted by ill-health.

Mr P LaFantasie, G5AAD/W6DLX
Phil LaFantasie died on 11 June. He was a member of the Collins Radio Club, and during his stay in England was well-known on cw.

Mr J G Lewis, GW3OXE
Graham Lewis died on 31 May, aged 56. He was a founder member of the Merthyr Tydfil RC and at one time tutored club members for the RAE. After some years of inactivity due to ill-health, he had recently resumed operating on all bands, including 28MH fm.

Mr A H Mason, GM6MS
Mr Mason died on 12 January, aged 81 years. He had been a radio enthusiast from his earliest years.

Mr S D Morrison, GM3HXF
Steve Morrison died on 18 June, aged 66. During the second world war he served with the Royal Corps of Signals in North Africa, the Middle East and Germany. He was mainly interested in cw working on the hf bands, and had a standing schedule with VE7 over several years. Although his operating was restricted by ill-health, his "pithy" remarks on the Grampian Phone Net will be well-remembered.

Mr I Mackenzie, GM6KNO
Ian Mackenzie died on 21 June. He had worked for the Royal Observatory, Edinburgh; Scottish Television, the BBC and Dundee College of Education. he was licensed in 1982 and was a regular operator on 144MHz.

Mrs M Pullen, BRS41471
Marjorie Pullen died on 25 June. She was a keen swl and a proud holder of the Bristol Award.

Mr G E Read, G3ERN
Ernie Read died on 10 May, aged 82. He was first licensed soon after the second world war, and quickly became known, mainly on top band, for the outstanding signal he put out from his home in Harlow, Essex, where the Harlow club also met. Following an enforced move to Hallingbury which affected his signal, Ernie moved to 144MHz. He was among the first to make transatlantic top band contacts using transistors. He was a former president of the Harlow Club, and was later given honorary life membership of Bishop's Stortford ARC in appreciation of his help to aspiring novices.

Mr V Terziev, LZ1AB
Vassil Terziev died on 21 May, aged 57. He was the leading amateur in Bulgaria, and represented their interests at IARU conferences, in written articles and on the vhf and Amsat nets. He spoke many languages fluently and translated on international nets, as well as being a technical expert and superb operator. He accomplished much, particularly on vhf, in sporadic-E meteor scatter and satellite operation.

Mr G C F Whitaker, G4KBU
Mr Whitaker died on 4 June, aged 81. He had been a member of the RSGB for over 50 years. He had an amateur licence and was operating in North China during the 'thirties. During the second world war he rejoined the Royal Navy, where he entered the newly-created Electrical Branch, retiring as a Captain in 1959. During the 'sixties and early 'seventies he was chief engineer with Associated Rediffusion, then technical director for Yorkshire TV, and after his retirement he renewed his amateur licence.

L Wilks, G2FHI
Les Wilks, who died on 6 June, held an AA licence before the second world war, and afterwards was soon active on the air. During his career with the Post Office he worked at various radio stations, retiring as manager of Somerton radio in 1962. Thereafter he could often be heard on 3·5MHz. conducting the BTI net, comprising many of his former colleagues.

Also:

Mr I F Baird, ZL2TNM.
Mr E V Bigg, G4MHP, on 1 September, 1985.
Mr W J Bowerman, G6MMO.
Mr R T Bowler, G3GKN, on 30 March.
Mr H O Bradshaw, G3VTJ.
Mr T W Chamberlain, G3FSK.
Mr G H Chambers, GW4TUQ, on 21 November, 1985.
Mr R Chillcott, G8PGV.
Mr R F Cosser, G8CLN.
Mr A S B Cutbush, G6ZNU.
Mr A P Drysdale, G3BWG, in March.
Mr R V Duesbury, G3CTE, on 23 June.
Mr G A Evans, G8MNJ.
Mr J E Francis, G3HGY.
Mr A E R Garden, G6PTH.
Mr J J Hargan, G12DHB, on 27 March.
Mr E W Harris, ZL2AD.
Mr M J Hewitt, G1ITG.
Mr J J Hynes, G0CZK.
Mr G W Lawrence, G4RQM, on 13 December, 1985.
Mr D J McCabe, BRS86916, on 11 April.
Mr V Morgan, G3SXM, on 15 June 1985.
Mr W N Morrow, EI5DP.
Mr A Nicholson, G4TKL, on 15 April.
Mr T Pook, G4LNS.
Mr C W Remington, G4HHG, on 5 May.
Mr R F Shilton, G2AFR, on 16 April.
Mr A Smith, G3AYT, on 4 May.
Mr H Stott, on 13 June.
Mr C R Templar, G3RDX, on 7 March.
Mr J R Tuck, G6TD, on 11 May.
Mr N E Wicks, G3IJO, on 2 May.
Mr K P B Wood, G3SME, on 11 June.

MEASUREMENTS ON MODERN VHF/UHF FRONT-ENDS

Ian F White, G3SEK*

IN MY earlier article "Modern vhf/uhf front-end design", [1] I explained how to design a receiver front-end with a specific noise figure and optimized gain distribution. So you design a new front-end, build it, and get it going. And then what? It may seem *to be working well—but is it, really? On-the-air impressions can be very misleading, unless you already have some idea of the kind of performance to expect. If you want optimum performance from a front-end, you need to check it out by* measurements.

This article describes some of the tests you can make on vhf/uhf front-ends or similar rf systems. Ideas and circuits are included for a variety of homebuilt testgear, with an emphasis on methods and equipment which give accurate results without needing external calibration.

Part 1 is about basic principles and the measurement of gains, losses and vswr. Part 2 will be about the measurement of sensitivity and strong-signal handling.

Part 1

ANY KIND of test or measurement involves three aspects: the device under test, the testgear, and yourself. If you have designed the circuit thoroughly in the first place [1], you should have a pretty clear idea how each stage should perform. If the results fail to agree with your expectations, there *must* be a logical reason, and it must lie in one of those three areas: the circuit, the testgear, or your own understanding of what's going on. You and the testgear are supposed to be testing the circuit, though it's quite possible that you and the circuit will finish up testing the testgear. The trick is to avoid the circuit and the testgear ganging up against *you*!

Modern commercial rf testgear is amazing and wonderful, but hideously expensive. Given the choice, most radio amateurs would prefer a new car or a new house instead! But don't despair; many of the features that make commercial rf testgear so expensive are unnecessary for amateur radio. For a start, we rarely need broadband performance across a wide frequency range. The broadband performance of commercial testgear always involves some degree of compromise, and home-made testgear that has been designed and optimized for a specific amateur band will often work just as well—or even better.

We don't need high accuracy in amateur radio, since we have no formal performance specifications to meet, and we can often manage with relative rather than absolute measurements. For example, it is easy to make a relative measurement of receiver sensitivity using an uncalibrated noise generator, but in order to make an absolute sensitivity measurement you would need to measure the receiver noise temperature or noise figure—a far more difficult project, as we shall see in Part 2.

Simple measurements, based on the calibrations of voltage and current meters, or on the marked values of components, can take you a surprisingly long way into the measurement of gains, losses, power levels and even strong-signal handling. You can also calibrate your home-made testgear against commercial instruments. The test and measurement stands at conventions are there to help you. One way or another, you can usually achieve the accuracy you need. Even so, the more your measurement methods wander away from reliable basic standards, the more errors can accumulate. The best test methods are the ones that calibrate themselves.

Gain and loss measurements

Power gains and losses are the basic currency of front-end system design. It's important to be able to measure them reasonably accurately.

The gain or loss of a device is the power level at its output, relative to the signal level fed into the input [2]. To measure gain or loss, you need a signal source, and an instrument for measuring *relative* power, calibrated in decibels. Although you don't need to know the absolute power level (in watts), you do need to make your measurements at the right *sort* of power level. To make valid measurements on receiver front-ends, you usually need to work at power levels well below the gain compression point [1], ie at levels of tens to hundreds of microwatts. At this low level, accurate relative power measurements require a special instrument which I'll describe later.

Say you want to measure the gain of an rf amplifier. First, set up the measuring system (Fig 1) with a coaxial adaptor instead of the amplifier. The two 20dB attenuator pads are used to establish 50Ω source and load impedances for the amplifier under test; see below. Adjust the meter so that it reads 0dB, then remove the adapter and insert the amplifier. The meter reading increases, and the amount of increase (in decibels) is the gain of the amplifier. If you had inserted a long length of 50Ω coaxial cable instead, the meter reading would have fallen below the 0dB setting, and you'd have measured the cable loss. As well as simple losses and gains, you can use the same technique for practically any other measurement that involves relative rf power levels, from hf to microwaves. For instance, you can measure filter responses, crosstalk in diplexers and coaxial relays, antenna gains and radiation patterns, and the vswr of anything that's got a vswr.

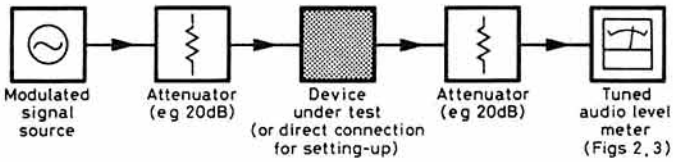

Fig 1. Typical test set-up for gain or loss measurement. Note the use of attenuators at the input and output of the device under test

Stage-by-stage measurement of gains and losses is an extremely powerful technique for checking out a newly-built rf system such as a receiver front-end. If you've designed the system properly [1] you'll already know what to expect. This is one of the big rewards for spending time on the design before picking up the soldering iron; if there are problems, you're almost bound to spot them! It's always useful to design and build systems with 50Ω interconnections, so that you can test each stage separately. You don't need to go to the extreme of building each stage in a separate box with plug and socket connections. Even a single-board layout can be designed to include interstage connections of 50Ω stripline with in-line coupling capacitors. By removing a capacitor you can attach a coaxial test lead to the output of one stage or the input of the next. Thus you can step through the entire system, stage by stage, checking that all the gains and losses agree with the design values.

* 52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP.

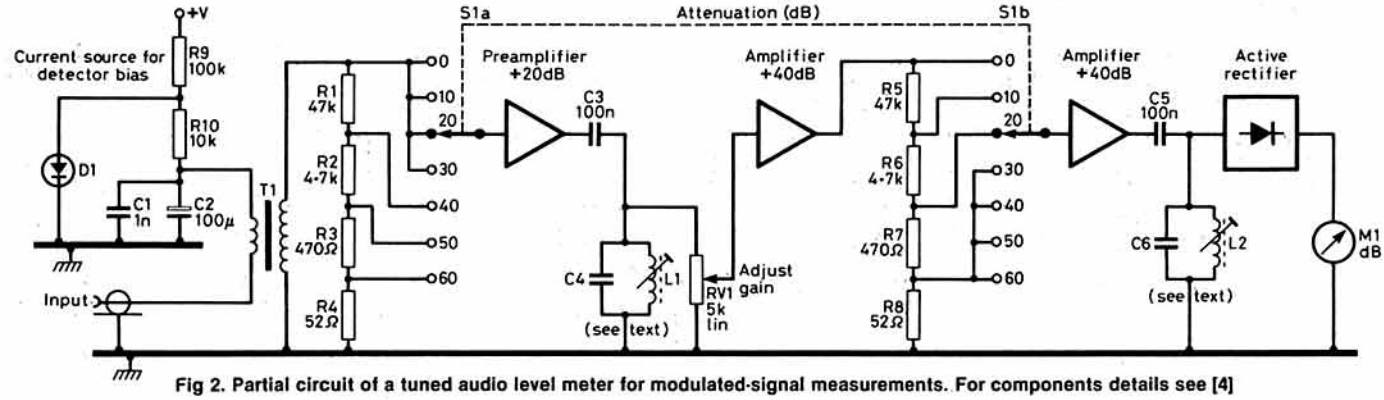

Fig 2. Partial circuit of a tuned audio level meter for modulated-signal measurements. For components details see [4]

Attenuators

One way to calibrate your relative power measurements is by comparison with fixed resistive attenuators. You'll need to build or acquire a range of good-quality attenuators designed for use in a 50Ω system. These should include a switched set giving any combination of 1, 2, 3, 4, 10 and 10dB (so you can select 1 to 30dB in 1dB steps), together with fixed attenuators of handy values like 3dB, 6dB, 10dB and 20dB. You can often pick these up as surplus, though home-made attenuators can be reasonably accurate at vhf, and with care can even work well into the uhf region [3]. It's also useful to own or have access to a few attenuators of known high quality, to check the others against.

Almost all your measurements are going to be made in a 50Ω system, feeding the device under test from a 50Ω source impedance and terminating it in a 50Ω load. You can ensure this by placing the device under test betweeen two 50Ω attenuators of 20dB or so. Any power reflected from a mismatch at the far side of an attenuator will itself be attenuated on the way back, so the vswr seen by the device under test can't stray far away from 1:1. For example, the vswr looking into a 20dB attenuator theoretically cannot exceed 1·02, no matter what is connected at the other end. (In practice the vswr would probably be rather higher, owing to errors in the attenuator itself.) If you make all your gain and loss measurements using impedance-stabilizing attenuators at the input and output of the device under test, you'll know where you are. If you don't, you'll get confusing and misleading results. For example, even your so-called standard attenuators won't perform as designed unless they themselves are in a 50Ω system.

Tuned af level meters

As I mentioned earlier, gain and loss measurements on receiver front-ends need to be made at power levels of tens to hundreds of microwatts. Conventional power meters using diode detectors and dc voltmeters either aren't sensitive enough, or tend to suffer from noise and drift. A better solution is to use a test signal which is amplitude modulated by a steady audio tone, and to measure the relative level of the *tone* instead of the carrier. The signal is detected by a diode in the usual way, but instead of trying to dredge the dc component out of the hum and noise, you amplify the audio tone signal. AC-coupled amplifiers neatly sidestep the dc drift problem, and hum and noise are reduced by a sharp audio filter tuned to the tone frequency. Finally you measure the level of the tone on a meter calibrated directly in decibels, those being the units of relative power level.

Testgear for the modulated-signal technique is very easy to build. The only special instrument is the meter which measures the level of the audio modulating tone. Fig 2 shows a partial circuit diagram [4]. It's simply a tuned af amplifier with adjustable gain, followed by an active rectifier which drives a meter. Gain is adjustable by both a switched attenuator and a continuously-variable control. The switched attenuation is in 10dB steps; the total of 60dB is split into two separate 30dB attenuators to maintain a good signal:noise ratio without overdriving any stage.

My own instrument is built to the same principles as Fig 2, but it's now 10 years old and is beginning to look rather antique with all its discrete transistors. You could easily update the instrument to use modern low-noise op-amps, so long as you keep to the basic block diagram.

Construction should follow standard hi-fi preamplifier practice. The first 20dB gain block is a low-noise audio preamplifier and requires care with shielding and grounding around the input. The two 40dB gain blocks are much less critical. Any frequency around 1kHz will do for the two tuned circuits, as long as they're both the same. The inductors L1 and L2 in my instrument are two pot cores from the junk box; the components suggested in [4] are the nearest commercially available. Capacitors C3 and C5 are chosen to match the low output impedances of the gain blocks to the high-impedance tuned circuits; the values shown should be satisfactory, though some adjustments may be necessary.

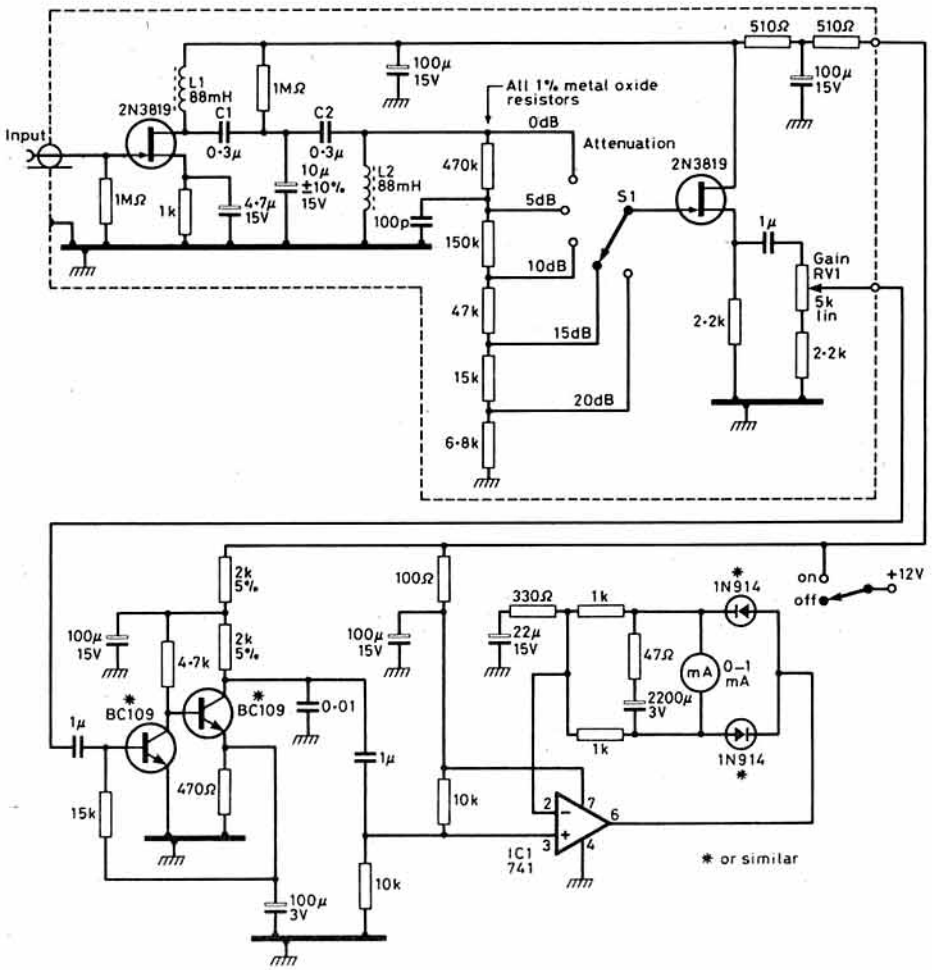

Fig 3. A simplified tuned audio level meter

Fig 3 shows an alternative instrument [5] which uses the well-known 88mH inductors for selectivity

To get the best from either instrument, you need a large, accurate, non-digital meter with some existing form of linear calibration (you'll see why in a moment). The instrument should preferably be battery powered, to avoid direct pickup of the modulating signal via ground loops instead of via the device under test.

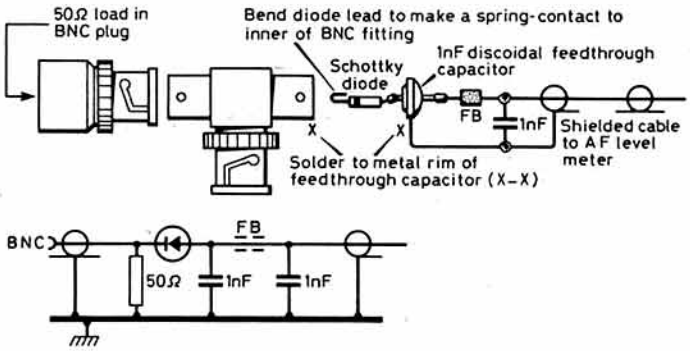

Fig 4. Exploded view of a detector and 50Ω load using a BNC T-fitting

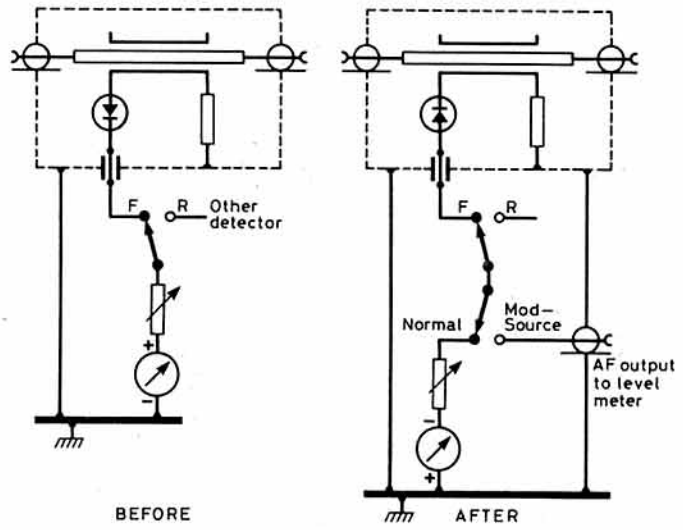

Fig 5. Adapting an ordinary "vswr bridge" for modulated-signal measurements. The two detector diodes in the bridge are reversed, as are the meter connections

Detectors and vswr bridges

A variety of diode detectors can be used for the modulated-signal technique. The most convenient are ordinary Schottky diodes fed with a few microamps of dc forward bias provided by the level meter (Fig 2). At or below the milliwatt rf level, these diodes are in their square-law region, which means that the rectified audio level is accurately proportional to the rf *power* (not the voltage). If your meter scale already has an accurate linear calibration, you can add a decibel scale using nothing more than a calculator [6]. Detectors usually need to provide a 50Ω rf termination, and I use a Schottky diode in a BNC tee adaptor with a 50Ω BNC load attached (Fig 4). The rf impedance is not exactly 50Ω, so I also use an attenuator ahead of the detector to "flatten" its vswr.

Since the modulated-signal technique basically measures power ratios, you can also measure vswr. Although vswr is defined as a ratio of impedances, it is more often measured as a ratio of the "forward" and "reverse" rf power levels or voltages, as detected by directional sensors. An ordinary vswr meter contains these directional sensors but typically requires at least a watt of rf to give a good indication on the dc meter display. Simply reversing the diode detectors allows you to use the modulated-signal technique to measure the vswr of delicate circuits at very low power levels (Fig 5). For example, you can measure the input or output vswrs of preamplifiers, mixers and other allegedly 50Ω devices (prepare for nasty surprises!).

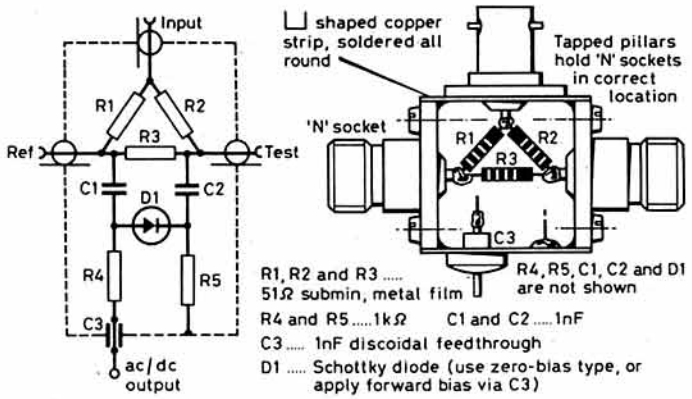

Fig 6. Circuit and sketch of a return loss bridge

Other kinds of vswr sensors can also be used. Fig 6 shows a home-made vhf/uhf return loss bridge. Return loss is an alternative way of expressing vswr, and can be read directly in decibels from the meter scale [7]. W7ZOI has recently described many uses for an hf/vhf test set based on an hf-type return loss bridge and unmodulated rf sources [8]. By using the modulated-signal technique and the bridge of Fig 6, the same measurements can be extended to uhf. For microwaves, you can use a slotted coaxial line or waveguide to observe and measure standing waves more directly [9].

Modulated signal sources

You can use a wide variety of modulated signal sources with the same detectors and level meter. For example, on 432MHz I use a crystal-controlled source modified from a converter local oscillator strip, which provides a few milliwatts of rf. A "Microwave Committee" board [10] would serve equally well if throttled back to the same power level. Since any signal source will always need a 50Ω output attenuator to establish the correct source impedance, a suitable pad can be permanently built in. Modulation can be very simple; almost any waveform will do, so long as the frequency is adjustable to match the tuned circuits in the level meter. My 432MHz source is modulated by an af oscillator using a 555 ic, which chops the rf output by supplying square-wave forward bias to the base of the final transistor—a bit brutal, but very effective! Whatever kind of modulated source you use, it should be very well screened, with supply leads decoupled to avoid stray pickup into the detector. The rf output should also be spectrally pure, because the device under test may have significant—and misleading—responses to spurious frequencies from the signal source.

Modulated signal sources can be made for all the vhf/uhf amateur bands of interest, following the above guidelines. The modulated-signal technique can also be used outside the amateur bands, and is equally useful at hf. For example, you could use a suitable general-coverage a.m signal generator with its internal modulation adjusted to the peak audio response of the meter. This would allow you to measure gains and losses in the i.f stages of a front-end, and to manually sweep the frequency responses of filters. If you are sweeping over a wide frequency range, or are measuring the gain or loss of a frequency-translating device (eg a mixer, transverter or complete front-end) you are also relying on your detector having a flat frequency response. It would be wise to check the detector first, using a good signal generator.

Accuracy

The modulated-signal technique can measure gains and losses with excellent accuracy. From the 0dB reference at full scale on the meter, the first 1dB of loss is spread over 21 per cent of the meter scale [6] so you can easily resolve changes of less than 0·1dB. Changes of 10 or 20dB are taken care of by the range switch, while bigger changes require external rf attenuators. Since the calibration of the instrument relies only on resistor values and the linearity of the 0—10 meter scale, you can use it to cross-check the calibrations of your attenuators. Take care to make all measurements at power levels within the square-law region of the detector diode. You can check this by increasing the applied power by a known amount, and observing that the meter reading increases by exactly the same amount. All the calibrations—the meter scale, the 10dB range switches, and all your fixed and switchable rf attenuators—are capable of being consistent within a small fraction of a decibel [11], at frequencies up to at least 432MHz.

(Continued on page 709)

THE TRANSMISSION LINE AS AN IMPEDANCE TRANSFORMER

Anthony B Plant, BSc, CEng, MIEE, G3NXC*

Licensed since 1959, G3NXC has operated on all bands from 1·8 to 432MHz using a variety of homebrew and commercial equipment. Currently he is building for the 50MHz band. Professionally he manages an electronics design laboratory in the aerospace industry, and lists among his other outside interests listening to music (preferably written before the 18th century) and photography.

Introduction

In the design of radio frequency systems there is often a need to transform the value of an impedance so that it becomes more usable. As an example, the input impedance of an ideal quarter-wave vertical is in the region of 35Ω. If such an antenna is to be fed with 50Ω cable, its impedance needs to be changed so that the line is terminated correctly. Such transformations may also be required to change, for instance, the input impedance of an amplifier stage so that it can present the correct load to the driver.

Usually impedance transformation is carried out by means of discrete component circuits using inductors and capacitors, the well known pi-tank circuit being an example of such an arrangement. An alternative method is to use a length of transmission line, and this article concentrates on describing such a use of lines.

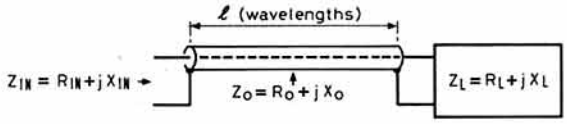

Fig 1. Definition of terms used in the article

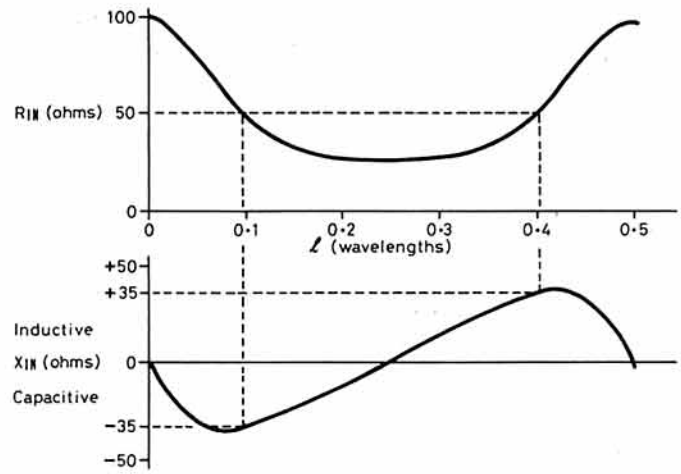

Fig 2. Variation of input impedance with line length, represented as effective series elements. ZL = 100 + j0, Zo = 50 + j0

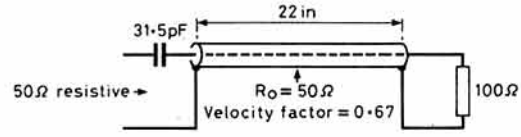

Fig 3. Simple arrangement to transform a 100Ω resistive load to 50Ω resistive

Principle of operation

Consider Fig 1. If the load impedance, ZL, equals the line's characteristic impedance, ZO, the input impedance, ZIN, also equals ZO and is independent of line length. Should ZL not equal ZO, ZIN varies as a function of the line length. In Fig 1 ZO is shown as being a complex impedance made up of a resistance, RO, in series with a reactance, XO. For all practical purposes the reactive part can be considered to be zero so that ZO = RO.

Fig 2 shows the variation of RIN and XIN with line length for the case when a 50Ω line is terminated with a 100Ω resistor. As can be seen, the pattern repeats every half-wave, so it is only necessary to consider line lengths between 0 and 0·5. It should be noted that the length in question is the electrical length, which is the physical length divided by the line's velocity factor.

Of note in Fig 2 is that there are two values of line length where RIN equals 50Ω. In one case RIN is in series with a capacitive reactance of 35Ω, and in the other with an inductive reactance also of 35Ω. By choosing the 0·402 wavelength case and putting a capacitor of appropriate value in series with the input, an effective 50Ω resistive input impedance has been generated. Fig 3 shows the resultant configuration for 144·5MHz.

For every series combination of resistance and reactance there is an equivalent parallel combination. If the equivalent parallel values of RIN and XIN are taken, the variation of these with line length for the same case as above is as shown in Fig 4. As before, there are two lengths where the resistive portion of ZIN is 50Ω, but this time these resistances are in parallel with reactances of 70Ω capacitive or inductive. By using the appropriate length of line and putting a reactance of equal value but opposite type in parallel with the input, an input impedance of 50Ω resistive can be generated.

The most convenient means of generating the appropriate reactance to put in parallel with the input is to use another length of line. A short-circuit line shorter than a quarter-wave looks like a pure inductance, while an open-circuit line of similar length produces a capacitance. For practical reasons a short-circuit line offers the best approach, it is easier to produce —and maintain—a short-circuit than an open-circuit. Fig 5 shows the resultant configuration; many readers will recognize this as being the familiar stub matching arrangement.

The examples given show that transmission line impedance transformers are practical but, unless one is fortunate in wanting to transform 100Ω resistive to 50Ω, they do not help with the design of an appropriate arrangement. In order to carry out the design process it is necessary to delve into the mathematics associated with transmission lines.

Basic line equations

Transmission lines are essentially simple things, all they have to do is to conduct electrical energy from one place to another. Unfortunately, since nature seems at times to have a dislike of simplicity, the mathematics needed to describe the way in which a line performs its simple task can be

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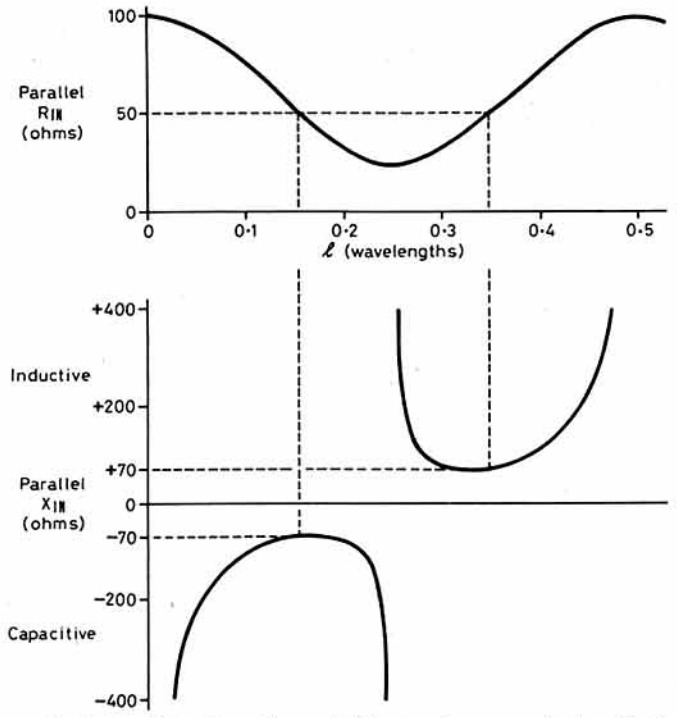

Fig 4. Variation of input impedance with line length, represented as effective parallel elements ZL = 100 + j0, Z_o = 50 + j0

rather overwhelming. I have attempted to minimize the use of complicated mathematics and to break down what remains into easily digested bites. Anyone with a scientific calculator or a home computer should have no problems in performing the calculations.

The basic expression which relates input impedance to line length is:

$$ZIN = RIN + j\,XIN$$
$$= RO\,\frac{ZL\cos 2\pi l + j\,RO\sin 2\pi l}{RO\cos 2\pi l + j\,ZL\sin 2\pi l} \quad \text{----------(1)}$$

Where l is the line length in electrical wavelengths.

Using the standard trig relationship $\tan 2\pi l = \frac{\sin 2\pi l}{\cos 2\pi l}$ and, to avoid a lot of writing, letting $\tan 2\pi l = \phi$, the above expression can be rewritten as:

$$ZIN = RO\,\frac{ZL + j\,RO\phi}{RO + j\,ZL\phi} \quad \text{----------(2)}$$

It should be noted that, in the above expressions, RIN and XIN are the equivalent series elements (ie a resistor of RINΩ in series with a reactance of XINΩ).

Before continuing, it is worth considering some special cases: the quarter-wave line, the half-wave line and the short and open circuit lines. For the quarter-wave line cos2πl is zero and sin2πl is 1. Putting these values into equation (1) results in the expression:

$$ZIN = \frac{RO^2}{ZL}$$

or:

$$ZIN\,ZL = RO^2$$

With a half-wave line cos 2πl is −1 and sin 2πl is zero so equation (1) reduces to:

$$ZIN = ZL$$

In the case of a short-circuit line ZL = 0, so equation (2) becomes:

$$ZIN = j\,RO\,\phi$$
$$= j\,RO\tan 2\pi l \quad \text{----------(3)}$$

Similarly for an open-circuit line, ZL is infinite thus:

$$ZIN = \frac{RO}{j\,\phi}$$
$$= -j\,RO\cot 2\pi l \quad \text{----------(4)}$$

From (3) and (4) it can be seen that a short-circuit line with a length between 0 and 0·25wavelengths looks like a pure inductive reactance, and with a length between 0·25 and 0·5 wavelengths looks like a pure capacitive reactance. The open-circuit line is the reverse of this.

Returning now to the length calculations. Equation (2) can be manipulated to produce individual expressions for RIN and XIN. From the first of these an equation from which the two values of φ (hence l) required to generate the desired value of RIN can be produced. Having determined

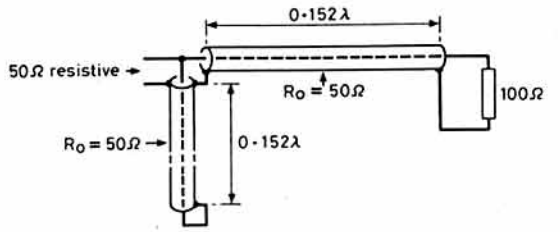

Fig 5. Stub matching arrangement to transform a 100Ω resistive load to 50Ω resistive

the values of φ, the expression for XIN can be used to calculate the input reactance. Two sets of equations are required, the first for the case when RIN is in series with XIN, and the second for the parallel case.

Series input calculations

The two expressions required are:

$$RIN = \frac{RO^2\,RL\,(1+\phi^2)}{(RO-XL\phi)^2 + RL^2\phi^2}$$

hence

$$\phi^2\,(RO^2\,RL - RIN\,XL^2 - RIN\,RL^2) + \phi\,(2RO\,XL\,RIN) + RO^2\,(RL - RIN) = O \quad \text{----------(5)}$$

and

$$XIN = RO\,\frac{(XL + RO\,\phi)\,(RO - XL\phi) - RL^2\,\phi}{(RO - XL\,\phi)^2 + RL^2\,\phi^2} \quad \text{--------(6)}$$

Expression (5) appears rather complicated but is actually a standard quadratic equation of the form:

$$a\phi^2 + b\phi + c = O$$

where

$$a = RO^2.RL - RIN.XL^2 - RIN.RL^2$$
$$b = 2.RO.XL.RIN$$
$$c = RO^2.(RL - RIN)$$

The two solutions for φ are then given by:

$$\phi 1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{----------(7)}$$

and

$$\phi 2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a} \quad \text{----------(8)}$$

By working through the steps of calculating a, b and c, then putting the results into equations (7) and (8), the values of φ1 and φ2 can readily be found. The electrical line lengths can be calculated from:

$$l_1 = \frac{\tan^{-1}\phi 1}{2\pi} \quad \text{----------(9)}$$

and

$$l_2 = \frac{\tan^{-1}\phi 2}{2\pi} \quad \text{----------(10)}$$

If the calculator, or computer, being used works in degrees rather than radians when working out trig functions, substitute 360 for the 2π in (9) and (10).

It is likely that l1 or l2 or even both will turn out to be negative values. What this indicates is that the line needs to be shortened by the calculated values—not easy if the line starts off at zero length! Remembering, though, that the impedance pattern repeats every half-wave along a line, the actual length required can be calculated by shortening a half-wave by the appropriate amount. For instance, if l1 is calculated to be −0·1 wavelengths, a line of 0·4 wavelengths will be required.

By putting the values of φ found from (7) and (8) in turn into (6), the appropriate values of XIN can be found.

Two things need to be kept in mind when using the above equations:

1. When entering XL it is important that the correct sign is used. XL will be a positive value if inductive, and a negative value if capacitive. XIN, when calculated, follows the same sign convention.

2. The values of RL and XL refer to the series elements needed to describe ZL. If ZL is made up of a resistance and reactance in parallel, the values need to be converted to the equivalent series form. The method for carrying out this conversion is shown later.

Parallel input calculations

The two relevant equations for the parallel input calculations are:

$$RIN = \frac{RL^2 + (XL + RO\phi)^2}{RL\,(1+\phi^2)}$$

hence

$$\phi^2\,(RO^2 - RIN\,RL) + \phi\,(2XL\,RO) + RL^2 + XL^2 - RL\,RIN = 0 \quad (11)$$

and

$$XIN = RO\frac{RL^2 + (XL + RO\,\phi)^2}{(XL - RO\,\phi)(RO - XL\,\phi) - RL^2\,\phi} \quad \text{------(12)}$$

Equation (11) can be solved using (7) and (8) for which:

$a = RO^2 - RIN.RL$

$b = 2.XL.RO$

$c = RL^2 + XL^2 - RL.RIN$

The line lengths can then be calculated using equations (7) to (10), and the reactances by using equation (12).

General comments

With a 50Ω line, RIN can, in theory, be made 50Ω for any value of ZL. In practical terms, however, it is not sensible to try to cope with very high or very low values of ZL since the accuracy required for the line lengths becomes rather critical. A simple test to find if the arrangement is too critical is to put values of l into equation (1) which are, say, 0·005 wavelengths longer and shorter than the calculated values (this represents about ±0·25in on 144MHz). If RIN departs unacceptably from 50Ω, the arrangement is too critical.

For the case when ZL is high, it may be better to use a 75Ω line but still aiming at RIN equals 50Ω. If dealing with low values of ZL, a low impedance line can be generated by putting higher impedance lines in parallel—eg two equal lengths of 50Ω line in parallel looks like a single 25Ω line.

It is not necessary to restrict the transformation to producing an input resistance which is equal to the RO of the line—any value of RIN can be achieved, within limits. Establishing the actual limits is rather complex but there is a simple test to find out if a particular case is achievable. Before evaluating equations (7) and (8), calculate the term b^2-4ac. If this is positive then the transformation can be achieved, if negative then it cannot.

The techniques are as applicable to balanced lines as they are to coaxial. To a large extent, life is easier with open-wire feeders, since the line can be constructed to have any desired RO simply by choice of wire diameters and spacing. Also with open-wire feeders there are other, more simple, techniques available for carrying out the transformations. For instance, it is possible to calculate the line length needed to make XIN zero and then use a quarter-wave line of appropriate RO to produce the required RIN.

It may be easier to understand the methods described above by giving some examples. The results of these might also be useful to check computer programs written to solve the equations.

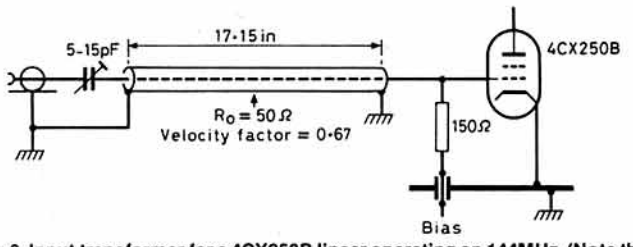

Fig 6. Input transformer for a 4CX250B linear operating on 144MHz. (Note that the actual input impedance of the 4CX250B has been simplified for this example. A practical design would need a better representation of the grid circuit impedance.)

Examples

SERIES ARRANGEMENT

A 4CX250B linear for the 144MHz band is to use a passive grid arrangement with a 150Ω resistor in the grid circuit. The input capacitance of the valve, including strays, is 20pF, and the input is to be matched to a 50Ω line. A design centre frequency of 145·0MHz is required. Since a series capacitor will be required to block the dc bias, it would seem sensible to use this also to tune out the residual reactance of a series arrangement.

At the design centre frequency the 20pF capacitance represents a reactance of 54·88Ω, this being in parallel with the 150Ω resistor. It is necessary first to convert this parallel combination to the equivalent series arrangement. The conversion is achieved by using the standard expressions:

$$RS = \frac{RP\,XP^2}{RP^2 + XP^2}$$

and

$$XS = \frac{RP^2\,XP}{RP^2 + XP^2}$$

Where RS and XS are the series values and RP and XP are the equivalent parallel values.

In this case

$RL = RS = 17{\cdot}71\Omega$

and

$XL = XS = 48{\cdot}40\Omega$

Equation (5) must now be solved remembering that XL is capacitive, and therefore needs to be entered as a negative value. So:

$a = 50^2 \times 17{\cdot}71 - 50 \times (-48{\cdot}4)^2 - 50 \times 17{\cdot}71^2 = -88535{\cdot}205$

$b = 2 \times 50 \times (-48{\cdot}4) \times 50 = -242000{\cdot}000$

$c = 50^2 \times (17{\cdot}71 - 50) = -80725{\cdot}000$

Then, from (7) and (8)

$\phi 1 = -2{\cdot}344467005$ hence $l1 = -0{\cdot}1858333288$

and

$\phi 2 = -0{\cdot}3889089444$ hence $l2 = -0{\cdot}0590319546$

Since both l1 and l2 turn out to be negative values, the actual line lengths required are:

$l1 = 0{\cdot}3141666712$

and

$l2 = 0{\cdot}4409680454$

The reactances can now be calculated by feeding the appropriate values of ϕ into equation (6), remembering to observe the signs of ϕ and XL. In this case the two values are:

$XIN1 = 97{\cdot}76156621\Omega$ at l1

and

$XIN2 = -97{\cdot}76156621\Omega$ at l2

Some readers may raise their eyebrows at the number of decimal places and think that the results represent a rather spurious accuracy. This is, to some extent, true, but it is always better to work to the highest resolution of the computer/calculator during the intermediate calculations then round to an appropriate degree of accuracy at the end of the operations. This minimizes the possibility of a build-up of rounding errors.

The intention is to tune out the residual reactance with a capacitor so l1 is the length required since it yields an inductance in series with RIN. At 145·0MHz the capacitance required to produce a reactance of 97·76Ω is 11·23pF—a 15pF variable would be ideal.

The physical line length can be calculated from l1 by reference to the design centre frequency and the line's velocity factor. Assuming the value of the latter to be 0·67, the length required is 0·436m or 17·15in. The final arrangement would then be as shown in Fig 6.

It must be added that for a real application it would be necessary to take into account all strays in the grid circuit, including the inductance of the connecting leads, in order to establish the actual load impedance.

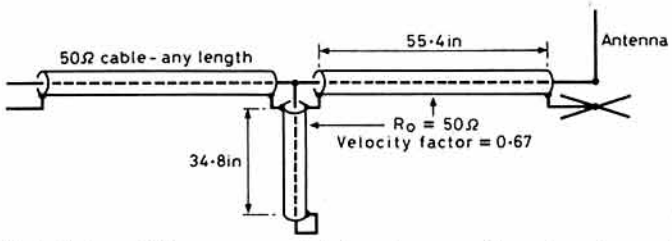

Fig 7. Stub matching arrangement to transform an antenna impedance of 100 + j50Ω to 50Ω resistive on the 28MHz band

PARALLEL ARRANGEMENT

A 28MHz antenna has an input impedance of 100 + j50Ω at 28·4MHz, the design centre frequency, and is to be fed via a 50Ω line.

This time the load impedance is already in series format and needs no conversion, so the first operation is to solve equation (11).

$a = 50^2 - 50 \times 100 = -2{,}500$

$b = 2 \times 50 \times 50 = 5{,}000$

$c = 100^2 + 50^2 - 100 \times 50 = 7{,}500$

So, from equations (7) and (8):

$\phi 1 = -1$ hence $l1 = -0{\cdot}125$ or $l1 = 0{\cdot}375$

$\phi 2 = 3$ hence $l2 = 0{\cdot}1987918088$

The input reactances associated with these two lengths can be calculated from equation (12) and are:

$XIN1 = 50\Omega$ at l1

and

$XIN2 = -50\Omega$ at l2

A short-circuit stub offers an inductive impedance for lengths less than quarter-wave, so the capacitive input case, l2, is chosen. Equation (3) is then used to calculate the length of stub required:

$$l = \frac{\tan^{-1}\frac{X}{50}}{2\pi} = \frac{\tan^{-1}\frac{50}{50}}{2\pi} = 0{\cdot}125$$

At 28·4MHz, assuming a line velocity factor of 0·67, the two line lengths are 55·4 and 34·8in, so the final arrangement would be as shown in Fig 7. □

Technical Topics

by Pat Hawker, G3VA

AMATEUR RADIO now means very different things to different people. The strands that held the hobby together seem to be growing ever looser. At one time, it was fairly safe to assume that anyone who held an amateur licence had a basic knowledge of and technical interest in receivers, transmitters and the valves and components that went into them. This did not mean that everyone built their own equipment, at least not since the 'thirties, but it did mean that most of us could look inside a receiver or transmitter and relate what we saw to its circuit diagram, and had some idea of the identity and purpose of the various stages, components etc. Even if we did not all possess the skills to construct working equipment, most amateurs could keep them working and do their own repairs.

Of course, then, as now, some "newcomers" to amateur radio were at the same time also "professionals" and often already knew a lot about the theory of radio communication. But there were very few indeed, young or old, who did not rapidly acquire a nodding familiarity with radio components, circuit diagrams and the differences between good and bad equipment.

Today, this is no longer the case. Just as the modern car driver often has little idea of the role of the carburettor, distributor or even the spark plugs, so licensed amateurs can now become keen and proficient operators of what are virtually domestic appliances, with only the basic knowledge required to pass the RAE. This often bears little relationship to the complex "black boxes" that are used. You may, or may not, think this a good thing. Who expects every television viewer to know how a colour tv set works?

There would (at least in my opinion) be little point in raising the theoretical standard of the RAE higher. What is needed, at least for those who are not content to see the hobby become just one of operating an appliance, is something to bridge the gap between the basic elementary theory of the RAE and practical familiarity with the elements of modern communications equipment.

It is encouraging to note that a number of clubs, groups and educational centres are beginning to recognise this, and are introducing practical post-RAE courses. John Lawrence, GW3JGA, believes that home construction should remain an inherent part of the hobby. He writes:

"I taught the RAE at the local evening institute for two years, and after several dozen new amateur licences had been issued locally—mostly to ex-cb operators—I decided that I would try to correct the black box trend. For the following two years I ran, instead, a 'practical amateur radio class'.

"The students, all from previous RAE classes, had to choose from several constructional projects of varying complexity: morse oscillator, vhf reflectometer, hf directional power meter, 100W dummy load, fet-dip oscillator etc. Some projects I designed from scratch, others were based on existing designs, but in each case all the information, together with a built and working sample, was available on the first night, so that the level of constructional work and the performance could be seen at first hand.

"Each week I spent the first 20min covering some aspect of construction or setting up a station; for example, soldering, fitting coaxial plugs, simple metal work, antenna construction, tuning up a transmitter, tvi tests, safety etc. The rest of the evening I spent assisting with the constructional projects.

"At first there was a great lack of confidence. Some in the class had never used a soldering iron. Many had great difficulty in equating the circuit diagram with the physical components and the wiring. The physical wiring of switches appeared to be particularly difficult. The de-bugging of non-working projects needed to be covered in easy stages; visual examination, point-to-point checking, voltage measurements etc. This year I intend to cover simple fault-tracing early, so that checks can be made as the work proceeds.

"The results so far have been very gratifying. All of the class completed their projects successfully, and several of the group entered equipment in the constructional competition at the local radio club.

"Incidentally, the constructional notes for the fet-dip oscillator formed the core of my article published in *Practical Wireless* (October and December 1985). My 17-year-old son wanted some extra pocket money, so he advertised suitable sets of coil formers (cut and faced in a lathe). To-date he has sold 280 sets, which seems to prove that interest in home construction is still alive and kicking!"

What I find interesting about this commendable project is that it provided encouragement for those who had already passed their RAE but needed guidance on the practical aspects of building simple equipment. The Americans have an expression "Elmers"; the experienced enthusiasts who provide guidance for what they call "neophytes"—not exactly beginners but those without much practical experience. It is also important to note the concept of starting on simple projects before plunging in off the deep end and trying to emulate the black-box manufacturers.

Components are a problem. There are few local stockists, but some good mail order distributors. It is refreshing, for example, to learn that Radiospares (RS) are ceasing to be "trade only" and are now prepared to cater for the home-constructor.

Magnetic (small loop) antennas

The June *TT* item (pp418-9) on the use of large-diameter compact loops as transmitting antennas has resulted in a long and interesting letter from John Brown, G3EUR, who draws attention to articles in *cq-DL* (No 2/1983 and No 5/1984). The first of these, by Hans Wuertz, DL2FA, was Part 12 of a detailed series of articles on dx-antennas and their image. Part 12 dealt with loop and ferrite-loaded antennas in considerable detail, including the various ways in which they can be coupled to the 50Ω output socket of a transmitter.

I have also received from Ted Hart of W5QJR Antenna Products, PO Box 334, Melbourne, FL 32902, USA, a copy of his *Small High Efficiency Antennas—Alias The Loop* which runs to some 100pp (soft covers $11.95 plus $3.30 to cover overseas air mail). W5QJR also has an article on the loop antenna, which he insists is no "second-rate" antenna when it comes to dx operation, in *QST* June 1986.

While I have always stressed the need for extreme low-loss, low-ohmic construction, W5QJR is an unashamed enthusiast. His back cover proclaims: "At last a dream come true. The loop antenna provides high efficiency for transmitting and low noise for receiving. It provides an optimum radiation pattern for both local and dx communications. The pattern gain is second only to multi-element beam antennas. For the small city lot and for apartment dwellers, there is no other antenna that will provide equivalent performance in a small space—and it does all this when mounted at ground level."

While this is putting it a bit strong, the book does stress the practical problems that are involved with small loops of high-Q and hence narrow resonate bandwidth (although capable of being resonated over a wide frequency range). He provides an octagonal-loop design based on 0·75in copper pipe with motor driven remote tuning: Fig 1.

John Brown, G3EUR, has put together some useful notes on the fundamentals of small loops that will help put this approach in perspective. He writes: "Siemens and Telefunken have used loops and ferrite assemblies for many years, mainly for hf/df and selective reception in commercial stations where the ability to null out interfering signals arriving from a different direction to that of the wanted station is often more important than high efficiency in converting field strength into microvolts at the receiver terminals. The principles of frame and loop antennas go back many years, and were set out in the classic *Admiralty Handbook of Wireless Telegraphy* in 1927 alongside "jars" of capacitance.

A loop can be equated to a resonant tuned circuit: in the conventional full-wave "quad" the resonance results from the electrical length of the conductor; in the small single-turn loop the smaller inductance is tuned, with the aid of a capacitor, to the operating frequency. The *Q* can be very high, say 300 at 10MHz. Radiation into space (hence the radiation resistance) increases with loop diameter; this represents "work done" and results in a lowering of the working *Q*. By reducing losses in the inductor by using large-diameter copper tubing and low-loss insulation in the (high-voltage) tuning capacitor, the ratio of tuned circuit loss to radiated energy can be kept low and an efficient antenna for transmission and reception results. It should be noted that with a high-Q resonant circuit even a few watts of rf power results in high circulating currents in the loop and high voltage across the capacitor. Most loops of practical size are limited to transmitter powers of 100-300W, even when well protected from damp and stray power losses induced into nearby conductive material. The high-Q

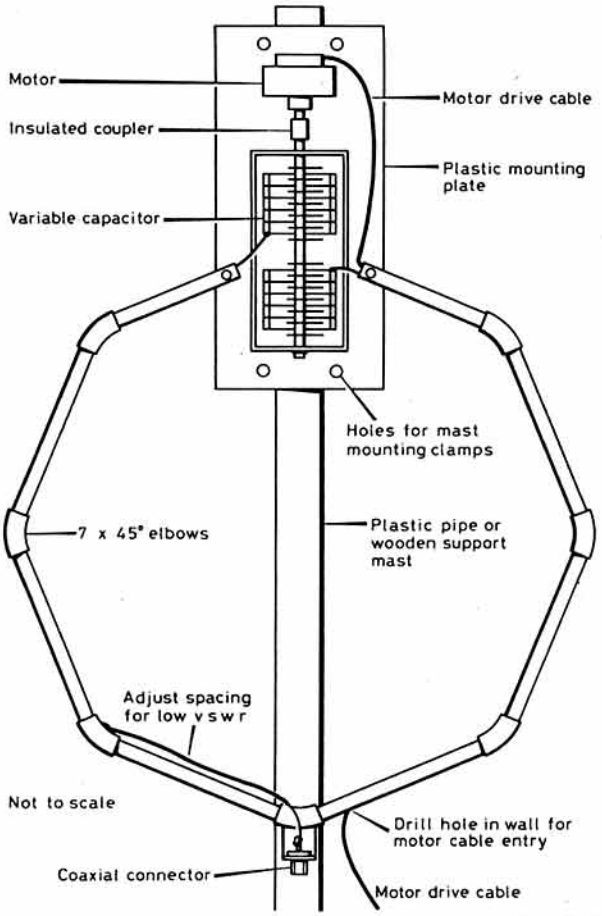

Fig 1. Suggested mechanical design of the magnetic (small loop) transmitting/receiving antenna as described by W5QJR in his book *Small High Efficiency Antennas—Alias the Loop*. The only changes are in the straight lengths of copper pipe that form the resonant octagon loop on different bands. Loops recommended by W5QJR include: (a) circumference of 8·5ft for use in 10/29MHz, approximate capacitance 125pF (10), 60 (14), 35 (18), 23 (21), 16 (24) and 9 (29); (b) circumference 20ft, capacitance 73pF (7), 29(10) and 6 (14)

results in a narrow bandwidth so that *accurate* retuning is necessary even for small changes of frequency. The radiation from a small loop is essentially via the magnetic field, hence the name "magnetic antenna".

Matching the loop into a receiver or transmitter can present problems. As a receiving antenna, the system is, in effect, a bandpass filter with some form of tap or link coupling between the element and the first stage (Fig 2). For a single-peak response the coupling (as in i.f transformers) must be critical; the first-stage tuned circuit needs to be high-Q so that its losses, coupled back to the antenna, do not reduce efficiency. By comparison, matching to a transmitter is easier since this can provide a low-impedance source from a broadband solidstate amplifier via lowpass filter and wideband transformer. Such an arrangement avoids the need to retune the transmitter tank circuit when changing frequency (but the high-Q loop itself *must* be retuned).

The loop radiation pattern is similar to that of a dipole, but efficiency will usually be lower. The advantages are primarily the smaller physical size, the ability to null unwanted signals during reception and the possibility of good performance close to ground.

Fig 3, derived from DL2FA's articles, shows options for matching a loop, including the use of capacitive networks and "miniloop" inductive coupling as discussed in the June *TT*. Fig 11 (e) is probably the optimum arrangement in practice. With optimum coupling between the primary and secondary loops, highest efficiency (maximum radiation resistance) occurs when the loop resonates with the tuning capacitance approaching 0pF. At frequencies above loop resonance, the system is no longer a true magnetic antenna, and electric fields develop in the neighbourhood of the antenna. This means that the loop circumference should not exceed about 0·4λ at the highest operating frequency.

Tuning with very small values of capacitance (about 5 to 10pF) is critical, and this usually requires a good remote tuning system. Small, geared "models" can be used, although tuning with them can prove rather slow. The power supply cable for the motor should be routed vertically from the zero point (mid-inductor).

DL2FA claims to have built and tested over 100 magnetic antennas, including ferrite types, with large area "air-cored" loops emerging as the most satisfactory. This checks with some wartime experiments made in 1943 by G3EUR with dust-core "loaded" wire antennas. Ferrite core losses tend to be significant for this application; the resulting smaller diameter loop for equivalent inductance reduces radiation (which is governed by the area enclosed within the loop). The reduced area offsets the concentration of flux via the core(s).

Among the advantages of the magnetic antenna, other than those already mentioned, is the fact that provided there are no masses of closed-loop or sheet conductors in the immediate vicinity, proximity to ground or to a typical building tends to result in lower losses than the electric field losses of a dipole or other conventional antennas. There is also, incidentally, less coupling to the human body.

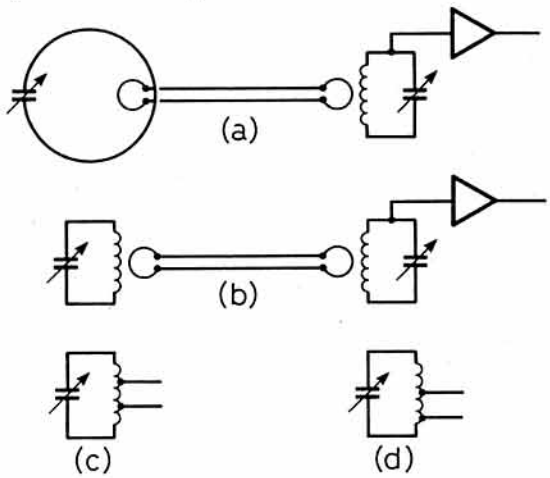

Fig 2. Coupling a resonant loop to a receiver. (a) Link coupling forming in effect a high-Q bandpass filter. (b) Electrical equivalent to (a). (c) Balanced and unbalanced tapped impedance coupling. Practical arrangements are shown in Fig 3

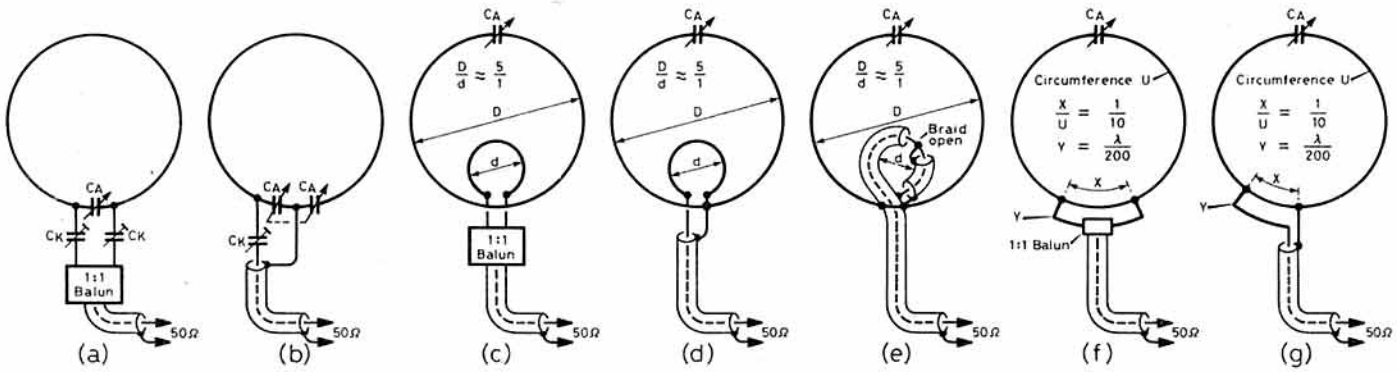

Fig 3. Matching a loop transmitting or receiving antenna to 50Ω cable as described in 1983 by DL2FA. The Faraday-loop coupling coil made from coaxial cable in (e) is considered optimum. (g) is the arrangement used by W5QJR

The magnetic field tends to result in less mutual interference (tvi and ivt) with television receivers. Small loop receiving antennas are less susceptible to all forms of local electrical interference. As df enthusiasts will appreciate, a loop antenna can be combined with a vertical element to achieve a cardioid radiation pattern (transmit as well as receive) but both antennas need to be resonated accurately (in amplitude and phase) to obtain useful gain in a desired direction.

A major disadvantage of the magnetic loop antenna is that using two or more closely-spaced loops to increase gain and directivity results in narrower bandwidths and individual tuning, so that a multiband antenna seems to be impractical (arrays of small broadband "active" loops have been used professionally as beam receiving arrays since the 'sixties). Some work has also been done commercially in the use of multiple loops for fixed frequency operation, using phasing networks in the feeder lines to reconcile the physical spacing of the loops.

Building your own stable vfo

John Hawes, G4UAZ, showed in "Stable vfo with bipolar-assisted mosfet" (*TT* June 1986, pp416–7) a novel idea of using a compound circuit in which the oscillator comprised both a dual-gate mosfet to provide high input impedance, thus maintaining the Q of the tuned circuit, and a bipolar transistor to provide the gain necessary to ensure ready oscillation.

Writing from British Columbia, Canada, Mike Koblic, G4GIU, congratulates G4UAZ on what he regards as one of the most brilliantly-simple technical ideas of the decade. He adds:

"I rushed to the work bench to try it out, and it certainly works! I built the vfo using the 'dry' method on a breadboard socket. Birkett's 'special' 40673-equivalent mosfet and a BC308 bipolar transistor were used, as I had nothing else suitable in my junk box. With the feedback capacitors of 3,000pF, a variable capacitor of 500pF, and a coil roughly similar to the original, the vfo tuned between 4·97MHz and 5·6MHz. The short-term stability at 7MHz (core removed from coil) was ±20Hz, remarkable considering the mechanical conditions. Blowing hot air onto the assembly from close-up hardly shifted the frequency by 100Hz (in conventional vfo units this test usually results in the frequency disappearing out of earshot!). With the feedback capacitors changed to 1200pF, the vfo tuned 9 to 13MHz with still pretty impressive stability.

"In agreement with theoretical calculations I found the tuning capacitance of 100pF maximum too small to tune the whole of the 5 to 5·5MHz range. I thought this might be improved if the tuning circuit were connected in series, thus changing the vfo into a Clapp configuration. It worked, but resulted in considerable degradation in stability.

"I feel G4AUZ may have provided us with an answer to every homebrew vfo-hacker's prayer."

Peter Hart, G3SJX, has also been busy putting together an external vfo unit for use with his Ten-Tec Corsair transceiver using a more conventional bipolar transistor oscillator. He writes:

"Earlier this year, after the frustrating experience of being unable to work two choice dxpedition stations through lack of a split-frequency capability, I decided to build an external vfo. The rf output of the internal 5 to 5·5MHz analogue vfo in the Corsair is routed via a jumper lead on the rear panel to the local oscillator mixer circuitry. A link on the accessory connector 'enables' the internal vfo. Adding an external vfo involves removing the jumper lead and applying suitable rf drive to the lo mixer input. Switching for internal/external/split operation may best be incorporated within the external vfo unit. The internal frequency display uses a frequency counter which will display correctly which vfo is selected, hence eliminating any requirement for calibration of the external unit. It is undesirable to have both vfo units running continuously in order to prevent spurious signal problems. For split-frequency operation it is necessary for the selected vfo to stabilize very rapidly, particularly for cw operation. This implies a clean keying characteristic. In my search for the ideal vfo to use, I found that many of the 'classic' circuits have poor performance in this respect, taking several seconds to stabilize. The circuit finally adopted has an excellent keying characteristic and overall performance. It is derived from a source close to hand, being a slightly-modified version of the Corsair's internal vfo, but using variable-capacitor tuning rather than permeability tuning.

"Fig 4 shows the oscillator circuit, and Fig 5 the associated switching control circuitry for use with the Corsair—the basic vfo would be suitable for many equipments, but the control circuitry would depend on the equipment involved. The oscillator transistor is biased at all times, and uses feedback from collector to emitter. Only when the base is decoupled to ground is there sufficient gain to enable the stage to oscillate. A switching transistor in series with the decoupling capacitor effectively keys this stage. Note that there is no dc applied to the collector of the switching transistor.

"Oscillator construction should follow standard practice. Polystyrene film capacitors were used for C1 to C8, and a solidly-constructed 100pF small transmitting-type variable capacitor is used for tuning. This had ceramic end plates for supporting the rotor at both ends. The flywheel and reduction gear mechanism from an old Eddystone 898 drive gave a tuning rate and knob size similar to the internal vfo. L2 comprises 14 turns of 26swg enamelled copper wire on a 14mm diameter grooved ceramic former with no tuning slug (believed to have originated in an old Army No 19 set). C4 and the coil turns are adjusted to give the required tuning range. L2 comprises 35 turns of 35swg enamelled copper wire on a 5mm former with tuning slug. Transmit/receive switching makes use of the normally closed t/r relay contact (NC) available on the Corsair's accessory connected (short-circuit to ground on receive, open-circuit on transmit). The rest of the circuitry is fairly self-explanatory."

Bert Grayson, G3EVP, adds a further note arising out of the notes on the construction of the G4AUZ vfo, but which applies to any unit in which high-Q is desirable. G4UAZ built his unit on Veroboard and melted some candle wax over the coil, the tuned-circuit fixed capacitors and other nearby oscillator components in order to anchor the components and prevent short-term drift due to draughts around individual components. G3EVP, however, points out that many years ago he experimented with several materials for this purpose. With respect to achieving a high-Q coil, candle fat came down near the bottom of the list. If memory has served him correctly, a coil with a *Q* of around 140 with no impregnation came right

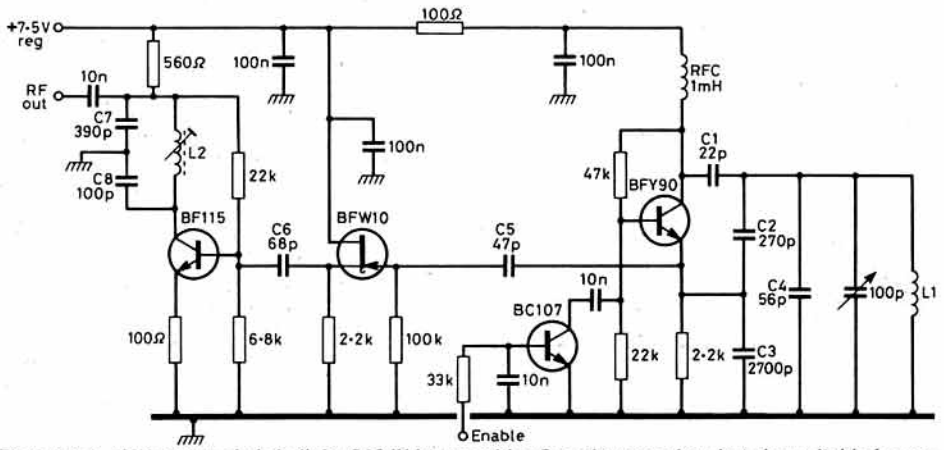

Fig 4. 5 to 5·5MHz external vfo built by G3SJX for use with a Corsair transceiver, but also suitable for use with many equipments having 5 to 5·5MHz analogue vfo systems

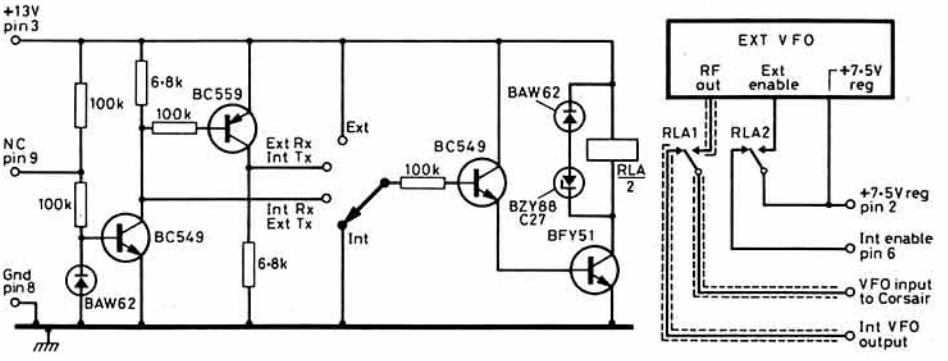

Fig 5. Internal/external vfo switching for the Ten Tec Corsair and the vfo shown in Fig 4

down to about 28 when impregnated with candle wax. He also tested sealing wax, shellac etc, as at the time he had access to a wave-winder and a high-quality Q-meter. He does not mention whether any of the alternatives proved significantly better. How about polystyrene dope?

G3EVP also notes that although extension spindle rods are now virtually unobtainable, a No 3 knitting needle can prove ideal for this purpose. It is slightly larger than a 0·25in spindle but can easily be rubbed down. A No 4 needle is just too small. Knitting needles are readily obtainable in alloy or plastic.

Clutter clunk? Synthetic voices?

At Bangor, a Dutch amateur, F Klinker, a QRP cw enthusiast, told me that in the last two or three years there has been a marked revival of interest in cw operation in the Netherlands. Similarly, in the London area one hears more new callsigns on groundwave on 7 and 14MHz cw than a few years ago. Could it be that the message is beginning to get through that manual cw and "plain ordinary speech" are the two fundamental modes most suited to amateur radio operation?—and tend to remain of lasting appeal to most operators. Keyboard and automatic data systems certainly offer interesting technical and software challenges, but once working satisfactorily can soon lose appeal to those who do not have large quantities of information to exchange but just wish to enjoy casual contacts or regular skeds. I hope that does not sound too much like the airing of personal prejudices. Rather it is a question of horses for courses—cw and 'phone may be slow nags but they do stay the course!

In a letter to *QST*, Charles P Krause, N7ESJ, puts it on a higher plane. He writes: "The centurions of ancient Rome, during the decline of their empire, sought to preserve Roman civilization and culture against the barbaric hordes.

"During the last quarter of the 20th century, a dwindling number of amateur and professional radiotelegraph operators seek to keep the Morse spirit alive during a time of encroachment by 'high tech', high-speed, fully-automated systems of communication.

"It is essential to preserve the cultured and civilized tones of the radiotelegraph signal as compared to the totally mechanical, barbaric, uncivilized and uncultured sounds of clutter-clunk, churgle, grunt, chirp-chirp, beep, oink, splutt, honk, hoot, howl, whine and buzz of high-tech communications . . . heralding the decline and fall of American civilization."

There is a similar threat facing phone operators. It was pointed out at Bangor that speech takes at least a 3kHz spectrum bandwidth (or more if you use what Professor Gosling calls "Armstrong's nightmare child", ie fm). On the other hand, control signals from a digital vocoder for reproduction from a voice synthesizer can use less bandwidth than a 100-baud teleprinter. As voice synthesis develops, "high-tech" and the pressure on the radio-spectrum will give us radiotelephone systems comprising automatic digitization and bit-reduction of speech, narrowband data link, with synthesized speech output that may (or may not) sound similar to the original speaker, though possibly adding a hint of a Japanese accent even to local contacts. However, even if synthesized speech can be improved to give us a recognizable rather than a purely synthesized "voice", we may have to learn not to talk in "connected" speech but as though giving dictation to a machine, ie in a "disconnected" manner.

Even Shakespeare's sonnets will sound pretty uncivilized: "Shall . . I . . com-pare . . . thee . . to . . a . . sum-mer's day . . . thou. . art . . more love-ly . . and . . more . . tem-per-ate . . . Rough . . winds . . do . . shake . . the . . dar-ling . . buds . . of . . May . . "

By comparison, even the Donald Duck noises of ssb may come to sound civilized. And what price amplitude modulation? Talking to machines and computers seems a rather sterile and antisocial way of passing one's spare time—though I notice that quite a few research groups (including a team at Hull University) are working towards digital speech that will fit into less than 100Hz channels, yet simple enough to be used with manpack sets. It would certainly allow more than 15 simultaneous phone contacts in each 3kHz channel—but only, I am afraid, with depersonalized, disconnected speech.

The series-parallel impedance transformer

Warren B Bruene, W5OLY (who designed many of the famous post-war Collins Radio transmitters and linear amplifiers, including the 30K-1 and 30S-1) introduces in *QST* (June 1986) an attractive form of impedance-transforming network that features wide and symmetrical bandpass characteristics. This is the series-parallel network shown in Fig 6(a).

W5OLY points out that, despite its very useful features, the s-p network is virtually unknown as a superior form of LC impedance transformation circuit with potentially many applications in amateur radio. He writes: "It is hard to understand how this network has escaped wider recognition and usage for so long. It deserves a place beside the popular L, T and pi networks. I make no claim for originating the circuit, but perhaps some of the relationships have not been published previously. There are many ways to use this basic network, which simply behaves as two resonant circuits with a perfect transformer between them. Now that the s-p network has been introduced to you, perhaps you have a good application for putting it to work."

In his article he suggests that this impedance transformation circuit has been used in filter design, but it does not seem to be well known by transmitter, receiver and antenna-coupler designers. The s-p network uses four elements in contrast to the two of an L network and three in a T or pi network. It has the properties of a series-resonant circuit on the low resistance side, and a parallel-resonant circuit on the high resistance side.

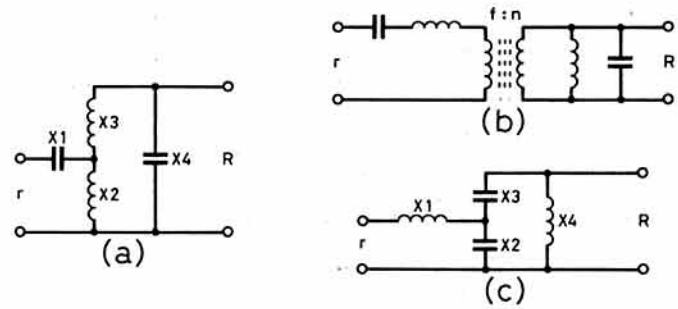

Fig 6. (a) Basic s-p (series-parallel) network configuration. (b) Equivalent circuit for the s-p network. (c) Reversing the sign of the reactances results in this alternative form of the s-p network

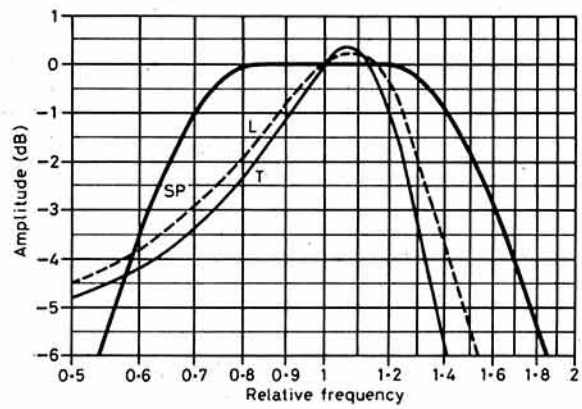

Fig 7. Relative responses for s-p, T and pi networks connected to a voltage source, showing the wide symmetrical bandpass characteristics of the s-p network. Actual s-p response is affected by the Q1/Q2 ratio

It provides a geometrically symmetrical bandpass response and zero phase delay at the centre frequency.

The designer may choose any desired impedance step-up (or step-down by reversing the input and output connections). The value of a single element is chosen with care (since this determines the frequency response) and then the other values are calculated as described in W5OLY's article. As for other networks, the signs of all reactances can be reversed, which means in practice that inductors can be replaced by capacitors, and vice versa, as shown in Fig 4(c). Component value relationships are: X2 and X3 in series resonate with X4, while X2 and X3 in parallel resonate with X2. The ratio -X4/X3 is equal to the voltage step-up ratio, n. The network is the equivalent of a classical form of two-pole bandpass filter. The *QST* article provides detailed information on the calculation of element values without resorting to complex mathematics.

Audio levels and "tinnitus"—a warning

Prompted by the notes in the June *TT* on morse and the hard-of-hearing, in which Nigel Neame, ex-G2AUB, warned those with partial hearing not to listen on headphones with excessive audio levels, I added that in my

opinion anyone using headphones—no matter what the state of their hearing—should use some form of automatic peak audio limiting, such as that provided by a pair of back-to-back diodes. Reg Taylor, G3AVQ, draws attention to yet another reason why you should avoid overloud noises near your ears. He writes:

"May I suggest a further warning. Even if loud signals do not impair or destroy hearing they can cause 'tinnitus', otherwise known as 'ringing in the ears' or 'noises in the head'. Being a sufferer myself since May 1979, I did for a while act as a research patient for the Royal National Institute for the Deaf. I learned then that not only is excessive noise one cause of tinnitus but that it may not manifest itself until years after exposure to the noise (mine could have been caused by second world war gunfire and there is, I believe, an association of wartime air gunners who suffer from it). I have read that it affects as many as 17 per cent of the population, a figure that may well go up dramatically when the effects of the Walkman-type portable tape cassette machines begin to show! In my case, tinnitus takes the form of a constant, 24h/day, 7kHz purish tone at a level of S4 to S5 (on a 1 to 9 scale). For others the frequency may be in another part of the audio spectrum and may be intermittent rather than continuous. Whatever form it takes I can assure *TT* readers that it is something to be avoided if possible."

The 10·1MHz band

A considerable number of readers have commented, some constructively others abusively, on the suggestion (*TT* August) that it is time to consider whether a small segment of the narrow 10·1MHz band might logically be used for ssb, if only to encourage more amateurs to use this valuable band than do at present. I have to admit that virtually all those who took the trouble to write to me were highly critical of this proposal and of the technical justifications put forward by G6XN. While, personally, I have no wish to use ssb on this band, I make no apologies for providing a forum for G6XN's views, remembering that among many other feats, he was the first person in this country to draw attention to chordal hop.

Several correspondents have pointed out that such discussion is a little academic, since the main reason for the under-utilization of the band has always been the presence of so many high-power "primary users", ie the fixed (point-to-point) commercial service. The amateur allocation is strictly on a secondary, non-interference basis. It remains a paradox that for much of the time the spectrum just below 10·1MHz or just above 10·15MHz seems far less crowded with commercial signals than 10·1 to 10·15MHz! The 1986 edition of Joerg Klingenfuss's *Guide to Utility Stations* lists no less than 19 fixed-service stations between 10,100 and 10,150kHz. These include cw, rtty, fax and ssb stations, many of them concerned with the meteo (weather) service, and many putting strong signals into the UK for much of the time.

One of the problems is that commercial stations, in order to keep their channel open, often spend hours "idling". It has been shown by various professional investigations that in Europe after dark it is unusual, at least in sunspot minimum periods, to find, below the muf, *any* interference-free gaps exceeding about 200Hz.

David Sergeant, G3YMC, one of those firmly against any use of ssb on this band, points out that since it is a secondary allocation to amateurs there is little likelihood that the long-established high-power rtty, fax etc commercial stations will move out in the foreseeable future. This means that in reality only about half the band, or about 25kHz, is actually usable by amateurs. He feels that if ssb stations were encouraged to use the top end of the band, they would soon be forced to spread downwards until they occupied virtually the entire available spectrum. He accepts, nevertheless, that the band is seriously under-utilized at present. He believes that more cw activity would be generated by accepting 10·1MHz contacts for "award" purposes—though, like others, he feels strongly that the band should continue to be kept clear of "contest" operation.

Several readers doubt whether we are ever likely to see the use of notch and narrowband filters effective enough to permit spectrum sharing between cw and ssb. Some dismiss the very idea as nonsensical; my own opinion is that cw operators might come off better than ssb operators in such a situation!

Phil Stevens, G3SES, a regular user of 10·1MHz, notes that one reason for the lack of cw activity is the continued absence of Russian stations that provide so significant an element of the cw activity on 7, 14 and 21MHz. He also believes that the widespread use on other bands of trapped dipoles and trapped verticals not designed for 10·1MHz discourages use of the band. His more provocative suggestion (no letters to me about this *please*) is that the Class B licence should be scrapped and replaced with a cw-only 25W "novice" licence for 1·8, 10, 18, 24 and 28MHz. In his view this would ensure a better standard of cw operation and more use generally of hf. □

MEASUREMENTS ON MODERN VHF/UHF FRONT-ENDS

(Continued from page 701)

References and notes

[1] "Modern vhf/uhf front-end design", Ian White, G3SEK. *Rad Com* April-July 1985, pp264, 367, 445, 537.

[2] Strictly speaking, we are measuring *insertion* gains and losses. Regardless of the actual input and output impedances of the device under test, the input power is defined as the power available into a 50Ω load, and the output power is that delivered into a 50Ω load.

[3] Design data on home-made attenuators for vhf/uhf are given in *Microwave Newsletter Technical Collection* (RSGB); the same data are in Appendix I to "The effect of preamplifiers on receiver performance", J N Gannaway, G3YGF. *Rad Com* November 1981, p1026.

[4] The original source of the circuit in Fig 2 was an article by W6VSV in a pre-1970 edition of *Ham Radio*. In the USA such an instrument is known as an "swr meter", a hangover from its original use as an indicator for a slotted-line probe. Hewlett-Packard still market the HP415 under this name, which conceals the instrument's far wider uses.

Components details:
D1 Silicon, eg 1N914;
L1, 2 80–100mH, eg Toko 719VXA8032 80mH (Cirkit Ltd);
R1–8 1% metal oxide;
R4, 8 47Ω + 4·7Ω;
T1 1:5, eg "transistor interstage" type;
C4, 6 220nF approx to resonate at 1kHz with L1,2.

[5] "Antenna gain measurements", Fred Brown, W6HPH. *QST* December 1982, p27. The article also describes simple tunable modulated signal sources for 432MHz and 1·3GHz, and tuned diode detectors which may give useful rejection of unwanted external signals when testing antennas on an open-air range. The 88mH inductors used in Fig 3 are available to UK amateurs through the G-QRP club.

[6] The scale calibration of a square-law diode detector is given by: (fraction of full-scale deflection) = 0·1 antilog (decibels below full-scale). If the full-scale reading of 10·0 is marked as 0dB, the rest of the scale can be marked as follows:

Loss (dB)	Scale (0–10)	Loss (dB)	Scale (0–10)
0·0	10·00	6·0	2·51
1·0	7·94	7·0	2·00
2·0	6·31	8·0	1·59
3·0	5·01	9·0	1·26
4·0	3·98	10·0	1·00
5·0	3·16	20·0	0·10

Note how this non-linear scale is expanded where you need the best resolution, in the region of low losses. The first decibel of loss is spread over more than 20 per cent of the entire meter scale.

[7] "More about return loss bridges", Ian White, G3SEK. *The Lunar Letter*, May 1983. VSWR and return loss L (in decibels) are related by the formula

$$\text{vswr} = \frac{1 + \text{antilog}\ \frac{10}{10}\ \frac{(L/20)}{}}{1 - \text{antilog}\ \frac{10}{10}\ \frac{(L/20)}{}}$$

A high return loss indicates a low level of reflected power, and hence a good vswr. A perfect open or short circuit has zero return loss. To use a return loss bridge, first connect a *good* 50Ω load on the REF port. Set the af level meter to zero with an N-type short-circuit connected to the TEST port, then connect the device under test and simply read its return loss from the meter.

[8] "Beyond the dipper", Wes Hayward, W7ZOI. *QST* May 1986, p14.

[9] "How to use an swr indicator", Bob Stein, W6NBI. *Ham Radio* January 1977, p66.

[10] *Microwave Newsletter Technical Collection* (RSGB)

[11] The accuracy of this method is quite amazing, considering that everything is home-built. In my own set-up, external 10dB attenuators correspond to 10dB steps on the range-switch within a meter needle's thickness. The meter display is the least accurate part, but only because of non-linearity in the meter movement itself! That problem could have been avoided by ignoring the existing meter calibration, and marking the decibel points with the aid of an external digital instrument.

TO BE CONCLUDED

NEWS & VIEWS

HF

*John Allaway, G3FKM**

ONE ARGUMENT being used by those who would like to hear ssb on 10MHz is that at present the band seems neglected. A notice has been received from the RSF of the USSR saying that 10MHz is now available in that country. I feel that this availability in another major country may well make all the difference and will add a considerable interest.

Society member Petr Doudera, OK1DKW (U1.baterie 1, 16200 Praha 6, Czechoslovakia), is making a last attempt to collect some QSLs for his DXCC QRPP and 5BDXC. He needs information on CT2BO, VP9IB, OH7TB/SU, FG7XJ, 9H1EJ, LU8DQ, WB2WYI/VP9, C31FK, FY0EOI, OX3OO, 9H1FB, 5B4AR, VU2GO and WL7ADX. He has tried some many times—can anyone help please?

John Hensley, WJ5J (5054 Holloway Av, Baton Rouge, La, 70808, USA), has a particular interest in telegraph, spark, wireless, and radio keys, sending elements and bugs. He is particularly interested in obtaining information about keys native to the UK—especially military keys and semi-automatic keys and bugs. John would like to acquire specimens for his collection, but more importantly to hear about them and to find out what keys have been made in Britain. Please write to him at the address above.

DX news

FK8FB is often to be found in the area just above 14,100kHz working French stations around 0700. He speaks good English. To celebrate the 25th anniversary of the ARA of New Caledonia, FK stations may use the FK25 prefix until the end of 1986 and the club station will sign as FK25A during this period. 7J1ACH is NJ7D and will remain on Marcus Is until the end of the year. He seems to centre his activity around 14,003, 14,027 and 14,210kHz between 0800 and 1600, although he has also been worked elsewhere. He should be on 1·8, 3·5 and 7MHz cw by now, and on all bands with rtty. From Ogasawara Is JD1BDK sometimes meets W2MIG on 14,165kHz around 1100, and *Long Island DX Bulletin* mentions activity by 8J3JST from the same location at around 1400 on 14,240kHz.

VK0SJ is quite active from Macquarie Is, and often works into Europe on 7MHz. He may be on 3·5MHz by the time this is being read. A sked is kept with WB6AFJ on 14,088kHz at 0100 on Tuesdays and Saturdays, and he has been worked from the UK a little later than this via the long path. He has also been reported on 14,285kHz from 0300.

ZL8OY is becoming tired of "pile-ups" and it is advisable to be patient if he is found to be already in QSO. He leaves early in 1987 and is sometimes active on 14,236kHz at 0030 on Saturdays. NH6FU/KH9 has been found on 14,309kHz at the same time, and *Long Skip* reports that this frequency is one used by many Pacific stations. NH6FU/KH9 will be on Wake Is for some time, and says that he is active between 14,075 and 14,100kHz at 0600 on up to four nights a week. ZK2JH was heard in the UK on 14,016kHz just after 2000.

KD7P has been told that his licence for Peter 1 Island has been issued but that it awaits final approval from the Norwegian Foreign Ministry. He is scheduled to leave for Antarctica in November, and should be in the vicinity of the island in mid-December. If he fails this time he expects to be making a similar trip next year. There is a likelihood of a visit to Christmas Is (VK9X) by Ron, ZL1AMO, this month.

BY5QA was due to open up on 20 August, and BY5HZ should appear on the air this month. *DX News Sheet*, quoting JA1UT, says that foreign visitors may apply for permission to operate one of the established stations; eg BYs 1PK, 4AA, 4AOM, 4RB, 5RA and 5RF. *DXNS* is able to provide a list of active Chinese stations and their QSL addresses in response to an sae plus 17p stamp (three ircs from abroad). Further details of licensing and copies of the application form are also available (DXNS, 123 Reading Road, Finchampstead, Wokingham, Berks RG11 4RD). A station using the callsign P5AGJ has been reported as on the air and giving his location as Hungnam, North Korea. More news is awaited with interest—it happens that I will be meeting a group of North Korean entrants to the IARU World ARDF Championship in Yugoslavia, and perhaps more information may be available there.

More on G3AOO's DX Newt. This picture was unfortunately omitted from the January issue. It shows (l to r) Bryan6, G3HJK, Trevor, VK4TM, Tony, G4EKL, Ken, G2FOS, and Don, G3AOO, on the occasion of VK4TM's visit to Manchester

Anyone looking for a QSO with East Malaysia is advised to check the area between 14,180 and 14,230kHz at around 1600 for 9M8GH, who is very active. Gordon has a delta-loop for 3·5MHz but was not on 7MHz at the time of writing. XU1SS is still on the air most days between 0900 and 1000 on 14,025 or 21,025kHz. Operation at times later than this is a problem as the station runs from battery power.

TZ1BG and TZ1GH (formerly TJ1CH) are the only licensees in Mali with the TZ1 prefix. I5YZB was on the air at the time of writing, using the callsign TZ0RD. 3C1MB has been appearing in the Round Table Net on 14,175kHz after 1700. *DXNS* believes that 9Q5MA may be the only properly-authorized station in Zaire, and that those who use their own callsign/9Q5 should be treated with suspicion. 9Q5MA was on leave in the Netherlands during August, and it may take him a little while to become active again as he is moving house.

There seems to be increased activity from Thailand—HS0PR has been worked in the UK on 14MHz ssb, and HS1ALP (who is also 9V1WF) was reported to be putting up antennas for 3·5 and 7MHz. Both ask for QSLs via the RAST bureau.

To celebrate the 20th anniversary of Botswana's independence, stations there will be permitted to use the 8O prefix during September and October. Novices will use 8O, and full licence holders 8O2. Special QSLs are to be issued.

AZ1D will be operated by a group of Argentine amateurs from Trinidad Is between 20 and 25 October. They expect to use 3,510, 3,690, 7,005, 7,090, 14, 020, 14,200, 21,020, 28,020 and 28,600kHz.

OH1RY is in the Pacific area and hopes to be on the air this month from A3, FW, 3D2, 5W and ZK2.

The *Long Island DX Bulletin* says that RZ1OWA is on 14,183kHz most days at 2130. He is located on Franz Josef Land.

To mark the occasion of the IARU Region 2 Conference in Buenos Aires, Argentine amateur radio clubs will be using the callsign AZ1ARU followed

Terry, GeMHV/W6 (sitting) with three operators of BY1QH. L to r: Yuan Bo, Guo Xu Hong and Wang Hsin

*10 Knightlow Road, Birmingham B17 8QB

Mady, KA6ZYF/G4WHV, with yl operator Chen at BY4AA

by a / and a number—each will use the same callsign but a different number. The HQ station LU4AA will use the callsign without the special suffix. This will take place during October only.

On 4 October HM Queen Beatrix of the Netherlands will put into operation a massive sea-barrier across the Eastern Scheldt river, and a special station will be on the air from the site with the callsign PA6SVK on 4 and 5 October. It will be on all hf bands on cw and ssb, and on 3.5MHz around 3,700kHz. A special QSL card will be printed, and cards should be sent via the bureau to PA6SVK, R.47 or Box 87, 4530 AB Terneuzen, Netherlands.

Overseas news

Martin Broadway, 7P8CM, has written to say that his stay in Lesotho was due to end in mid-September after almost four years of continuous operation using both hf and satellites. The only other resident and active amateur in the country after he leaves will be Gunter, 7P8CI, who runs the LARS QSL bureau. All further QSLs for 7P8CM should be sent to Martin's home call, G4GFI.

Terry Langdon, G3MHV/W6, recently completed a five-weeks lecture tour of China during which he visited BY1QH and BY4AA. The latter is located at a sports complex in the northern suburbs of Shanghai. BY1QH is on the top floor of the men's dormitory on the campus of Qing Hua University and the operators are students. There are six main users of the station and each keeps a separate log book. Incoming cards are sorted into piles according to the operator, and therefore it is important to include his or her name on the QSL. At the time of writing, Yuan Bo was the only operator using cw, but the others are learning from tapes sent from the USA. Finally Terry mentions that a station may open at the NE University of Technology in Shenyang soon—this is in Liaoning province and may well be the first BY2 call to appear on the air.

C53FG is returning to the UK this month and will be heard as G4WOF. He reports that the Radio Society of the Gambia will be down to three active members out of five by the end of the year, and that activity will be at a low level until new amateurs come on the air. Guest licences are available and have the permanent format C56/own call. C53 calls are only available to genuine residents and are not legal unless a current receipt is registered on the station's file. C50 will be used for special event stations. Mr M M Cham, of GAMTEL, Banjul, is in control of all licensing, although the RSTG can help anyone interested in obtaining a licence. C53OY is confirmed as the only genuine /MM call to have been allowed. C53CJ has been banned, but was heard recently on the air and may face prosecution in due course. The RSTG's address is PO Box 2470, Serrekunda, Gambia.

G0CJM and his wife will return to their home in Singapore during December, and he hopes to be looking for UK stations on 7,004, 14,004, 21,004, and 28,004kHz as well as on 10,104kHz. This will be between 2200 and 2230 daily and between 1600 and 1800 on Saturdays. He has an FT757 and promises to QSL via SARTS.

QTH CORNER

A35JF	J Layton, G4AAL, 341 Stourbridge Rd, Bromsgrove, Worcs, B61 0BN.
A71BJ	L J Anstead, c/c QNTS, PO Box 14, Doha, Qatar, Arabian Gulf.
AH2BE	via KA6V—see VS6CT.
BY4CZ	PO Box 51, Suchow, P R China.
BY5RB	PO Box 413, Zhenjiang, P R China.
BY9GA	PO Box 12, Lanzhou, P R China.
C56/G3DQL	E Sumption, Post Office, Hatfield Woodhouse, Doncaster DN7 6NF.
EJ5EP	ON5KL, Hospicestraat 175, B-9080 Moerbeke Waas, OV, Belgium.
HS0C	JA8ATG, PO Box 3, Yakumo 04931, Japan.
J5WAD	W6CNA, PO Box 2665, Spring Valley, Cal, 92077, USA.
VS6CT/KP2	KA6V, 93787 Dorsey Lane, Junction City, Ore, 97448, USA.
OH0AC	OH2MN, YHY ry n Radioamatoorikerho, Box 10, SF-00241, Helsinki, Finland.
OH0MB/OJ0	OH2BH, Nuottaniementie 10 D 20, SF-02230 Espoo, Finland.
PY0FE	PY1BVY, R M Costa Leite, Rua Presidente Backer 34/1502, 24220 Niteroi, Brazil.
VQ9GB	NA7P, G Bell, 14814 NE 11th Pl, Bellevue, Wash, 98007, USA.
ZF2JU	KV9S, 1624 Columbine Dr, Schaumburg, Ill, 60194, USA.
ZL6A	via NZART.
5R8JD	Jean-Paul Delpierre, Box 15, Abidjan, Ivory Coast.
ZL8OY	L Hannigan, 4 York Av, Herataunga, Wellington, New Zealand.
7P8CM	to G4GFI UK Qth.
9N1MC	Krishna Khatry, Ministry of Communications, Katmandu, Nepal.

ALL-TIME TABLE (with deletions) No 17

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total	
G3KMA	125	231	303	332	333	318	1,642	
G3G1Q	69	203	254	334	332	310	1,502	
G3MCS	49	208	257	321	322	306	1,463	
G3XTT	135	190	232	282	277	247	1,363	
G4DYO	63	175	224	312	303	285	1,342	
G3UML	30	216	229	334	298	255	1,362	
G3HTA	69	182	233	311	291	249	1,335	
G2DMR	52	165	178	307	309	266	1,261	
G3ALI	2	211	220	315	278	235	1,261	
G4FAM	63	180	238	268	268	242	1,259	
G4GIR	67	168	205	267	248	244	1,199	
G3XQU	44	162	183	289	271	247	1,191	
GW4BLE	25	171	183	282	270	245	1,176	
G4BWP	65	182	202	261	215	237	1,162	
G3VIE	41	109	160	290	287	252	1,139	
G3TXF	62	163	183	260	252	211	1,131	
G3NOF	4	84	82	343	324	278	1,115	
G4LJF	28	178	199	272	227	201	1,105	
G3YMC	76	102	166	237	239	184	1,004	
GM4OFQ	50	198	181	209	191	135	964	
GM3YOR	67	130	173	210	194	180	954	(all cw)
GM3PPE	48	125	149	182	167	138	809	
G4OBK	114	98	123	182	155	121	793	
Average	59	167	198	278	263	234	1,199	

Next deadline (current all-time) **to reach G3GIQ** no later than **15 October.** Apologies for the non-appearance of this table in the September issue—this was due to the early deadline caused by the move of the editorial department to Potters Bar.

1986 ALL-BAND TABLE No 3

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total	
G4OBK	56	44	73	82	45	34	334	
GW4RHW	-	35	101	98	48	34	316	
GM3YOR	46	77	85	48	35	24	315	(all cw)
G3TXF	44	40	43	104	37	21	289	(all cw)
G4ODV	44	32	65	60	53	25	279	
G4ZCG	-	74	56	64	43	20	257	
G4GOF	2	8	23	35	33	32	133	

Next deadline—scores **to reach G3GIQ** no later than **15 October** please.

1986 28MHz COUNTRIES TABLE

G3XQU—97	G0AGB—69	G3BXM—31 (QRP)
G4JBR—94	G0DNV—69	GD3SVW/A—27 (cw)
G3VOF—91	G4MUW—65 (ssb)	G4YWG—17
G0AEV—87	G0DXW—44	G4LZZ—5
G4XAH—79	G4OBK—43	5B4DN—2
G4RAB—74 (ssb)		

Welcome . . .

. . . to the following who became RSGB members during July: EA1AIH, F1BCH, SP6GVU, W9IP/2, YB0EO, and Mr D. Taylor (9Y).

Contests

ON Contest
5 October 3·5MHz ssb
12 October 3·5MHz cw
19 October 144MHz cw and ssb
0700–1100 in each case. Work ON and DA (Belgian Forces) stations only, and exchange RS/T plus serial number (from 001). ON and DA stations will give their club code; eg 50993MCL. Each QSO counts three points, and each club worked counts as a multiplier. The leader in each country receives an award. Listeners may enter and should log time, station heard, code given and station being worked. Points and multipliers are the same. Send logs within three weeks of the contest to Welters Leon, ON5WL, Borgstraat 80, B-2880 Beerzel, Belgium.

CQ WW DX Contests
0000 25 October–2400 26 October (Phone)
0000 29 November–2400 30 November (CW)
1·8 to 28MHz. Exchange RS/T plus *CQ* zone number (UK is 14). QSOs with own continent count one point, with others three, QSOs with own country count only for multiplier credit. The multipliers are one for each country and zone on each band. There are single-operator single- and multi-band and multi-operator multi-band single- and multi-transmitter sections as well as a QRP section (not more than 5W output). Photocopies of the rules as well as of log forms and summary sheets are available from G3FKM (sase please). Entries must reach CQ Magazine, 76 North Broadway, Hicksville, NY, 11801, USA, postmarked no later than 1 December 1986 for the phone section, and 15 January 1987 for the cw section.

WA-Y2 Contest
1500 October 18 to 1500 October 19
CW and phone. Single-operator multi-band (with QRP section for stations with less than 10W input), multi-operator single-transmitter, and swl categories. 3·5 to 28MHz in contest-preferred segments only. Exchange RS/T plus serial number (from 001), Y2s will send RS/T and two letters indicating

Unal Akbal, TA1A, who was the first official TA on the air

Mustafa Tandoigan, TA3B, at his station in Izmir

their "kreiskenner". QSOs with Y2 count three points, and each station may be worked or heard one per band on each mode. Listeners score one point per Y2 with number sent (with letters) and call of station being worked. The sum of districts worked/heard on each band forms the multiplier—they are indicated by the last two suffix letters of the call. Separate logs are required for each band, and a summary sheet showing multipliers and score on each band, plus the usual signed declaration, should be sent to Y2-Contest Bureau, RKDDR, PO Box 30, DDR 1055 Berlin, German Democratic Republic, no more than 30 days after the contest. In the 1985 contest G3ESF scored 30,492 points, G4OKN 19,425, G3VZT 16,200, G4YEK 5,760 and G4ZPE 4,536.

Australian Ladies' ARA Contest
0001 to 2359 8 November
This is open to all comers and also to listeners. It is on all bands 3·5 to 28MHz both cw and phone. Photocopies of rules are available from G3FKM (sase please).

In the **AGCW Happy New Year Contest** from 68 entries, G4BWP came fourth with 7,900 points and G4DRS 10th with 5,445. In the 25W section G5LP was listed third (out of 76) with 4,725 points.

YL Anniversary Party
1400 15 October to 0200 17 October (cw)
1400 29 October to 0200 31 October (phone)
Lady operators only. Copies of rules available from G3FKM (sase please).

Awards

LZ60 Jubilee Award
Issued by BFRA in connection with the 60th anniversary of the foundation of the first amateur radio club in Bulgaria in 1926. It will be issued to those who score 60 points by working (or hearing) Bulgarian stations between 1 July and 31 December 1986. QSOs with LZ60 stations count six points, and with LZ1 or LZ2s one point. Each station may only be counted once. Send log extracts, certified by awards manager or two other licensed amateurs, before 1 July 1988, to BFRA, PO Box 830, Sofia, Bulgaria. There is no charge.

Devonshire Award
For QSOs with members of the Southdown ARS. Contacts must be made with five members and club stations G3WQK, G1KAR and special event callsign GB2SAR count as two. Send log extract, certified by local club or signed by two licensed amateurs, plus £1.50 or five ircs to: Awards Manager, Southdown ARS, Hailsham Leisure Centre, Vicarage Lane, Hailsham, E Sussex. Band/mode endorsements are available. Current membership lists can be obtained for an sase or one irc.

Canadian Liberation March Award 1986
The ON4CLM Award has now been issued for three years, and the 1986 version will be available to those working ON4CLM during the period 27 October—2 November; this features the cap badge of the Royal Winnipeg Rifles—the fourth Canadian regiment to be honoured. The award costs US $5 or 10 ircs, and all proceeds go to a welfare fund. Look for ON4CLM on 3,515, 3,685, 7,012, 14,020, 14,125, 21,020, 21,245, 28,020 and 28,585kHz. To enable the whole series to be collected the 1983, 84 and 85 certificates are still available. Apply to Radio ON4CLM, PO Box 140, 8300 Knokke, Belgium.

Danish Underground Radio Award
Amateur radio station OZ5MAY is on the air using second world war clandestine radio sets exclusively. These were partly built in Denmark from parts supplied by parachute drop. To obtain the award European stations must contact OZ5MAY on two different bands or on the same band on two different days, and a visit to the Museum of Denmark's Fight for Freedom, which is the location of the station, may be counted as one of the required contacts. DX stations need only one QSO with OZ5MAY. Send details, with six ircs, to Allis Andersen, OZ1ACB, Kagsaavej 34, DK-2730 Herlev, Denmark.

Band reports

G8KG says that the month of June saw solar activity fall to a very low level, with a monthly sunspot number of only 0·8 and the 27-day average of solar flux falling to 67sfu, which is close to the value seen in the past two minima. The dip was, however, only short-lived, and in July activity had recovered to around the level that has prevailed for much of the past 18 months.

Of particular interest was the report by SIDC Brussels that the first spot group of Cycle 22 was observed in the first week of July, although the bulk of the month's activity belonged to the present cycle. Last time round the period of overlap lasted about a year and a half, and this tends to support an earlier guesstimate that the upturn will begin early in 1988.

At present the general trends suggest that hf band conditions in the 1986-7 dx season will be much the same as a year ago, with perhaps rather more days of stable conditions if the downward trend in geomagnetic activity continues.

In spite of these obvious signs of poor propagation on the higher frequencies, G3XQU is only three short of 100 countries worked on 28MHz this year!

A very satisfactory batch of reporters this month—to whom, many thanks. These included: G2HKU, G3YY, G4QK, G5JL, GM3CSM, GJ3EML, G3s GVV, HCT, KSH, NWG, PJT, GD3SVW/A, G3YRM, G4s EHQ, JBR, GW4KGR, G4s MUW, OBK, UOL, UZN, XAH, G0s AEV, DNV and RSs 10906 and 88639.

Stations listed in italics were using A1A.

1·8MHz 0100 *PY0FE.* **0300** *VE1BVL, W1AX, 4X4NJ.* **0400** *ZB2BK.* **2100** *C30DAJ, T77C, UP9A.* **2200** *HB0/HB9BZA, UA9s CBO, UCO, UF6FFF.* **2300** *HG9R, LZ1R, OH0MD/OJ0, 4U1ITU.*

3·5MHz 0000 *PY0FE.* **0100** *FY4EE, HZ1HZ, LU, RL9MM, 5B4TI, 8R1J.* **0500** *FM5WU, FP/W1CCN, PP7IE, VE2EDK* (Zone 2). **2100** *5H3CE.* **2200** *HB0/HB9BZA,* YB0AH, YC0SY. **2300** EK8AD (Obl. 154), LU3JCE, *PY0FE, UM8MO, ZS1CT, 5B4TI.*

7MHz. 0000 *TZ0RD, 1A0KM, J6LAD/9Y.* **0100** *HK7MBY, OH2DP/OH0.* **0300** *OY9JD.* **0400** VP2MU. **0500** *W6-W7, ZF2BW,* ZL1-ZL4. **0600** *CE0ZIG,* FM5BH, *K5HK/KP2,* NP4TB, *TI4BGA,* TI8CBT, *VK, XE, ZF2JU,* ZL. **1500** *AM0EEE.* **1700** *5B4TI.* **2100** *CU2AK, UA9A, 5T5CJ.* **2200** *A6XTH, FP/K1RH, KP2J, PY0FE, UA0AG, VE2EDK/*Zone 2, *ZS6ANL.* **2300** *HS0C, KP4BZ,* TZ0RD.

10MHz 0500 *FM5WD, N5VV(N.M), VK2,3.* **0600** *VK2,3,6, W7VY, ZL3GQ.* **1000** *CU2AR, W2FJ.* **1300** *5B4OG.* **1500** *UA9AAB, 9M2FP.* **1700** *JH1DLJ.* **1800** *EA6WX, FG5XC, SV0AH* (Rhodes), *VE3BFF, W1.* **1900** *UA9XAB.* **2000** *C30DAK, JA2EPW, VE2, W1, W2, ZL3GQ.* **2100** *FG5AH, FP/W1CCN, W1,2,3,4,8.* **2200** *FG5RX, SM5HV/HK7, VE1,2,3, J6LAD/9Y.* **2300** *FM5s BH,WD.*

14MHz 0000 *1A0KM.* **0400** *VU2BK, W6, W7.* **0500** *KH6/J.* **0600** *FO8FO.* **0700** A35NP, *FO8FB,* GB0SWR/MM, KH6, KL7, UV1OO, W6, W7, Y14KRD, ZK1XV, 5W1BZ. **0800** *KL7MF,* VY1CO, 5X5MR, 7J1ACH. **1000** JW5E, KX6AX, 4S7PVR, 9N1MC. **1100** *4U1VIC.* **1200** DU2IW, *FP/W1CCN,* JAs, *T77C,* YK1AO, *4X0WAE.* **1300** *W7.* **1400** JA, VK, VE2PAB/4U, 9M2s HB, *OK.* **1500** JT1JBC, JW8FG (Bear Is), TA1O, V85BU, V85MK/OD5. **1600** OD5SM, 7P8RM, 9M2RI. **1700** HS0C, TL8BA, 9M8GH. **1800** A71BK, *FY5CG,* HF0POL, *OE3EMN/YK,* 3C1MB. **1900** AL7BL, *JY5DP,* TA1K, VP8VK, ZD8JT, *6W1AE,* 9L1AR, *9Y4NK.* **2000** *PY0FE,* TR8RAL, VP8MT, 8P9AF. **2100.** CO7KR, *SV1JG/SV5, J6LAD/9Y.* **2200** FG5DL/FS, HC1MD/HC8, *HL1EJ, J28EO,* PJ2A, TE0X, TZ6WC, *UA0LL, VE2DWU/*Zone 2, VK, 4U1VIC, *5Z5EXP.* **2300** T77C.

18MHz 0700 *DL, F, HB, I, SM, YU.* **0900** *EA6XN, EA8ZJ, SV0AH, T77C.* **1300** *ZF2IR/MM* (nr. CT3). **1400** *TK5VN.* **1500** *C30DAJ, PY7s XC, ZZ.* **1600** *EA8AGF.* **1800** *HB0/DJ2CS, PY7XF.* **1900** *OA4IF, PY7DH.* **2000** *FM5WD, FY4EE, LU6UO, PY0FE.* **2100** *FM5BH, 4X6DK.*

21MHz 0700 EC9JM, Z21AU. **0800** *YM3KA.* **0900** *OY/OZ3QU, VQ9s EE, GB.* **1000** A4XFZ, *C30CAW,* 4S7PVR, 5H3DX. **1100** JY5ZM, *OH0MD/OJ0,* VU2DVP. **1200** *CP8/DL3NAZ.* **1400** *HZ1HZ, 7X2AX.* **1500** *YB.* **1600** JY9RL. **1700** *VP8PTG, ZD8KM.* **1800** *C30BBC, UV1OO,* 5Z4ET, 9X5VL. **1900** FM4DN, 5N9GM. **2000** CE, HC, *KG4XO,* LU, PY, *WP4D,* 9L1AR. **2100** AZ1ARU/5, J6LGH, VS6CT/KP2, V44KAR, *KG9N/V4.* **2200** J87CD, HH2DF, OA8N, PJ2NN, VP2MU.

24MHz 0800 *F, ON, SM.* **1000** *EA, HB, I.* **1500** *C30DAJ.* **1900** *YT3MJ.* **2000** *FM5WD, HB0/HB9BZA, IK4CUA, PA3AFF.*

28MHz 0700 *EK9AD* (Obl. 154), *UW9CO.* **0800** *UF6FFF, RL8PYL.* **0900** T77C. **1000** *VQ9GB.* **1200** TK0KP/P. **1300** CU2CH, VU2DVP. **1400** DL9ZAP/TF. **1600** OH0AM. **1700** CE3GWU, *CN2AQ,* ZB2FK. **1800** AM0EEE, LU, PY, UH8ABD, 3X4ADC. **1900** CE, CU2DG, *HB0/HB9BZA,* OX3LX, OY9JB/M, *VE2EDL/*Zone 2, W6, W7, 5N9GM. **2000** K2ARO, NP4A. **2100** CN2AQ, W1,2,4, ZP5JAL. **2000** CE4ETZ, HP3FL, J88BK. **2300** W1.

Thanks also to the following for information: *DX News Sheet* (G4DYO), *The Ex-G Radio Club Bulletin* (GI3OEN/W6), *Long Skip* (VE3IPR), *Lynx DX Group Bulletin* (EA2JGO), *DX Family Newsletter* (JH1KRC), *DX'press* (PA3CXC), *CQ Magazine* (W1WY), *DXNL* (DL3RK), and the *Long Island DX Bulletin* (W2IYX).

Closing date for receipt of material for **December** issue is Thursday **30 October.** □

HF F-layer propagation predictions for October 1986

Time / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	.....	.....11.....	....2332....	....46652...	...3777762..	...666567831	654433335787	++4.....25++
MALTA	.....	.....1.1....	....34332...	....565651..	...3877886..	131765568962	896533235898	+++2....25++
GIBRALTAR	.....	.....	.....2111...	....254342..	....6777871.	.1.37666796.	574753335797	+++52...24++
ICELAND	.....	.....	.....1.....	.....1321...	....157653..	....5667774.	43.354445785	+++52...24++
** ASIA								
OSAKA	.....	.....	.....	....22.....	...155311...	...2433344..	21113651	.....34.
HONGKONG	.....	.....1.....	....232.....	...1555.....	...266521...	....13333451.	....11.13673	.....3+2
BANGKOK	.....	....111.....	...1343.....	...2566.....	...24652....	....2333..2.	2....1.12473	.....3+4
SINGAPORE	.....	....111.....	...14443....	...256652...	...2466662..	....1333673.	1....1.13682	.....3+3
NEW DELHI	.....	....111.....	...14442....	...35664....	...345662...	1.1112335432	62.....13688	4.....3++
TEHERAN	.....	....2211....	...244441...	...466663...	...5455662..	323212335743	852....13688	+3.....3++
COLOMBO	.....	....2211....	...14444....	...356661...	...234565...	.1....1335423	21.....13678	2.....3++
BAHRAIN	....11.1....	....2222....	...255551...	...455674...	...4335672..	4332112357S4	862....13688	+3.....3++
CYPRUS	....1111....	....33331...	...266674...	...5777872...	...76667872.	665533456876	985211124789	++2.....4++
ADEN	....1112....	....33341...	...255575...	...4556771..	...4224675..	5.21..135843	842....13688	+3.....3++
** OCEANIA								
SUVA/S	.....	.....	.....	.....11....	....1344.1..	....4333141.	...2211123..	.....
SUVA/L	.....	.....	.....	....21....1.	...4531..23.	..164322.52.	...32...13..	.....
WELLINGTON/S	.....	.....	.....1.....	....1221....	....4554....	...2433333..	...22111331.	.....
WELLINGTON/L	.....	.....	.....	.....	...12....13.	.11441...43.	...221..131.	.....
SYDNEY/S	.....	.....1.....	....331.....	...15532....	...476553...	...34333541.	....21.1362.	.....3..
SYDNEY/L	.....	.....	.....	....1.....	....51....3.	....521..151	...121...42.	.....2..
PERTH	.....	....221.....	...2554.....	...36662....	...3565531..	1..123335631	1....1.13673	.....35.
HONOLULU	.....	.....	.....	.....	.....12..	....1121431.	...2211121..	...2.....
** AFRICA								
SEYCHELLES	....1112....	....33342...	...255675...	...3557771..	...32256761.	531....235864	84.....13688	+.....35+
MAURITIUS	....12231...	....34452...	...255676...	...3557882..	...32356771.	531...235864	83.....12688	5.....3++
NAIROBI	....22242...	....44464...	...2566871..	...4556883..	...42236781.	4421...35873	872....12688	+4.....3++
HARARE	....23353...	....45576...	...1667882...	...3556885..	...53336782.	3522...35873	873.....2688	+5.....3++
CAPETOWN	.....1465...	....136771..	....357885..	...2556787..	...54335793.	34231..24883	8841....2688	++.....3++
LAGOS	....234551..	....456772..	....667786..	...1755688..	.1.55323694.	27152..13793	7962....1588	5+5.....2++
ASCENSION Is	....122252..	....344474..	....666687...	....7655781.	.1..6433476.	275231..1584	79851....278	+++2.....4+
DAKAR	.....33342..	....255564..	....576687...	....7766782.	.1.17433577.	275541..2584	78851....278	+++2.....4+
LAS PALMAS	.....21121..	....143342..	....476676...	....6877882.	.1.18766787.	375664445795	899632112589	+++4.....25+
** S. AMERICA								
Sth SHETLAND	.....11..	.....1233..	.....24465..	....1466672.	.1.15555555.	165543222232	466521....12	2342.....
FALKLAND Is	.....11242..	.....23464..	.....56676...	....1776672.	.1..5654355.	166443211233	688521....13	4++2.....
R DE JANEIRO	.....21122..	.....42244..	.....75466...	.....765672.	....3643356.	2654431..254	798521....26	+++2.....4
BUENOS AIRES	.....12132..	.....34354..	.....66566...	.....776662.	....3653345.	26534321.133	798521....14	+++2.....
LIMA	......1.11..	......2122..	......5344..	......64552.	......53323.	143..231..12	688321.....2	4++2.....
BOGOTA	.....	......2111..	......4333..	......64442.	.....363223.	122.3331..13	687321.....2	5+52.....
** N. AMERICA								
BARBADOS	......1.....	......2122..	.....25344..	.....564552.	.....653335.	133.232..134	787321....15	++52.....2
JAMAICA	.....	......1.11..	......3233..	......54441.	.....154333.	111.1231..23	676121.....2	5+52.....
BERMUDA	.....	......1.11..	......3233..	......54451.	.....354454.	121..3311244	786111....15	+++2.....2
NEW YORK	.....	.....	......1222..	......34441.	.....55554.	11...2332233	6751.1....14	5++2.....
MEXICO	.....	.....	.....221..	.....433..	.....25322.	11..1.331.11	375121.1....	.++2.....
MONTREAL	.....	.....	......1221..	......34431.	.....55553.	11...2332343	674.11....14	5++2.....
DENVER	.....	.....	.....1.....	.....132..	.....4542.	133221	3531....1...1	.5+2.....
LOS ANGELES	.....	.....	.....1.....	.....21..	.....2531.	33211	24211..11...	.3+2.....
VANCOUVER	.....	.....	.....	.....1..	.....331.	.....2432.	23211..121.1	.2+2.....
FAIRBANKS	.....	.....	.....	.....	.....12..	....1112442.	111221112211	..22.....

VHF/UHF

*Ken Willis, G8VR**

Shetland . . . . DTI decides

Back in March *VHF/UHF* responded to a request from licensed amateurs living in Shetland for a separate callsign to be allocated to the area in view of its geographical position and relative isolation from the UK mainland. The campaign gathered momentum, and virtually every amateur in the Shetland Islands signed a petition supporting the proposal, while local authorities and even the local MP put their names to the document which ultimately was the subject of a "Minister's case" at the Department of Trade & Industry. Unfortunately, the DTI was unable to grant the request on the grounds that "a concession of this kind, made on the strength of regional/geographical distinction, would leave us open to large numbers of such requests which would add unwarranted expense to the administration of the amateur licenses", The DTI went on to say that "those distinctive locators currently in use are awarded to self-governing islands and the three countries of Great Britain"....these being...."sufficiently small in number to be accommodated in the callsign series scheme...."

So, for the time being, nothing more can be done. However, all may not be lost, for sometime in the future a rationalisation of callsigns will be undertaken by the authority, and at this time it *may* be possible to identify areas by callsigns in much the same way that the USA defines regions by numerical differences in the calls, ie W1, W2, W3 etc. We can only hope. Meanwhile there is a good deal of support for considering Shetland as a separate country for award purposes, so will contest organizers please note. I greatly appreciate the many letters received from Shetland Islands amateurs during this "campaign", and look forward one day to visiting the area to find out for myself how far my 144MHz signals have to travel to make a contact there.

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Meteor scatter

The advent of 50MHz operation not only changed the sporadic-E scene, it has also had a great effect on meteor scatter, especially as this lower-frequency band is proving so good in this mode. So, to report the Perseids, one must try to form an impression of how 144MHz conditions compared with those on 50MHz. My first impression of the Perseids this year was that reflections were rather poor on 144MHz, and Mats Espling, SM6EAN, confirmed this view. There was plenty of activity both on skeds and the random channels (144·100 and 144·200MHz), but not much in the way of sustained reflections. The vhf net on 14MHz was spread wider than I have ever heard it, indicating the high level of interest in ms these days. Few used the 144·400MHz ssb channel compared with the "old" one on 144·200MHz. On cw random channel, 5min periods were the "norm", whereas in skeds most were working 2·5min. Tying up a frequency for 2·5 or 5min at a time working ms is regarded by some as anti-social, but one well-known Continental amateur who uses frequency-shift keying (on auroras too!) certainly took up a large part of the spectrum with his two transmissions, one readable, the other "Chinese morse!" It is essential that we all adopt the same period lengths, and either accept or reject the new proposals for frequency off-set random-channel operation, or chaos will result—especially if we get mixed 2·5/5min periods on the cw random channel.

Listening to ssb random operation, two points emerged. The first is the sheer stamina of some operators who called hour after hour with little or no success. Some were calling "Break" every few seconds, which meant that others locally were calling when they listened, so surely a break every 15s when everyone should (theoretically) pause at the same time is likely to be more productive.

Next, one reason why operators complain that they don't get QSL cards for ms "contacts" was obvious from an extended listening session. With half a dozen stations called "CQ" on random channel, in a listening period a burst yields a callsign, say YU2ZZZ. Several operators then call "YU2ZZZ 37 37 break". Later, in another period, a "Roger 28 Roger 28" is heard, whereupon several operators start to send "rogers". I heard at least four "contacts" when both callsigns were not exchanged, nor the formal exchange of "roger reports", while not one but two or three then claimed the "contact". This is not to denigrate the many successful contacts made during the shower, but every year the postbag reveals

complaints of stations failing to QSL when true reason was probably a "no contact".

In contrast, the same shower provided much longer reflections on 50MHz, and G4IJE (Essex) reported good activity on the ssb random channel of 50·350MHz during the shower between 2100 and 2400gmt. Many bursts lasted over 1min, and Paul says that LA6QBA worked as many as six stations during a single burst! Paul worked GM4TXX (XP), GM4NXO (YS), LA6QBA (FT) and LA9DL (FT) during the shower, and commented on the particularly good signals from GM4NXO with only 10W. LA6QBA is QRV every weekend on 50·30MHz, looking for ms ssb contacts from about 0615 to 0700gmt.

The postbag brought a very interesting letter from Jan Hubach, OH1ZAA, on the subject of random procedure for ms. Another letter, from John, G3WZT, will be held over until next month. Meanwhile Jan says that experiments with call-sign-related frequencies has not worked well in practice. There is no indication from a reflection whether the system is being used, so operators tend to stay put rather than risk losing a contact. He suggests that when a station calls "CQ" on random channel, a letter be added to the CQ which would indicate unambiguously where the sending station would listen for replies. Hence using the same system in which letter A is +1kHz and letter Z +26kHz, OH1ZAA might call "CQH OH1ZAA CQH OH1ZAA . . . which means "Listening on 144·108MHz", H being the eighth letter in the alphabet. This method enables the operator to choose his own listening frequency which, Jan says, is important in these days of local QRM, computer birdies etc. Another suggestion he makes is that the system could be expanded later to indicate what period length was being used. On ssb, a "CQ" call would use the same technique; eg CQ Golf OH1ZAA . . . etc. This seems to me to have considerable merit, especially as I have always advocated the exchange of more "unknown" information in ms transmissions than is currently the case.

Peter John, DL7YS, is equipped for both 50 and 70MHz reception, as reported earlier, and wants skeds in the coming meteor showers to work crossband. He has 100W on 28MHz and 150W on 144MHz.

50MHz

Newcomers to this band are finding out for themselves what 50MHz devotees have known for a very long time. It is a fascinating part of the radio spectrum which occasionally surprises even the experts. In these days of sophisticated equipment it was good to get a letter from Ted Holmes, G4TLY (Wilts), describing his "greatest day". Tuning around a dead 50MHz band on 21 July, he heard WA1OUB, when a "most orderly pile-up" ensued. Ted worked him two calls later and received a 57 report using a P W Meon into a 20W amplifier and a three-element quad antenna made from ex-tv fittings, plus garden canes costing 20p.

Writing for the first time, Eric Parvin, G2ADR (York), says that low-power or poorly-located stations need not despair, since on 50MHz from a QTH near sea level and 10W to a *fixed* dipole at 28ft he has worked, either two-way or crossband, EA1, 2, 3, 4, LA, YO, ZB2, HB9, CT1, GJ, GW, GM, GI, OX, SM6, 7, OH, OZ, F and D, but has "unfortunately not been QRV during a transatlantic opening". However, he has heard VE.

G4SJG (Notts) has also sent in a report of similar dx worked on the band, and hopes that this and similar records will help a general allocation being made, to both classes of liensees. He too uses 10W to a dipole, though he has recently expanded into a three element antenna.

Dave Newman, G4GLT (Leics), is one of the more experienced operators on 50MHz, and his letter summarizes what happened on the band during the past summer. He heard a lot of beacon FY7THF in French Guiana, and comments that reception of this beacon during the period of sunspot minimum is a matter of much controversy. Some ascribe it to multi-hop Es, whereas Dave and G2AHU believe it to be Es propagation at our end of the path and F2 thereafter. Dave says that last year there were two very big widespread transatlantic openings on the band (2 and 30 July), whereas this year there had been at least five openings up to the end of July, all of which were very localised at the USA end of the path (9, 12. 17, 19 and 21 July), and Dave worked W stations in three of these. Dave comments that just as in 1985, some bursts of 50MHz signals were copied after the main opening, and wonders if meteor scatter replaced the first reflection point in the path after the (presumed) Es ionization had diminished in that region. However, SM6PU has noticed that weak "E scatter" occurs when E conditions do not quite provide a muf of 50MHz. On 21 July, a 30s burst of cw was copied from K2QWD well after the main event, and a further burst more than 30min later. Since these bursts have been observed as late as 1h 43min after the fade-out of the main event signals, it clearly pays to keep listening when the band seems to have gone dead.

Graham Kimbell, G3TCT (Surrey), is another who studies propagation mechanisms on 50MHz, and his findings are equally interesting. On 24 June he worked GM3JIJ (Stornway) at 860km, after which OX3LX worked G4GLT and stations in the north. While making these contacts, OX3LX could hear the ZB2 beacon over 4,600km, or the distance between G and VE1! Analysing the distances, Graham says that with OX-ZB2 at 4600km, OX-G 2,750km, ZB2-G 1,700km and G3TCT-GM3JIJ 860km it suggests that ionization could have been at the right spot to support OX-ZB2 by multi-hop Es, though it does not prove it.

On 29 June, G3TCT worked OE3HGW crossband 28/50 over 1,300km, and then later heard the 5B4 beacon on 28MHz, plus a G- Bahrein contact on the same band over 5,200km. Graham reports that on 10 June, G3RMB (Coventry) between 1210 and 1230gmt heard KP4EOR at S9+ working into the USA, but could not penetrate the QRM. The KP4 then said he would look for European stations and promptly disappeared—probably when he turned his beam towards Europe—suggesting that the propagation was backscatter from somewhere north of KP4. What an interesting band this is, and it can only get better as the solar cycle starts its upward climb.

W2CAP/1 is collecting data from the various openings, continuing a study commenced by his father years ago. He encourages minute-by-minute records, which obviously would be too detailed to reproduce here, so send any information to him. He plots Es cloud positions in 10min intervals based on what is heard, and his data goes back to 1938. He said he "would love to have data from Europe".

Snippets of 50MHz information are: GW4KDP has heard a Spanish radiotelephone on 50·040MHz, and another on 50·240MHz. A correspondent who wishes to remain anonymous tells me that the issue of 50MHz permits in Europe is to a large extent prejudiced by the fact that the US Armed Forces use the band in Western Germany, while Security Services in East Germany use it also. Definitely a case of "Don't call us, we'll call you"!

Bill, GM4DGT, asks if there is a standard procedure for raising ZB2BL when his beacon ZB2VHF is heard. He cannot find any reference to it in back copies of *Radio Communication*.

Ian, G3SEK, reminds us that one goes down in frequency, background (external) noise increases, whereas at vhf it is the noise generated by the front-end device which is more significant. Thus 50MHz is about the lowest band on which really sensitive receivers can be used, and generally they are much too sensitive and have too much gain. If one treats the permanent background noise as part of the receiving system noise, and the front-end gain is reduced accordingly, 50MHz does not sound so noisy. Commenting on 50·200MHz, which Ian says is being treated like a calling frequency with operators moving off it when contact is established, he says that this is fine for local contacts, but since it is "band-planned" as a "centre of activity", operators are free to stay there if there is risk of losing a contact with a weak dx station by a QSY.

Sporadic-E

What could have been the final sporadic-E opening on 144MHz this season occurred around breakfast time on 4 August just as many operators had left or were preparing to leave for work. It seemed to embrace HG, YU, OK, OE and D, and was workable from the Midlands down into the south. Jim, G8LFB (Whetstone), who always seems to be in the right spot, managed six contacts in 17min and gained two new squares in the process. Jim also reported that on 6 August 144MHz was open between EA and OZ, and although fm broadcast from overseas was heard up to 100MHz, nothing "broke" on 144MHz. On 5 August Jim watched Russian tv all day, but again nil on 144MHz, though he heard that there was Es between UL7 and Central Europe during this period. Who will be the first to work UL7, UI8, UJ8 etc on 144MHz? Lots of things we thought impossible a few years ago are old hat now, though admittedly this would be quite a challenge on modes other than eme. Jim has a personal view of sporadic-E, which might sound simple, but could be very close to what actually occurs. He says (at the risk of getting egg on his face!) that he visualises the sporadic-E reflecting "patch" as a "mobile fried egg over Europe". The yolk can reflect the higher frequencies while the "white" can only handle lower frequencies. On 4 August we were getting help from the yolk, but on 5 and 6 August, only the white produced any signals here. The duration and intensity of the event would then be determined by the size of the yolk and the speed at which it travelled.

Turning to 50MHz, where Es is so much more prevalent, an experienced operator, Jan, OH1ZAA, who has now worked more than 100 UK stations 50/28 crossband during the summer, says that as a general rule the Es path from G to OH is open on average every third day from mid-May to mid-August. He makes an interesting comment on a matter of much concern to the licensing authority. Even when UK signals were very strong in Finland and tv was noisy and weak, radio interference has been observed only on two occasions, appearing as horizontal bars on the screen. On 3 August, Jan heard beacon OX3VHF and tried to get the USA operators on to it via W3XO, but Bill was not available. Jan has crystals for a 50MHz beacon

(also for 28 and 2,320MHz) but says it may take some time to get authority to operate the 50MHz unit, "if ever", because of regulations.

For those still looking for a tv to monitor sporadic-E etc, especially now we have so much happening on 50MHz, David Martin of Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset (tel 0202 738232), is offering the Yoko vhf/uhf tv system which receives both UK and Continental sound and vision. It is very sensitive and features the very latest in circuit design with a 5in black-and-white picture tube. Write or phone him for details.

Repeater news

Still very quiet on the repeater front from the point of view of correspondence received. Do they all stop talking to one another in the months which we laughingly call summer? I have been asked to repeat here an announcement broadcast over GB2RS some time ago, to the effect that when on 4 May repeaters GB3BM, GB3MH, GB3PW and GB3VT were involved in channel changes, the RSGB introduced a scheme whereby those needing to change crystals as a result of these channel changes could have the cost re-imbursed in exchange for their old crystals. Claim forms for this are available from Chris Reed, G8MFP, Ashlea, London Road, Stretton-on-Dunsmore, Rugby CV23 9HX, though the closing date was 16 August.

South West Hertfordshire UHF Group announce that their 432MHz repeater GB3HR (RB14) was 10 years old on 21 August 1986. It has moved from Bushey to a site near Stanmore which gives much improved coverage in most directions, while a better antenna in February further improved things. The reliability of the system has been excellent. Plans for the future include a complete standby repeater station for GB3HR, a new duplexer for single-antenna working, and a protected mains electricity supply. The group also operates beacon GB3SWH on 10GHz and is working on repeater GB3BH for 1·3GHz (due to come on this year). Apparently not everyone dislikes repeaters, for the group's "machines" are located at St Peter's, Bushey Heath, a very beautiful church by all accounts, and with the blessing of the Bishop of St Albans. Treasurer of the group is Brian Greenaway, G3THQ.

Some expedition reports

This year, Manchester University Radio Society organized an expedition to the Island of Mull (WQ-IO66 square), and the party arrived on the southern coast of the island on 18 June. Plans to operate from a cottage had to be abandoned, so they set-up on the headland at Scoor, 310ft asl. Operation commenced on the evening of 20 June when they were inundated with calls from PA and DL stations, most of those worked saying it was a new square for them. The locations of those calling fell within a sharply defined area, and attempts to contact France proved unsuccessful. Several PAs were worked on 432MHz using only 10W.

Skeds with UK stations produced no contacts, and the only G heard was G6MEN (Shrewsbury) who was eventually worked with a 31 report. However, at one point a cw call on S20 resulted in a pile-up of Dutch callers. As a result of a sked with GI4LGK, good tv pictures were received from the northern coast of Ireland. On the Sunday a group scaled Ben More and operated as GM3VUM/P, making contacts into G and GW, plus GMs on Staffa. The team used 100W into a 13-element on 144Mhz and 2 × 19 elements and 10W on 432MHz, all powered by a succession of car batteries hand-carried up a hill! Towards the end, when conditions seemed to have reached rock-bottom, several Gs were then contacted, but infestation by midges brough a halt to the proceedings. The team so much enjoyed the good weather that some nearby islands were visited, to the detriment of time spent operating, but there's more to an expedition than filling the log book!

Dave, G8YYB, operating in some comfort from the Isles of Scilly, July 1986.
Photo: **G8YYB**

Colin Oakley, G0AEA, the harbourmaster of Hughtown, St Mary's, Isles of Scilly, the only permanent vhf operator in the entire "WJ" square.
Photo: **G8YYB**

Another island to be visited, this time in more comfortable circumstances, was Scilly. Dave Gray, G8YYB operated from there between 2 and 16 July, using both 144 and 432MHz gear. Although conditions were poor, some sporadic-E was encountered on 8 July when some SMs were worked in JO97 and JO66. EA6FB was heard but not worked on 12 July when Band 2 fm was full of Spanish and Italian stations. 432MHz was difficult to use due to Syledis (not worse than Broadstairs, surely!) Although many east-coast and northern UK stations were given their first WJ square contact. Counting both bands, 523 contacts were made in all, and Dave promises to send out cards as soon as he can—quite a mammoth task.

From the postbag

Thanks to G0CHI for details of the dates of the AGCW DL VHF/UHF Contests sent to him by DF7DJ. The timetable is so arranged that it will apply indefinitely, viz 144·010—144·150MHz, 1600–1900gmt, and 432·010—432·150MHz, 1900–2100gmt on: New Year's Day, 3rd Saturday in March, 4th Saturday in June, and 4th Saturday in September. There are three classes and a complex multiplier system. Those requiring full details, please send me an sae plus 12p in stamps for photocopying, or write to DF7DJ, Bergkamener Str 76, D-4708, Kamen, West Germany.

Jack Hum, G5UM, wonders who was first to work Madeira on 144MHz. It is known that several G stations worked CT3DK in the early hours of 19/20 July, some of them as far north as Warwickshire in an unusual opening. Colin Oakley, G0AEA (Scillies), is said by Jack to be able to contact Madeira or EA8XS (Canaries) "fairly regularly", and each has claimed him as a new country. Possibly they are confusing the Scillies as a country in its own right, since EA8XS, at least, has been worked many times from the UK. GJ4ICD worked CT3DK early on 20 July during the 1986 VHF World-Wide WPX Contest. This year he scored 89,612 points from 1,042 separate contacts (86 multipliers) and hopes to be placed high up in the final list, since as winner last year he made only 45,849 points. He wishes to thank Microwave Modules for their sponsorship this year.

On another subject Geoff, GJ4ICD, tells me he is inundated with English stamps which people send him when requesting QSL cards for contacts with Jersey. He says that these stamps cannot be used for postage in the Channel Islands, so operators are requested to send ircs rather than stamps in future.

Richard, G3WW, one of the old-time "greats" on vhf who now spends much time operating amateur television, reports that "until recently, users of the Walter Wraase SC-1 slow-scan converter and Robot 1200C and 450C converters have found their 24s and 48s line sequential colour systems non-exchangeable and incompatible". However, Martin Emmerson, G30QD has developed a slow-scan converter which will cope with both systems, and has a substitute eprom for the Robot 1200C with overcomes the incompatibility with no degradation of its normal performance. Write to G3OQD, QTHR, for further details. Incidentally, *CQ-TV*, the magazine of the British Amateur Television Club, is an extremely well-prepared publication, full of technical and general information. No 135, out recently, contains information on a satellite tv "receive only" receiver which many microwave "buffs" might like to build. It is based on some new Astec modules which greatly simplify construction. The secretary of BATC is Trevor Brown, G8CJS, while the tvro receiver is the work of John Wood, G3YQC. □

MICROWAVES

*Mike Dixon, G3PFR**

The Midlands Convention and the Sheffield round table

October is a busy month for microwave enthusiasts, with two Society sponsored events of interest.

On Saturday 11 October the Midlands VHF/UHF Convention will be held at the Madeley Court Centre at Telford, and fuller details appear elsewhere in this issue. Microwave Committee members will be present at the event, and will provide "manning" for both the components service and the open forum, as well as being available to answer technical questions related to microwave activity and construction. Peter Blakeborough, G3PYB, will be giving an illustrated talk and demonstration of 10GHz atv: the quality of the full colour (PAL) pictures emanating from quite simple 10GHz transmitters and receivers is really most impressive, and Peter's talk should provide practical interest in what has so far been a somewhat neglected side of wideband 10GHz operation.

The next Sheffield round table is scheduled to take place on 25 October at Sheffield University, Department of Electrical and Electronic Engineering, Mappin Street. Details of how to get there can be obtained from Dr Barry Chambers, G8AGN, QTHR. Starting at 10.30am and ending at 5pm (with an hour's lunch break from 1pm to 2pm), there will be the usual informal interchange of ideas and views, a bring-and-buy facility, the components service, and a full range of test-gear available for alignment and test purposes. This service usually proves to be so popular that the "booking" system previously used will again be in operation, thus ensuring that all participants get their fair share of the time available. All enthusiasts are cordially invited. It is hoped that G3PYB will be at the event to again demonstrate his 10GHz atv gear for those who missed either his visit to the NEC Convention or his talk at Telford. Bob Harris, G4APV, who has done a lot of very effective work on satellite tv reception may also be present and available to answer questions—again for those who missed his excellent talk at the NEC!

Operating news and views

A most welcome letter from Simon, G3LQR (Woodbridge, Suffolk), gave details of a quite remarkable 10GHz contact which took place at 2215 on 30 June during an opening which lasted about half an hour. This was over a 924km path to Karl, SM6HYG. Reports of 559 (57 on ssb) were sent to Karl, and Simon received 529 from Sweden. Simon's equipment is, he says, "very simple—a tower-mounted varactor giving 100mW (a 'Birkett Special' of some years ago costing 10p!) and a JVL mixer with the flanges sawn off, SMA transitions to semi-rigid coaxial cable, a two-stage MGF1402 preamp and an 18in dish." Karl's equipment is described as "much better—20W twt and GaAsfet preamp with waveguide feed to the tower". Simon reported that the contact started off on 5·7GHz "where the signals were not so loud" and then moved up to 10GHz where signals were much the same strength to start off, with Karl's signals getting stronger all the time. It should not be forgotten that the first 50 miles or so, from Simon's point of view, is across land, so the path cannot be considered a true sea-path—his comment: "John, G4BYV, was very loud at the time, so I guess there was a good duct across Suffolk and Norfolk—no doubt at the coast the signals would have been very large!".

From Dave, G8VZT (Wellington, Shropshire), came the comment that of late there seem to be some frequency and contest "clashes" going on. He came forward with the fact that BATC use 144·170MHz for a "fast-scan calling channel", noting that the microwave net in the Kent area also uses that frequency and that the BATC "Summer Fun Contest" was on 12/13 July, coincident with the fourth Microwave and 10GHz Cumulatives: "144·170MHz proved a little hard going with microwave people using it for talkback". Being an ex-10GHz operator and now "playing with 1·3GHz but with an itchy feeling for 10GHz" he will perhaps be aware of the difficulty in finding a "free" frequency, under contest conditions, for calling and talkback. With more and more contests on 144MHz (and the June Cumulatives clashed with the PW QRP Contest for the second year running) it is becoming more difficult to arrange contests without some clashes. Perhaps we may ultimately be forced into the situation which prevails in Holland, where 432MHz or even 1·3GHz are used for calling and talkback because of the extremely crowded nature of 144MHz there. Sorry, Dave, we cannot please all of the people all of the time!

A short article from the BATC journal *CQ-TV* entitled "Horizontal or Vertical, that is the question" was brought to my attention by Mike, G3JVL. This opened by posing the question "Was it such a good idea to go for horizontal polarization for 1·3GHz tv repeaters?" and then went into the apparent difficulty of providing "good omni-directional gain" from horizontally-polarized antennas. One other comment was: "Have you ever tried fitting a horizontal antenna with omni coverage to the roof of a car?" In sending his views to BATC (as requested in the article) Mike commented that there are demonstrable advantages to horizontal polarization—less and slower QSB, fewer "horizontally-polarized" natural reflecting objects to cause multi-path effects—the preponderance of operators having used this polarization for many years for these very reasons. Even the "Horizontal FM Group" on 144MHz have remarked on better propagation ranges! Mike and others have successfully fitted and used Alford slots in a mobile situation, and I seem to remember that some years ago there was an RSGB paper submitted to a professional conference on mobile operation which described the outcome of the very successful 1·3GHz mobile operation which took place with such antennas. Mike finally mentioned "a more recent design of skeleton Alford slot which is even less trouble". We look forward to details of this in due course—any microwave antenna design emanating from JVL is bound to be worth waiting for!

John (formerly BRS87607, now G1TZT), who sent information on the 1·3GHz radar situation last month, has now sent some more information which indicates that using lva (large vertical aperture) antennas, the "bottom" of the main beam is expected to be at about 500ft at a range of 10 miles and 2,000ft at 40 miles. There will obviously be detectable (especially in terms of a very sensitive amateur receiver) radiation outside this beam and, as the usable range of some of the sites is up to 250 nautical miles (288 statute miles or 470km), it is not difficult to predict that we can expect more interference than hitherto, especially under lift conditions.

Microwave bands "assembly" and dinner

Frederick, G6FK, sent in a brief report on a recent social event which he and others of the Midlands microwave fraternity had arranged. This was an informal gathering of some 40 like-minded souls. There was no formal agenda: just people "doing what they wanted to do—talk—a glass of beer—and meeting the other fellow", followed by a dinner. Frederick especially welcomed Sam, G4DDK, and Dave, G4FRE, who had travelled from East Anglia; and Cyril, G3VVB, who had travelled from St Austell to be at the function. At the dinner, Glen, G8MWR, was "chairman" and Sam, G4DDK, delivered a few words about the work of the Microwave Committee. Frederick reported that the whole affair went down very well and that another, similar informal gathering is planned for July next year, when it is hoped that the size of the gathering can be extended: **but** with the earnest hope that if extended in size, the informality and spontaneity will not be allowed to suffer.

Technical items

Bob, G8GDZ (Birmingham), sent information on his recent experiences with the YD1060 valve on 3·4GHz. The design of amplifier he has been using is the DK1UV *(VHF Comms* 3/82) which claimed 6W output at 10dB gain with 400V on the anode and consuming 55mA. Bob has so far achieved over 4W without trouble, as shown in Table 1. More testing is needed, plus silver plating and an increase in anode voltage. A later article in *VHF Comms* (1/84) suggested that 12W could be obtained with a 400V supply/120mA, but since the valves are in short supply Bob's comment was: "I won't be pushing mine too far".

His tests were carried out using a 3,456·9MHz source, a calibrated 20dB attenuator and an HP435A power meter, and gave the following results:

Table 1. The YD1060 as an amplifier at 3·4GHz

Drive (mW)	Output (W)	Gain (dB)	DC input (W)	Efficiency (%)
20	0·69	15·4	14·15	4·9
50	1·2	13·8	14·5	8·3
100	2·05	13·1	15·5	13·2
200	2·9	11·6	16·6	17·5
300	3·6	10·8	17·25	20·8
400	4·2	10·2	17·9	23·4
500	4·6	9·6	18·98	24·2

Conditions: Va = 375V, Iq = 38mA, at 500mW drive Ia = 55mA

Using the valve as a high-level mixer, the following results were obtained: Va = 225V, Iq = 28mA, Ia = 40mA, i.f drive (144·2MHz) = 400mW, lo drive (3,312MHz = 400mW, output (3,456MHz) = 390mW.

The figures indicate a greater efficiency (in terms of lo drive) than the usual varactor mixer, and Bob's view was that the performance was a great deal more stable and predictable than with varactors. Which all goes to show that the "bottle" still has "a lotta bottle"! □

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SATELLITES

*Bob Philips, G4IQQ**

JAS-1

The major event to report this month concerns the successful launch of the first Japanese amateur radio satellite JAS-1. For the record, the satellite was placed into its orbit by the H1 rocket which was launched from the Tanakashima site in southern Japan at 2045gmt utc on 12 August. The satellite was separated from the launcher at 2147gmt, and the 435·795MHz telemetry signals were successfully received at the command station at the University of Surrey 18min later. The satellite has several designations, but the official name after launch is FO12 (Fuji Oscar12).

The launch of the satellite was monitored by many thousands of amateurs around the world through the efforts of three regional Amsat launch information nets. For a large part of western Europe the news was provided by the Amsat-UK net operated by Richard Limebear, G3RWL.

Initial indications are that the satellite is in very good shape, though a full check-out of the on-board systems is likely to take several weeks. At the time of writing the Mode JA transponder (145 to 435MHz) has been declared fully operational; however, further engineering tests are being carried out on the digital transponder before it is released. The telemetry beacon on 435·975MHz is transmitted at 20wpm and has the following format.

HI HI	3A 3B 3C 3D
1A 1B 1C 1D	4A 4B 4C 4D
2A 2B 2C 2D	5A 5B 5C 5D

The first 12 channels, 1A to 3D, represent analogue values with the characters A,B,C and D transmitted as a two-digit decimal number in the range 00 to 99. The parameters and associated equations for each of the analogue channels are given below.

Channel	Parameter	Equation
1A	Total solar array current	19·1*(N-0·4) mA
1B	Battery charge/discharge	38·1*(N-26·4) mA
1C	Battery voltage	N*0·21 V
1D	Half battery voltage	N*0·0937 V
2A	Bus voltage	N*0·192 V
2B	+5V reg voltage	N*0·0572 V
2C	JTA power output	51*(N-15·8) mW
2D	Calibration voltage	N/50 V
3A	Battery temp	1·39*(68·9-N)°C
3B	Baseplate temp #1	1·39*(68·9-N)°C
3C	Baseplate temp #2	1·39*(68·9-N)°C
3D	Baseplate temp #3	1·39*(68·9-N)°C

The remaining telemetry values provide digitally-encoded information on up to 40 status points. The value transmitted is a two-digit octal number in the range 00_8 to 37_8. Each of the six bits of two-digit octal number indicates a particular status point (except the first, which is always zero). For example, the octal number 24_8 has a binary representation of 010 100 from which the five status bits are 1,0,1,0,0. (There is inadequate room to carry the full details of the status points in this issue.)

The characteristics of the satellite orbit are almost identical to those planned, as follows:

Mean motion	12·413 orbits per day
Period	115·8min
Inclination	50·0082°
Mean height	1,498km
Eccentricity	0·0011644

Orbital predictions can be obtained from the wide number of computer programs currently available (with the appropriate orbital elements inserted). Since the orbit is essentially circular in nature it will be possible to use the well-established "Oscarlator" with overlays for the new orbit. Many operators still find this method of determining satellite availability very useful, as they provide a rapid, visual indication of the location of the satellite and the corresponding coverage. Polar projection maps and acetate overlays may be obtained from Amsat-UK (sae for details to G3AAJ, Amsat-UK, London E12 5EQ.)

Oscar 10

As reported last month, a great deal of effort has been put into re-writing the software for the integrated housekeeping unit so that it will fit into the available memory. By the middle of July this work had been completed and the Mode B transponder was reactivated under a limited schedule. Attitude re-orientation manoeuvres which had been planned for late May were carried out during the third week in July so as to give the satellite an adequate sun angle. It now appears that the useful life of the satellite can be prolonged for a reasonable time into the future depending on the rate of degradation of the surviving computer memory chips.

Assuming all is well, October should show dramatically-improved operating conditions compared to when the satellite was last operational in May. The operating window is centred around midnight, so late nights or early mornings may be required to catch the periods when the transponder is switched on. The availability chart for the month is show in Fig 1; please note that the baseline is off-set to 1800-gmt for purposes of clarity.

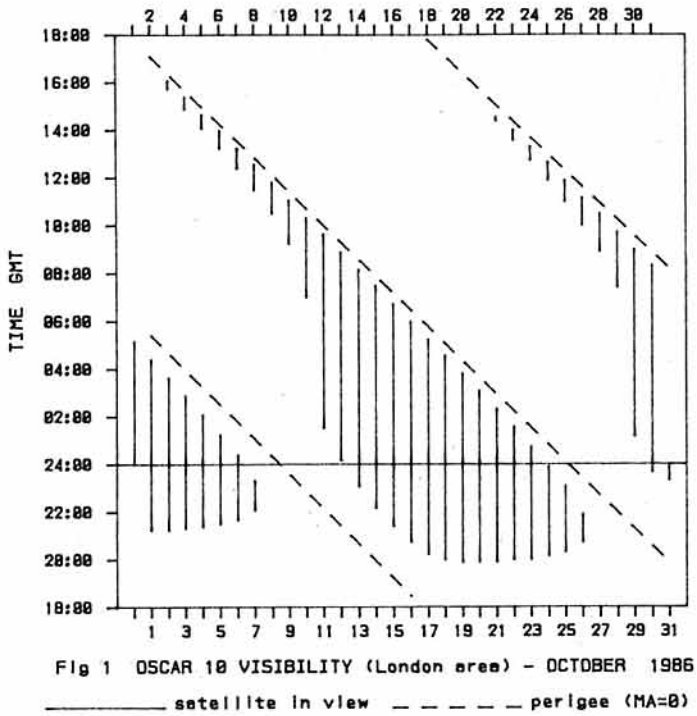

Fig 1 OSCAR 10 VISIBILITY (London area) – OCTOBER 1986

Uosat

Normal operation of both satellites was resumed in August after a period of several problems, mostly associated with the new software. Due to the higher degree of difficulty in up-loading into Oscar-9, it is being considered that up-dating of the bulletin may be carried out on a monthly rather than weekly basis. Oscar 11 would continue to provide the more immediate information via the newsflash service. The University of Surrey is very pleased with the success of the digital communications experiment on Oscar 11, which has provided reliable message transfer between the UK and USA over the last eight months. The experiment is likely to draw considerable interest from commercial circles, where a great deal of effort has been devoted to the provision of low-cost satellite terminals for message-transfer services. The experience gained in the development of appropriate communication protocols is certain to be useful for the future introduction of commercial services.

Other news

The Phase 3C spacecraft is now back at Marburg University in the Federal Republic of Germany after successful completion of the thermal-vacuum testing in the USA. Several small adjustments and up-grades will probably be carried out before the spacecraft is finally shipped out to Kourou for integration with the launcher.

On the subject of the Ariane launch vehicle, the board of inquiry investigating the failure of the V18 launch in May has completed its preliminary report and recommended a detailed series of tests on the third-stage engine. Arianespace is very confident that the problems can be rectified, but will want to be very thorough in their testing before attempting a further launch. Present indications are for a launch sometime during the first quarter of 1987.

The news that the US shuttle will no longer be available for commercial launches after the present commitments have been honoured is not good for amateur radio. What is not clear is whether Nasa will be willing, or able, to consider further amateur launches in the vein of scientific satellites which appear to have been excluded from the ban.

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COMPUTING

*John Morris, GM4ANB**

Software register

The first edition of the register is now available. For details of what it is all about, see *Rad Com* April 1986, p274.

The response has not been as overwhelming as I had hoped, but nevertheless there are sufficient entries to proceed with the project; for a while at least. The entries consist of an even mix of amateur and commercial software, with the former including a fair selection of previously-published programs adapted for various machines. As might be expected, there is a preponderance of programs for the Sinclair, Amstrad and Acorn machines, but there are also entries for the Dragon, Commodore plus 4, and one or two others for which software is hard to find.

To get a copy of the register send an sae (4 by 9in or larger) to me at the address below. More contributions would be welcome.

The computer as a signal generator

A letter from Neil Benton, G4KBS, prompted a series of experiments here. Neil uses the 6522 VIA chip in his BBC as a source of accurate audio tones for setting up an rtty terminal unit. His program contains facilities for sending tone sequences, as well as single tones, but is too long to give in full. Program 1 shows the essential portion. It will program the BBC's 6522 to generate a steady audio tone. On the BBC, programming is best done using the OSBYTE facility, as shown. On other computers it will most commonly be done by POKEs to the appropriate memory addresses. The sequence is as follows:

(1) Program port B as an output by writing 255 to register 2 (line 10).
(2) Set counter 1 to free run mode by writing 192 to register 11 (line 20).
(3) For each frequency calculate the value:

clock frequency / 2 / required audio frequency.

In the BBC the 6522 clock frequency is 1MHz, so the formula reduces to 500,000 divided by the required audio frequency, (line 50). In the program this is variable CN.

(4) Place the remainder from dividing CN by 256 into register 4. This is the low-order latch for counter 1 (line 60). Note that on computers which have no "DIV" operation the value can be obtained using the expression "256*(CN/256—INT(CN/256))".

(5) Place the result of dividing CN by 256 into register 5 (line 70). If no "DIV" is available use "INT(CN/256)" instead. The required frequency —or very nearly—will now appear on output PB7 of the 6522 chip.

On the BBC the output can be found on pin 20 of the user port connector. Pin 19 is earth.

PROGRAM 1

```
10 *FX 151,98,255
20 *FX 151,107,192
30 INPUT "Frequency (10 - 20,000 Hz)"; HZ
40 IF HZ<10 OR HZ>20000 GOTO 30
50 CN=INT(500000/HZ + 0.5)
60 A%=151: X%=100: Y%=CN MOD 256: CALL &FFF4
70 A%=151: X%=101: Y%=CN DIV 256: CALL &FFF4
80 GOTO 30
```

Having turned the computer into a programmable audio tone generator, a natural thought is to see what other useful signals can come out of it. A browse through the chip set produced Programs 2 and 3.

At this stage I must offer an apology to non-BBC owners, as both programs are very definitely specific to that computer. They use features which are either absent or implemented very differently on other computers. However, the ideas themselves are quite simple, and with a bit of effort they can be implemented on other machines so long as suitable hardware is available.

Program 2 is a second audio generator, but this time using the Beeb's sound generator. The tones are less accurate than those from the 6522, but it has the advantages that two or three tones can be generated at the same time, and the amplitudes are controllable.

The coding of frequency in the SOUND command is logarithmic, with one octave being represented by a difference of 48. This gives the factor of 159·45, which is 48/log(2), in lines 130 and 140. The offset of 293 was determined empirically from the fact that a frequency code of 137 comes

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PROGRAM 2

```
10 DIM A(3),PT(3),HZ(3)
20 CLS: FOR J=1 TO 3
30 SOUND J+16,-A(J),PT(J),-1
40 PRINT J;" - Amp. ";A(J);", ";HZ(J);" Hz"
50 PRINT: NEXT
60 INPUT "Channel to change";C
70 IF C<1 OR C>3 GOTO 60
80 INPUT "Amplitude (0-15)";V
90 IF V<0 OR V>15 GOTO 80
100 IF V=0 THEN A(C)=0: GOTO 20
110 INPUT "Frequency (70-2400 Hz)";P
120 IF P<70 OR P>2400 GOTO 110
130 A(C)=V: PT(C)=INT(159.45*LOG(P)-293 + 0.5)
140 HZ(C)=INT(10^((PT(C)+293)/159.45)+0.5)
150 GOTO 20
```

out (at least on my Beeb) at about 500Hz. Adjust this value to tune the generator.

Note that after entering a nominal frequency, the actual frequency—which is the nearest it can actually generate—is displayed. Be warned that without calibration the absolute accuracy of the generated tones is at best only moderate.

Besides sounds, all home computers produce pictures. This is usually done by generating a standard video signal, which can then be modulated to pass into a domestic tv, or can go straight into a video monitor.

This gives a useful source of video test signals. Program 3 can produce nine simple test patterns. Pressing a key from "1" to "9" invokes the corresponding pattern. Pressing "0" halts the program.

All of the patterns are generated using the standard graphics commands, MOVE and DRAW. Other computers usually have equivalents which do the same thing.

PROGRAM 3

```
10 MODE 0: GCOL 0,1
20 T$=GET$: IF T$<"0" OR T$>"9" GOTO 20
30 CLS: T=VAL(T$): IF T=0 THEN STOP
40 IF T>=4 GOTO 110
50 ON T GOSUB 60,80,90: GOTO 20
60 FOR J=21 TO 630 STEP 42: FOR K=J TO J+5
70 MOVE K*2,0: DRAW K*2,1023: NEXT K,J: RETURN
80 FOR J=12 TO 255 STEP 23: FOR K=J TO J+3
90 GOSUB 60: GOSUB 80: RETURN
100 MOVE 0,K*4: DRAW 1279,K*4: NEXT K,J: RETURN
110 RESTORE 140: FOR J=4 TO T: READ BW: NEXT
120 FOR J=0 TO 639 STEP BW*2: FOR K=J TO J+BW-1
130 MOVE K*2,0: DRAW K*2,1023: NEXT: NEXT: GOTO 20
140 DATA 8,5,3,2,1.5,1
```

The patterns produced by Program 3 are vertical bars, horizontal bars, crosshatch, and a range of full-screen "multiburst" lines. The latter consists of alternate black and white vertical stripes. Among other things they can be used to estimate the frequency response of the system, as the narrower the stripes the higher the video frequency needed to represent them.

Of course, using a computer's video generator is not as good as a purpose-built instrument—the crosshatch pattern, for example, does not go all the way to the extreme edges of the screen—but it is cheaper!

There is a lot of room for expansion in Program 3. After a lot of twiddling, I have managed to produce a moderately respectable test card, missing only the "castellations" around the edge of the screen. You might like to give this a try.

There may be scope for re-programming the 6845 crt controller to extend the display width and height, but I have not yet tried this. I would be interested to hear from anyone who has.

As always when using the computer to generate signals, take care when putting them into a transmitter. In particular, make sure any audio tones are properly filtered, as computer outputs are usually square wave. Fail to filter, and your two-tone test rapidly becomes a 12-tone test, and your radio neighbours will not be amused.

Incidentally, should you ever need a signal source to test a receiver on an apparently dead band, I can recommend putting an unscreened computer anywhere within a few feet of the antenna.

HF contest scoring programs

There have been many programs published for scoring vhf/uhf contests, but relatively few for hf contests. I suspect that the main reason for this is the variety of scoring systems used. While nearly all vhf contests are scored in much the same way—according to distance—hf contests use a variety

of methods, such as points according to whether the worked station is in another county, country or continent, with many different multiplier schemes.

This variety has two effects. The first is that to work out the score for a contact it may be necessary to determine, from the callsign, where the station is located. This implies the need for a data-base of callsign prefixes. The second is that a program to calculate the score for any given hf contest is likely to be useful only for that contest, and for no others. In other words, you need a different program for every contest.

As regular readers will know, I am all for radio amateurs writing their own programs (like home construction, only cheaper). Therefore, over the next few editions I will be presenting a few techniques and routines which you may find useful in writing your own contest scoring programs.

Oddbits

G4NRY claims a record for the shortest useful program to appear in *Radio Communication* with the following for the Amstrad CPC computers:

10 IF INKEY$<>" " THEN SOUND 2,73,10: GOTO 10 ELSE 10.

Type in SPEED KEY 4,5 and RUN the program. By pressing any key, or connecting a morse key to the joystick port (G4NRY recommends pins 1 and 9) you have an effective morse practice oscillator.

G4FRO has noted that most of the contacts he makes in vhf/uhf contests are in locators starting with "IO", and has added the following typing saver to his vhf contest scoring program:

IF LEN(a$)=4 THEN a$="IO"+a$.

Change "a$" to whatever variable your scoring program uses for the locator, and add the line just after the locator INPUT. Then whenever you have a locator starting with "IO", you can just enter the final four characters.

G6LAW (5 Teal Close, Fareham, Hants PO16 8HG) published an article in Spring 86 *Datacom* entitled "RTTY on the Electron", including constructional details for an Electron I/O port using a 6522 VIA. He can now supply the ports in kit form or ready built. Details from the above address. G6LAW is also on the look-out for slow scan tv or fax software for the Beeb. □

SWL

*Bob Treacher, BRS 32525**

AS WE ENTER the last quarter of the year it is time to look forward to the winter's projects: catching up with the summer's QSLing, bringing the station's record-keeping up to date, making that new antenna in readiness for the forthcoming dx season, or thinking of improving the station to ensure that less dx is lost in future. The traditional start of the autumnal dx season, occurs this month with the CQ WW Contests at the end of October and November to give the bands a much needed boost from the summer doldrums. With the sunspot cycle offering little help on the main dx bands, it is hoped that 3·5 and 7MHz will continue to provide some tasty dx after sunset; also that conditions on 1·8MHz will be a little more favourable than they were last season. Whatever happens, I am sure that swls will let me have their news so that it can be reported in this column. The number of newer BRS members who entered the SWL Contest in July was particularly welcome, and I hope that they will join those others who send me regular reports, thus increasing their input to the listener activities organized by the RSGB.

Here and there

I Wood, BRS88019, is one new member. At present he uses a Lafayette HA350 with a long wire, although he was on the look-out for a more modern general coverage receiver.

Angela Sitton, BRS88639, had made up a solid brass "Kent" morse key with real silver contacts which she purchased at a mobile rally. She was having tuition and is hopeful of being proficient enough to get a pass before she sits the RAE in December. For hf she has constructed an inverted-L antenna for use on the lower frequency bands this winter, and has a new 28MHz preamp which works well. Not content with that, she was in the process of constructing a cw filter/morse oscillator and was having thoughts on building a 144MHz converter.

G4JT provided some feedback following the mention of his vhf and meteorology study several months ago. He has some hypothesis which may be useful in our day-to-day monitoring of the vhf bands. Firstly, that as well as facing your beam into the wind to protect it from damage, it seems that that is also the best path for dx too. Secondly, humidity is critical to distance —75 per cent humidity is considered to be a good value. It is said that the greater the humidity the less distance, and the less the humidity the greater the distance.

G0CJM returns to 9V1 in December. At the time of writing he did not have his callsign, but promised to let me know so that it could be publicised. He intends to be quite active, listening for Gs between 2200 and 2230gmt daily, except Saturdays when he will be QRV from 1600 to 1800. He will be looking for QSOs on cw 4kHz from the band edges, including 7,004 and 10,004kHz. All swl reports will be gratefully received and will be acknowledged via the SARL bureau.

G8GFF advised that G1CSR will be active on 144MHz using low power, but with a seven-element Yagi at 250ft from Central London, especially at lunch-times. SWL reports will be especially welcome.

G1BUO mentioned that the Cray Valley Society, of swl contest fame, will be using the special callsign GB4OCV during October in connection with their 40th anniversary celebrations. SWLs are invited to listen for the station to obtain a special QSL card and also to obtain sufficient points to claim a special award. Further details from G1BUO.

Brad Bradbury, BRS1066, returned from a long holiday in W3 and W4 to find a large selection of QSLs waiting for him. Included were four new oblasts, taking him to 83 confirmed.

David Burt, BRS85613, recently had a QSL from BV2B, who indicated that there are now quite a few swls in Taiwan.

Graeme Caselton, RS44984, had received his DXLCA certificate for having confirmations from 100 different countries. He is now after the five-band version. Few listeners seem to collect certificates now, but this Society one is well worth having in the shack. Why not check your records to see how many countries you have confirmed and send off a claim?

VHF corner

Last month I mentioned briefly the sporadic-E on 8 July to SM and OH. Now the dust has settled on what was an unusual direction for Es—to Scandinavia—I have not only my own impressions but those of Mick Toms, BRS31976 (Essex), and Colin Watson, BRS46598 (West Scotland). In London, the opening appeared to last only 8min, with SM4GVF (JO79), SM0MEM (JO99), SM5DYC (JO89) and OH1AWW (KP10) being logged. All signals were 59.

In Essex, Mick heard SP6GVU and SO6AUU (both JO81) at 1844. The Scandinavian opening only lasted 5min with him, but Mick logged SM4GVF, SM0HAX (JO99), SM6CMU (JO57) and SM0OUG, SK0LM and SM5EVZ (all JO89). In GM, Colin was hearing different dx. He provided no details of time or QTH locators—can you do so, Colin?—but logged OK3CFH, HG1SO, HG0HO, HG1VQ, HG2RI, SP6LZW, SP9CSO and YU1PCA.

On the tropo front, apart from G0AEA on the Scilly Isles and EI3VPH/P in WL square, little of note had been reported during August. The 2nd produced a few French portables but nothing of any consequence.

The Perseids meteor shower appears to have peaked late on 12th August. I only have my impressions at the time of writing, so I will hold over a detailed report. As an appetizer, good meteor bursts were heard from EA6FB, HG2NP/0, I4XCC, OE5MKM, SP6FUN, TK5EP and YU1EV.

HF news

Most of our reporters were obviously on holiday at the time of the deadline for this piece, as I only have hf news from BRSs 1066, 20249, 44984, 87156 and 88639. However, it appears that if you chose your operating times carefully you would have been rewarded. A few of the more exotic callsigns mentioned were VS6CT/KP2, KH6DC/KL7, KE5OG/V44, EJ5EP (Saltee Is), VE2PAB/4U (counts as YK for DXCC), K2MPY/VP2M and OH0BH/OJ0. On the lower frequency bands, CX1TE, HC5EA, HH7PV, 4J4F and 8R1RPN were noted on 7MHz. Several loggings were incorrectly reported—JA4CYG was /MM off the coast of West Africa when I heard him last, and should not be counted as JA. "ZD5LOB" is obviously a case of the station being mis-logged. CE0ERY is located on Easter Island, not on mainland Chile, and 4U1VIC QSLs should go via the OE bureau. It takes only a little extra time to ensure that the details of a heard QSO are correct. That extra time will undoubtedly reap rewards in the longer term —the message is clear.

Finale

Lastly, a reminder to participate in the HF Challenge on 25 and 26 October —rules last month. The tables have been held over this time as there were only a handful of updates. News and views for inclusion in the December issue should be received by 20 October, with late copy by 28 October. □

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DATA COMMS

*Ian Wade, G3NRW**

AMRAC news

The secretary of AMRAC (the Amateur Radio and Computer Club), Phil Bridges, G6DLJ, has recently moved house to 9 Hollydene Villas, Southampton Road, Hythe, Southampton SO4 5HU. He can be contacted by phone in the evenings on 0703 847754, and also via Prestel mailbox number 703847754. The group is growing by leaps and bounds, and publishes an excellent magazine, *AMRAC User*, every eight weeks, with a brief newsletter in between. In the August issue of the magazine there is a design for a digital speech synthesizer for automatic voice station identification; hints on curing rfi from the PK-80 packet tnc; an up-to-date review of AX.25 packet literature; information from the RSGB Repeater Management Group on licensing of packet repeaters; details of packet switch tests in the southwest of England; details of Pac-Comm TNC-200 kits available to members; news about the Arcnet telephone bulletin board; a simple RS232 interface for a Commodore 64; a tutorial on Amtor; details of the Japanese JAS-1 satellite packet mailbox; a report on the Amsat-UK Colloquium in July; and finally (phew!) a list of members. They also mention that Tony Mountifield, G4CJO, is setting up a data comms library for the benefit of members. The magazine style is chatty and readable, and the annual sub of £5 seems to be very reasonable. For full membership details send an sae to Tony Trigell, G1JAF, Gleness, East Boldre, Brockenhurst, Hants SO42 7WD.

Packet happenings

Another group specialising in packet has been established in the West Midlands. Called MAXPAK (Midlands AX.25 Packet Radio Group), they have applied for a digipeater to be installed at Dudley, and hope to put on a demonstration of AX.25 at the Midlands VHF Convention on 11 October. An sae to Andy Witts, G1DIL, 56 Stephenson Drive, Hollin Brow, Perton, Wolverhampton WV6 7YB, will bring more details.

Pac-Comm TNC-200 tncs are now being imported into this country by Amdat, whose address is Crofters, Harry Stoke Road, Stoke Gifford, Bristol BS12 6QH. The TNC-200 is a Z80-based TNC-2 clone, and is available in several forms, from basic kits of difficult-to-get parts right up to fully assembled and tested units at £199.

More AX.25 packet stations in the Channel Isles. Jonathan Gready, GJ6ENP, reports that GJ4YAD, GJ6HIB and GU4YMV are active, and that he too will shortly be operational. He asks if there is any packet activity in France—I have not heard of any.

The ARRL is compiling a directory of active AX.25 packet stations on the hf bands, in an attempt to reduce the current confusion over operating frequencies and times, and to encourage more activity. If you are active on hf, please send me details: name, callsign, address, Maidenhead locator, centre frequency (eg 14,101·3kHz—what many people, including myself, loosely call 14,103kHz!), shift (eg 200Hz), speed (eg 300bps), usual operating days and times, and purpose (eg dc experiments, ragchews, digipeating, gateway, mailbox etc). I will collate all this information and then forward it on to the ARRL.

Packet moonbounce

It had to happen! On 29 June W3IWI attempted to connect to "MOON", and successfully copied his own packets on the way back. He used a 26m dish with 140W on 432MHz, plus a standard TNC-2 and an AEA PM-1 hf packet modem. This modem was chosen because it has separate filters and square-law detectors for the high and low tones, hence being about the optimum for paths with lots of non-coherent fading. The tests were done at a time when the doppler shift was small, so that the receiver could copy both the outgoing packets and then their return after reflection from the moon. During the three days of operations, W3IWI had hoped to make two-way eme packet QSOs, but only managed to hear weak packet signals from XE1XA/XE1TU in Mexico City and VE7BBG in Vancouver.

Computer Networking Conference Proceedings

The *Proceedings of the Fifth ARRL Amateur Radio Computer Networking Conference*, which took place in March this year at Orlando, Florida, (Vol 5) is now available from the RSGB (see Mail Order Price List, p748). The 134 pages contain some 28 technical papers representing state-of-the-art thinking on packet. Topics include reviews of protocols, high-speed modems, network addressing and packet routeing, packet switch design and Uosat mailbox operation. If that isn't enough to wipe the smile off your face, you can still get the *Proceedings* of the four earlier conferences, which have now been bound into a single book (1in thick!), together with reprints of ARRL's *Gateway* packet newsletter. This book (Vols 1–4) is also available from the RSGB.

Bi-phase (Manchester) encoding

Following on from August's *Data Comms*, another technique for sending data is known as bi-phase, or Manchester, encoding. Bi-phase has been around for many years in several guises, but probably its most well-known application is in Ethernet. More recently it has popped up in the world of amateur satellites—the new JAS-1 bird will use it, for example.

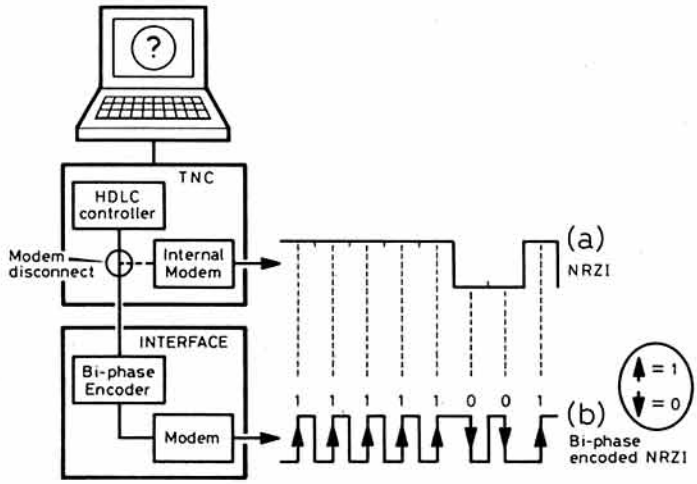

Fig 1. Bi-phase (Manchester) encoded AX.25 packet signals

The principle of bi-phase is very simple, see Fig 1. Basically, for every data bit transmitted there is a change in level between mark and space. A change from space to mark represents a "1", and a change from mark to space represents a "0". The resulting bi-phase signal (Fig 1(b)) therefore contains many more edges than the corresponding NRZI signal (Fig 1(a)), making it easier to recover the clock at the receiving end. So bi-phase is especially suitable when it is expected that received signals will be weak and noisy, and suffering from phase distortion; satellite signals certainly fit into this category.

Will it be possible to communicate with JAS-1 in bi-phase using a standard AX.25 tnc? Unfortunately not. Most tncs contain an internal modem (see Fig 1 again), which modulates and demodulates the NRZI data passing through the hdlc controller. To use bi-phase, it is necessary to break the connection between the hdlc controller and the modem, and to connect the controller to an external interface instead. With some tncs, like the TNC-1 and its clones, it is easy to break the controller/modem connection, simply by removing jumpers from the "modem disconnect" socket inside the tnc, and plugging in the new interface cable instead. With other tncs, however, it will be necessary to cut some pcb traces and solder in a new socket into which you can then plug the interface cable.

The interface unit itself contains the necessary encoder to convert between NRZI and bi-phase, plus a special modem to handle the tones used by JAS-1: 1,200Hz on the uplink and 1,600Hz on the downlink. For the 144MHz fm uplink, the modem simply filters the 1,200Hz bi-phase waveform, rounding off the edges to make it suitable for direct input to the microphone socket of the radio. For the 432MHz ssb downlink, however, the situation is much more complicated, as the modem has to demodulate psk (phase-shift keyed) signals which will be suffering from noise and rapidly-changing doppler shift.

A suitable design for the interface? James Miller, G3RUH, of Amsat fame has been beavering away on a new design over the last few months, and by the time this appears in print he hopes to have tested it live on JAS-1 signals. Assuming all goes well, a pcb will be available from Amsat-UK; send an sae to Ron Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ, for more details. Another design, by JS1UKR, appears in an article entitled "A PSK Demodulator for the JAS-1 Satellite" in the August 1986 issue of *QEX* (published by ARRL). □

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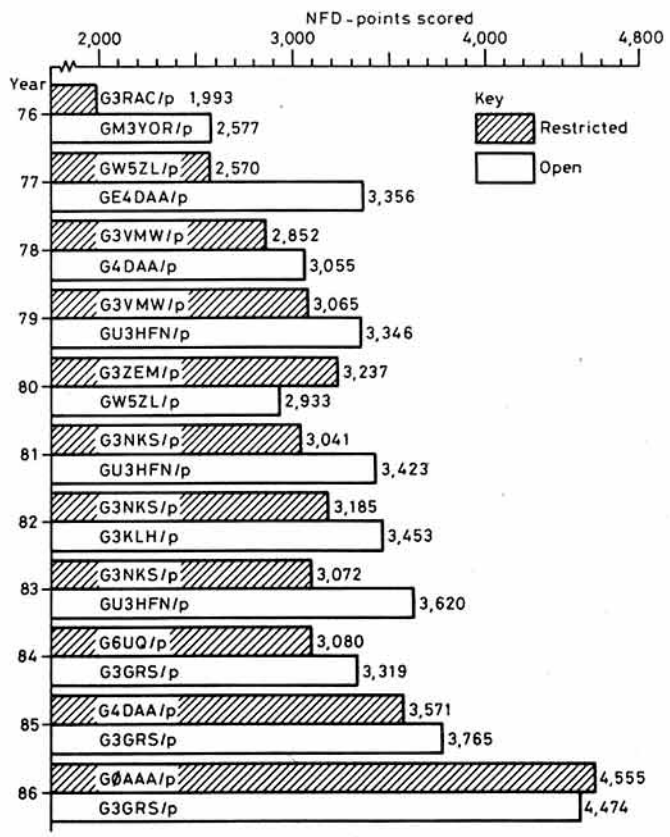
Contest News

HF NATIONAL FIELD DAY 1986 RESULTS

The 1986 NFD, the 46th in the series (taking account of the war years), proved to be an absolute cracker, with the highest-ever scores, no thunderstorms and a minimum of reported problems. With WWV forecasting a low solar flux for the weekend of 7/8 June, the norm for the bottom of the 11-year solar cycle, many entrants were expecting to have to use the lower frequency bands as the main vehicle for their activities. What was not anticipated were the long periods of intense ionization of the E-layer that provided tremendous openings to Europe on 28MHz, and the almost non-stop short-skip conditions on all the other bands. Despite the low sunspot count, there was dx to work in plenty on 14MHz, but the difficulty was to hear it under the mass of S9 plus Europeans and, except for the few single-band entrants, it was largely ignored in favour of the more productive Eu/P stations that proved much easier to work.

It is interesting to note the relationship between conditions and the scores achieved by NFD winners. HFCC member G3TXF has prepared a chart (Fig 1) showing how the winning scores have progressed since the trough of the last solar cycle in 1975-6. Examination of past winning logs clearly shows that the ever higher scores are in direct relationship to the number of Eu/P stations that are available for the UK to work during the contest, and not to dx conditions. The overall improvements in operating skills and equipment also played their part in higher scores, but perhaps not as much as some people think. In 1980, hf conditions were very poor and Restricted Section entries, with their unsophisticated antennas at a low height, were able to outgun Open Section stations by working more Eu/P stations on the lower frequency bands. The Open Section logs for the years 1981, 1982 and 1983, contain a large number of short-skip contacts on 14MHz, together with extensive use being made of 7 and 3·5MHz, and a high number of Eu portable contacts. In 1984, conditions were good and much more dx was worked on the hf bands with lesser use of the lower frequencies, resulting in lower scores. The 1985 logs again showed an increase in the number of DL and HB portables worked and a further upward progression in scores, while this year with the openings on 28MHz and the double-points advantage plus many additional Eu/P stations to work, the scores went through the roof and once again a Restricted Section entrant had the highest score. For the first time in HF NFD, there was organized participation from Italy, the USSR and several other East European countries to supplement the very large DL, HB and other regular contingents.

This extra European portable activity resulted from the promotion of HF NFD during the 1985 Friedrichshaven and 1986 Vienna IARU meetings, and other public relations work done by RSGB representatives since the 1984 Cefalu conference. Copies of the RSGB HF NFD rules and documentation were sent to interested Region 1 societies, and we provided assistance and encouragement as required. We had hoped for DL/P activity on 1·8MHz, but they were not able to arrange this because of the current limited frequencies available to them on the band. The additional HB/P top-band stations were welcome, as were the other newcomers, and we are hopeful that this was a sign that there will be many more countries on during future field-day events. We have certainly tried to persuade more of our Region 1 friends to include 1·8MHz in their local field-day rules. It was also pleasing to the HFCC that a number of newly-formed UK groups were on, as well as some who had not been active in HF NFD for some years. The 1500gmt start and finish was generally well accepted and will be the norm for future HF NFD events.



Leading entrant HF NFD scores in the Open and Restricted Sections, 1976-86

Restricted Section

The outstanding short-skip conditions and first-class operating gave the Three-As Group, G0AAA/P, the opportunity of making the highest score ever achieved in an HF NFD event. Using a TS930S feeding a 256ft centre-fed wire, G3SXW, G3TXF and G3WVG had an average of over 40 contacts/h throughout the 24h. They made good use of the bonus bands, 7 and 14MHz, as the main plank for their 1,000-plus contacts and the NFD Shield.

Second in the section was the Stockport RS entry, G6UQ/P, with operators G3NOM and G3PEK. They also used a TS930S and a c/f wire for their 800-plus contacts and, being the runners-up in the section having the most entries, they will receive the Gravesend Trophy. Their best bands were 28, 7 and 1·8MHz. In third place were the Golden Pot Brigade, G3SYM/P, operators G3KMO, G3SYM and G0EFO, one of the few groups to use the Drake T4/R4 "separates" in place of a transceiver. They will receive a certifcate for their efforts.

Open Section

From the comments on the cover sheets, some groups in the section found it a hard battle to cope with the abnormal conditions and the very high QRM levels. Gravesend "A", G3GRS/P, which won the NFD Shield in 1984 and 1985, put up the highest score in the section. G4BUO and G4FAM were the operators, and they did not seem to find things too difficult as they made over 900 contacts, an average of 38 QSOs an hour. This excellent score nets them the Bristol Trophy. They used a Ten-Tec Omni-D transceiver and had a choice of a variety of antennas, including a four-element monobander for 14MHz, a three-element tribander, separate dipoles for each band, loops for 3·5 and 7MHz, and a T2FD. (*Yes*, they remembered to bring a light this year!)

The Verulam ARS, G3VER/P, operated by G3JKS and G4DJX, was second in the section, using a TS930S. Their antenna farm included a triband beam, a delta-loop beam for 7MHz, and numerous dipoles. Although they also made over 900 contacts, they did not do quite as well as Gravesend on the two bonus bands. In third place in the section was G3RAC/P, Racal "A", with G3PGM, G3YGR and G4CXT sharing the keying. The rig was also a Ten-Tec, and the group was one of a number that used multi-element driven arrays to supplement other antennas. The group also made extensive use of the bonus bands but spent less time on 21MHz than the leaders. Second and third placed, Verulam "A" and Racal "A" receive certificates of merit.

Scottish NFD Trophy

We have become accustomed to finding that Glenrothes in the Open Section are the trophy winners, but this year all is changed, with the leading three stations being in the Restricted Section and a new top station, Aberdeen "A", GM3BSQ/P. In second place was the West of Scotland, GM4TOQ/P, while Glenrothes, GM3ULG/P were third. Aberdeen used a Swan 102BX transceiver feeding a 264ft c/f wire and their operators were GM3WTA, GM4SID and GM4ZRR. West of Scotland had nine operators and a TS180S working into a top-band loop. Glenrothes used a TS830S and a 256ft c/f wire with five different operators. (We wonder how the Scottish groups manage to find so many operators, when the rest of the UK seems starved of talent!) There were five Open Section and seven Restricted Section entrants in contention for the trophy.

Frank Hoosen (G3YF) Memorial Trophy

In the 'fifties and 'sixties, G3YF was a great supporter of HF NFD and a well-known 14MHz dx operator. When he died, his widow presented the Society with a trophy to be awarded to the HF NFD group which put up the best performance on 14MHz. As in the 1985 event, Guernsey "A", GU3HFN/P, and Croydon/SRCC "A", G6LX/P, both entered a single-band station. During HF NFD, the RSGB President, who was visiting the island, presented the Memorial Trophy to the Guernsey group for their 1985 win. Perhaps this was an omen of things to come, as they have also won it this year, with SRCC the runners-up. GU3HFN/P used a TH6 antenna, and G6LX/P a wire array of eight phased end-fire colinear elements, both proving to be excellent dx antennas as a large number of the contacts made by both stations were outside Europe.

Check logs

Certificates are awarded to the station in each continent that provides UK HF NFD entrants with the most points. This year they go to YU1WR for Europe, to VK6PG for Oceania, and to KA1DWX for North America. There were no check logs from the other continents. Thanks also to the other stations and groups for their most useful check logs. A full listing of these is shown in the main tabulation.

28MHz (by G4RWW)
What superlatives can we use to describe the excellent openings to Europe that enabled so many groups to make their best ever HF NFD scores on the band. With signals arriving at a very high vertical angle, the Open Section with their lofty directional antennas were no better off than the Restricted Section groups using low omni-directional wires, and in some respects were at a disadvantage. Many groups reported that their beams at 60ft had no directivity, and appeared to be skipping over the mass of DL and HB portables during the peak of the openings. A number erected low dipoles or let down and re-tuned their lower frequency wires, while several who had the benefit of telescopic towers rapidly wound these down to minimum height. The initial opening at the start of the event lasted for many hours, and during the peak the QRM levels and the number of stations active was more akin to 7MHz during its busy period. The leaders in both sections used the first few hours on the band to make a substantial number of contacts at a very rapid rate, giving them an unexpected and very useful bonus before having to do battle on the other bands.

The overall band leader, was the Cornish Radio Club, G4CRC/P, in the Open Section. Using a Yagi at 30ft and a vertically-polarized quad loop, it managed to make 60 QSOs/h during the initial opening. It was followed in the Open Section by G3SDC/P, G3PRC/P and G3NJA/P. The Three-A's group, G0AAA/P, led the Restricted Section, with GM3BSQ/P and G3SYM/P in second and third place.

Almost every entrant lost points because of logging errors or through incorrect claimed scores. It would have been helpful if the persons preparing the final logs had taken the trouble to check some of the unfamiliar prefixes in the *RSGB Amateur Operating Manual* to see what continent they were in before entering the score for the contact!

21MHz (by G4BUO)
Because of the poor dx conditions on the band, contacts were almost completely limited to short-skip, and several groups found that this made the band more productive than in recent years. Southwest England seemed favoured in the Open Section, but band scores are in direct relationship to the time a group was prepared to spend on the band. Unlike last year, no Americans were contacted, but PY appeared in a few logs and VK6PG worked two stations in the Open Section around 0800, which seems a surprising time, but it checks with the propagation predictions in the June issue of *Radio Communication*, as well as with the two G logs concerned.

Several competitors made a token three or four contacts just to prove their system worked on the band; in the case of one group, half a dozen Eu/P had been worked before it realized that its FT101 was only delivering 4W output. The group's claim for a miles/W bonus is not upheld! It is several years since anyone bothered with a single-band 21MHz entry, and 1986 was no exception. Torbay ARS, G3NJA/P, in the Open Section was the band leader, making a respectable score as part of its six-band effort with 122 contacts in one session; Cornish, G4CRC/P, was second in the section, and made several visits to the band for its 116 QSOs; and Cheltenham were third—all three used tri-band Yagi beams.

In the Restricted Section, Stockport RS, G6UQ/P, spent nearly 3h making 107 contacts. It was followed by the Golden Pot Brigade, G3SYM/P, and the all-conquering Three-As, G0AAA/P.

14MHz (by G3TXF)
Over 13,000 QSOs were logged, but for the majority of entrants 14MHz was a band for working Europeans. Only the Open Section single-band entrants worked dx in any quantity. Guernsey, GU3HFN/P, the section leader, had a good run of W6/7s, and Croydon "A", G6LX/P, the runner-up, found a number of VKs and other dx. For the lesser mortals 14MHz proved to be a European slog.

Apart from the usual G, DL, HB, ON and PA portables, the band provided many contacts with Europe's newer /P participants, including I, OK, UA, Y2 and others. Rarer calls worked included C30CCA (G4QK in Andorra), G4AAL/CE0 (portable on Easter Island), 3D6AK and 4X6IF/P.

The leading Restricted Section entrant was the overall HF NFD winner, the Three-As group, G0AAA/P, which commented that the relatively poor dx conditions and good European propagation may have worked to the advantage of those with simpler antennas. Downs Contest Group, G4FNL/P, second in the section, used the same type of antenna as Three-As, while Worthing, G3WOR/P, had a dipole to make third place.

Log checking brought to light some 27 unmarked duplicates and about 600 wrong callsigns. On average, entrants lost about seven per cent of their claimed points, with the booby prize going to the group that worked an HB9/P, logged it as a 4S9/P and promptly claimed six points!

7MHz (by G3SXW)
The 7MHz band is commonly referred to as the "bottomless pit", as more QSOs and points are available than on any other band. This year the high levels of activity on the higher frequency bands, particularly 28MHz, drew some of the activity away so that 7MHz sounded a little less frenetic than usual, but nonetheless an average of nearly 500 points was scored on this band by the 105 entrants that used it, and it contributed a quarter of all the HF NFD contacts. The majority of QSOs were with European stations, but inter-G traffic was also very prevalent. Some dx was worked, including North America around 0100 and with VK early Saturday evening during the "Grey-line" opening.

Logs were generally of a high standard and only a few contained unmarked duplicates. The only two logs with more than one of these had been checked and several dupes removed before submission, but clearly had not been checked carefully enough. (A common fault—*G6LX*). The major loss of points derives from inaccurate recording of the callsign either at the time of the contact or later, during log preparation.

The band is alway a favourite for the single-band entrants and, as they are able to concentrate all their efforts in a single direction, they usually do well. This year is no exception, with the highest scores in both sections coming from these groups. In the Open Section, three single-banders were in contention, Lime and Cedar CG, G5RS/P; Grimsby ARS, G3CNX/P; and Clifton "B", G3JKY/P, and they finished in that order.

The Restricted Band leaders were the XRO CG/Eccles & DARC, G3XRO/P: the Chiltern ARC, G0ACL/P, who put in a three-band entry; and the Three As, G0AAA, (multi-band), the HF NFD winning entry.

The many comments from entrants attached to band cover sheets are much appreciated by your adjudicator. They reflect a happy scene on 7MHz, for example: "The band to come back to when things dry up elsewhere" (*G4TLH*), and "How could anyone dream of changing such a fantastic contest" (*G4MCC*). See you again next year.

3·5MHz (by RS20249)
This was the "bread and butter" band with plenty of G and Eu portables, a good sprinkling of two-point non-NFD stations, but little or no dx. Some groups found it hard going, but others were pleased with their efforts. In the latter category were Sutton & Cheam RS, G4BOX/P, which finished as the Open Section leader with 273 contacts. Second was Gravesend "A", G3GRS/P (215 QSOs), with Hornsea ARC, G4EKT/P, in third place.

The Restricted Section leader was Echelford ARS, G3UES/P which managed to make 276 contacts, while the runner-up, the Mid-Bedford CA, G4MBC/P had 224 QSOs, and in third place was the East Barnet ARC, G6KQ/P.

Conditions varied considerably—the further north you were sited, the less there was to work. In GM, only one group was able to make over 100 contacts, and all reported on the poor state of the band. ZC4TB/P was worked by a few entrants, and there were a few USA stations and one LU in a small number of the logs.

The adjudicator feels that mention must be made of the number of logs that were incorrectly totalled. One group failed to account for two pages of their log, and many others lost their way in what would seem to be simple addition. Eleven logs were found to have one or more unmarked duplicates, which were penalized according to the rules. Another group claimed five points for each /P station worked—nice try lads. Finally, contacts with UB/P stations do not warrant the merit of six points!

1·8MHz (by G3KDB)
Ninety-three logs were received for this band and produced over 6,700 QSOs, of which 5,200 were fully cross-checkable as they were in other entrants' logs. With such a high number of checkable contacts, there were a lot of errors because of wrong callsigns and reports etc. There were some unmarked duplicates resulting in the loss of well over 100 points. The adjudicator was amazed to find his own callsign in one log, especially as he was active throughout the contest with his local group and using the club call!

Very few stations were worked outside of Europe, but it was pleasing to note the callsigns of some of the more unusual European countries that were operating /P. Once again several groups logged QSOs with DL/P stations, but this was wishful thinking as we are reliably informed that there was no /P activity from Germany on the band.

The Open Section band leader was the Maidenhead & DARC, G3WKX/P, which submitted a single-band entry. It was followed by the Southgate ARC, G3SFG/P, with the Gravesend "A" entry, G3GRS/P, third. The Restricted Section winner was the Scottish HF NFD winner, Aberdeen, GM3BSQ/P, with Oxford & DARS, G5LO/P, in second place, and Stockport RS, G6UQ/P, third.

Equipment and antennas
A count of the rigs listed on the cover sheets shows that 34 different types of transceiver and two "separates" were in use. The TS930 was again the most popular, with the various FT101 models a close second. Not every group gave details of its antennas, but in the Open Section, the triband Yagi was favoured by 25 groups for 14, 21 and 28MHz (including a number of the larger TH6, TH7 and KT34 units). There was a small number of multiband quads in use, and a few groups had separate single-band three- and four-element Yagis either on separate poles or mounted Christmas-tree fashion. One group used a many-element LPA array, but gave no details. There seems to be a revival of interest in the use of fixed-wire arrays, including the lazy-H, sterbas and various combinations of colinear, end-fire and broadside antennas. On 7MHz, 15 groups used rotary beams and 11 used phased arrays with four or more elements. The four- and five-element sloper was widely used on 3·5 and 7MHz, and there were several V-beams in use. While most groups used dipoles or long wires for 1·8 and 3·5MHz, there were a few that were different, including loops, a cubical quad reversible beam (no other details given), phased zig-zags and an extended double-zepp.

Once again many Restricted Section entrants favoured the centre-fed wire, with lengths as diverse as the 57 varieties, there was also a wider selection of other types in use this year. A check on the cover sheets shows that the variation in length of the c/f wires was from 130ft to a massive 750ft (how did they keep the centre off the ground!) A derivation of the 5RV is listed in a few cover sheets, and it appears that someone has found a "magic" length which provides a low swr on all bands (including 1·8MHz) without recourse to a tuning unit and without joining the feeders together and working it as a "T". Unfortunately, none of the users disclosed the length of the top or gave any other details. Several groups used multiband loops, including one monster with horizontal sides of nearly 300ft. The trap and linear decoupled multiband dipole, that was popular in the early days of the Restricted Section, seems to have made a comeback with a number being used. Caravans, vans, motor-homes and other specialized vehicles have become commonplace as the HF NFD "shack", but there are still a few that use tents.

Virtually every entrant used a motor-driven generator of some sort fuelled by petrol, diesel or gas. These mobile power units are still the weak link in HF NFD operation, and a number of groups reported troubles. One group went through three separate generators and finished up by powering their transceiver with batteries removed from operators' and helpers' cars. Another started the event with a borrowed generator that had a gooed-up fuel system which had to be cleaned out at ever-decreasing intervals. After a while the group gave up the unequal struggle and went home! It always pays to bring a torch to HF NFD, as one group discovered when the generator broke down during the night and they had to wait until dawn to locate the problem. Diesel oil is smelly and messy even when it is in a can, but it's much worse when it's not contained—as another group found when a helper left a tap partially on after refuelling, depositing 15 gallons of the fuel on the floor of the hired generator vehicle. This was only discovered at the next visit to the generator in the wee small hours. Apart from the problem of getting

RESTRICTED SECTION

Posn	Society or group	Callsign	BAND (MHz) 1·8	3·5	7	14	21	28	QSOs	Final score
1	Three As CG	G0AAA/P	738	657	902	713	299	1,246	1,010	4,555
2	Stockport RS	G6UO/P	748	661	752	349	381	1,006	835	3,897
3	Golden Pot Brigade	G3SYM/P	576	450	664	435	351	1,120	791	3,596
4	East Barnet ARCC	G6KQ/P	730	722	542	259	246	952	750	3,451
5	Red Dragon CG	GW8GT/P	720	587	552	390	277	864	786	3,390
6	Mid-Beds CA	G4MBC/P	598	799	482	469	223	676	737	3,247
7	Lichfield ARS	G3WAS/P	738	588	705	332	93	746	703	3,202
8	Aberdeen ARS A	GM3BSQ/P	774	136	508	469	160	1,128	635	3,175
9	Crawley ARC	G3WSC/P	636	624	712	458	172	488	683	3,090
10	Marple CC	G4MCC/P	732	450	536	409	215	712	654	3,054
11	Downs CG	G4FNL/P	734	493	446	689	159	482	699	3,003
12	West of Scotland ARS	GM4TOQ/P	464	428	558	408	211	876	641	2,945
13	Colchester RA	G4CRA/P	746	478	674	324	134	576	629	2,932
14	Leyland Hundred ARG A	G4TLH/P	668	460	573	450	100	588	603	2,839
15	Thames Valley ARTS	G3TVS/P	734	433	570	371	61	666	603	2,835
16	Glenrothes & D ARC	GM3ULG/P	694	275	542	392	176	704	608	2,783
17	Oxford & D ARS	G5LO/P	762	544	538	512	209	152	642	2,717
18	South Manchester RC	G3FVA/P	414	596	450	267	224	764	670	2,715
19	Stirling & D ARS	GM6NX/P	304	207	300	413	184	1,060	521	2,468
20	Western ARC (IoM)	GD3RFH/P	596	279	558	413	268	348	626	2,462
21	White Rose ARS	G3PSM/P	678	463	397	531	186	182	570	2,437
22	Gloucester ARS	G4AYM/P	510	462	508	185	108	648	519	2,421
23	Preston ARS	G3KUE/P	364	563	470	324	106	544	541	2,371
24	Telford & D ARS	G3ZME/P	472	396	458	505	209	328	572	2,368
25	Norfolk ARC A	G4ARN/P	516	526	693	383	74	160	563	2,352
26	SRCC/Croydon B	G3SRC/P	372	288	622		161	886	499	2,329
27	South Hampshire ITS	G3DIT/P	400	251	491	336	158	652	478	2,288
28	Echelford ARS	G3UES/P	438	954	472	212	8	144	541	2,228
29	West Kent ARS	G3WKS/P	620	286	432	278	102	504	466	2,222
30	Cheshunt & D ARC	G4ECT/P	400	404	239	318	221	616	466	2,198
31	Hereford ARS	G3YDD/P	702	294	254	369	70	480	470	2,169
32	Melton Mowbray ARS	G4FOX/P	558	580	422	276	84	220	488	2,140
33	Gravesend RS B	G0DYX/P	624	362	378	288	72	380	458	2,104
34	Worthing & D ARC	G3WOR/P		620	487	625	168	196	584	2,096
35	Easington ARS	G4APN/P	442	293	450	354	116	434	467	2,089
36	Aberdeen ARS B	GM4TEF/P	308	82	404	403	92	770	448	2,059
37	Shefford & D ARS	G3FJE/P	434	451	476	256	10	392	429	2,019
38	Guernsey ARS CG B	GU4NYT/P	56	276	413	417	150	682	499	1,994
39	Scunthorpe ARC B	G4FUH/P	198	536	465	383	16	266	473	1,864
40	Reigate ATS	G5LK/P	658	253	358	427	135	28	450	1,859
41	Bredhurst "Zog Force"	G0BRC/P	116	254	588	254	89	540	434	1,841
42	Weston-super-Mare RS	G4WSM/P		442	654	226	152	292	488	1,766
43	Braintree & D ARS	G4JXG/P	214	455	286	456	106	212	444	1,729
44	Norfolk ARC B	G4RKL/P	260	417	510	348	60	44	411	1,639
45	Hastings E & RC	G6HH/P	152	353	339	91	63	622	358	1,620
46	Crystal Palace & D RC	G3VCP/P	340	355	392	143	72	300	373	1,602
47	Aylesbury Vale RS	G4VRS/P		494	246	409	124	292	393	1,565
48	SEARS CG	G4RSE/P	472	118	293	374	118	164	346	1,539
49	Maidstone YMCA ARS	G3TRF/P	448	174	317	236	83	276	374	1,534
50	Thornton-Cleveleys ARS	G4ATH/P	444	282	346	116	58	200	315	1,446
51	North Bristol ARC	G4GCT/P	322	256	317	204	32	270	322	1,401
52	Blackpool & Fylde Group	G8GG/P	376	383	322	173	125	16	340	1,395
53	Chiltern ARC	G0ACL/P	204	212	949				399	1,365
54	Torbay ARS B	G4SBH/P		106	630	432	86	8	347	1,262
55	Darwen ARC	G4JS/P		32	166	375	188	424	299	1,185
56	Mid Cheshire ARS	G3ZTT/P	324	118	74	236	69	316	226	1,137
57	Chesham & D ARS	G3MDG/P		375	26	296	55	364	288	1,116
58	XRO CG/Eccles & D ARS	G3XRO/P			1,101				322	1,101
59	Aberdeen ARS C	GM4AZZ/P		337	150	371	16	200	284	1,074
60	Havering ARC	G4HRC/P	40	276	124	384	118	128	310	1,070
61	Cunninghame & D ARC	GM3USL/P		4	52	110		560	140	726
62	RCT ARS	G4GGD/P		103	302	98			160	503
63	Leyland Hundred ARG B	G4PPG/P		112	10	52		96	75	270

Check logs: C30CCA/P, G0AER/P, KA1DWX, N4LS, PA3BFH, VK6PG, YU1WR, YU5FNT/M, YU7MGU/P, YU7SF.

OPEN SECTION

Posn	Society or group	Callsign	BAND (MHz) 1·8	3·5	7	14	21	28	QSOs	Final score
1	Gravesend RS A	G3GRS/P	872	819	813	691	251	1,028	965	4,474
2	Verulam ARC A	G3VER/P	742	602	769	681	362	934	924	4,090
3	Racal ARS	G3RAC/P	814	615	885	569	73	1,038	878	3,994
4	Cornish RC	G4CRC/P	654	433	602	437	386	1,456	836	3,968
5	Torbay ARS A	G3NJA/P	636	596	523	710	421	1,044	889	3,930
6	Cheltenham ARA	G5BK/P	752	555	711	578	324	906	863	3,826
7	Addiscombe ARC	G4ALE/P	764	688	678	725	196	734	878	3,785
8	Leicester Polytechnic ARS	G3SDC/P	740	641	722	204	217	1,044	762	3,568
9	Scunthorpe ARC A	G3PDL/P	694	633	598	455	214	670	747	3,264
10	Reading ARC	G3ULT/P	576	522	488	568	201	889	745	3,244
11	East Notts CG	G3TBK/P	640	627	690	441	222	594	696	3,214
12	Plymouth RC	G3PRC/P	578	213	539	401	280	1,044	664	3,055
13	Chiltern ARC	G3CAR/P	626	444	506	368	272	736	632	2,952
14	Hull CG	G3ZRS/P	620	620	612	394	233	408	674	2,887
15	Verulam ARC B	G4JKS/P	470	294	770	668	64	612	651	2,878
16	Southgate ARS	G3SFG/P	880	275	454	296	169	764	602	2,838
17	Liverpool & D ARS	G3AHD/P	566	540	452	367	253	652	627	2,830
18	Leicester RS	G3LRS/P	570	588	461	380	124	624	618	2,747
19	Kilmarnock & Loudon ARC	GM0ADX/P	544	340	400	652	148	548	602	2,632
20	Farnborough & D RS	G4FRS/P	512	529	504	370	172	460	596	2,547
21	Hornsea ARC	G4EKT/P	570	685	314	458	81	390	592	2,498
22	Edgware & D RS	G3ASR/P	542	416	517	206	376	436	581	2,493
23	Shirehampton ARC	G4AHG/P	642	475	408	343	259	200	536	2,327
24	Wirral ARS	G3NWR/P	650	323	594	418	28	300	521	2,313
25	Chelmsford ARS	G4CUT/P	374	565	322	370	131	480	504	2,242
26	Southdown ARS	G3WQK/P	642	288	411	393	122	328	481	2,184
27	Windy Yett CG	GM3NIG/P	290	211	320	1,003	123	128	549	2,075
28	Guernsey ARS A	GU3HFN/P				2,020			715	2,020
29	G4GZO NFD Group	G4GZO/P	228	406	480	484	220	200	485	2,018
30	Humberston CG	G3IYT/P	536	340	540	311	44	216	495	1,987
31	Burton & D RS	G3NFC/P	530	244	424	128	8	636	393	1,970
32	Greenock & D ARC	GM3ZRC/P	456	347	231	535	105	272	507	1,946
33	Great Yarmouth CG	G3YRC/P	192	527	268	185	193	572	442	1,937
34	Scarborough ARS	G4BP/P	440	382	406	448	168		478	1,844
35	Maldon & D CG	G4WOI/P	504	342	342	44	12	588	399	1,832
36	Ilford RSGB Group	G3XRT/P	436	478	583	208	123		449	1,828
37	Falkirk & D RC	GM4MCB/P	392	98	406	523	98	160	425	1,677
38	Bromsgrove & D ARC	G3VGG/P	422	412	294	368	38	88	410	1,622
39	SRCC/Croydon A	G6LX/P				1,583			500	1,583
40	Lime & Cedar CG	G5RS/P			1,238				368	1,238
41	Ayrshire ARG	GM0AYR/P		155	350	132	199	273	359	1,109
42	Maidenhead & D ARC B	G3WKX/P	1,082						164	1,082
43	Clifton ARS B	G3JKY/P			982				331	982
44	Sutton & Cheam RS	G4BOX/P		880					285	880
45	Bangor & D ARS	GI3XRO/P	38	8		99	128	590	187	863
46	Meirion ARS	GW4LZP/P	376	278	232	129	16		248	825
47	Maidenhead & D ARC A	G0AYA/P			540	22	16	24	175	602
48	Clifton ARS A	G3GHN/P	276				225	68	141	569

replacement oil during the night, it was a sad experience for all those who had to clean the generator and the site! (We hope the group paid the dry-cleaning charges).

Sutton & Cheam found the knob on its atu was much more useful when it was used to replace the one lost on their Camping-Gaz cooker!

Inspections

Around 30 per cent of the entrants were inspected by persons nominated by the HF Contests Committee. No difficulties were experienced by the inspectors, and all reported that the stations visited were operating within the rules and spirit of the event. As mentioned in last year's report, the committee's aim is for every group to be inspected, and this year's visits included a number of groups that had not previously been on the list. The committee notes the comments from one group regarding the problems of notifying a last-minute change of site, and it will review the position and see what alternative arrangements can be made before the next HF NFD. One method that has been used in the past is for a notice to be left at the original site giving details of the new location. This not only helps the inspector but is also useful for other visitors to locate the changed site. On behalf of the Society we thank all the inspectors for their visits and their reports.

Comments

A number of groups complained that they had not received log or cover sheets, others commented on the rules, the future of NFD and other related matters. While it has not been possible to individually list these because of space limitations, we can deal with some of the points and will note them all for future consideration by the HFCC.

There was a problem with the distribution of contest stationery, and, on behalf of HQ, we can only apologise. The HFCC accepted all the entries, no matter how they were prepared (and there were some funny ones!) A query that was raised by several groups is why the Restricted Section antennas are limited in height to 10·7m (35ft) in CW NFD, but the SSB FD rules permit an antenna height of 15m (49ft). The reason is that the RSGB originally set the antenna height for both events at 35ft, but when IARU Region 1 took over the responsibility for the ssb contest, some changes were made to the rules. A number of groups failed to give any details of the antennas in use. This year's cover sheets include "various", "several", "beams" (Open Section), or "wire", "vertical", "dipole" (Restricted Section), and such descriptions are not helpful.

Several groups asked about the use of transceivers as monitoring receivers in the Open Section, and the possibility of them being used as a second operating position in violation of the NFD rules. While this is of course a possibility, we have had no reports from inspectors (or others) that this rule has been violated. There is a suggestion that "check" receivers should be allowed for both sections.

There were complaints from a small number of competitors about their loss of points in previous NFD events. One group went as far as suggesting that checking should be eliminated, and that we accept claimed scores; while another refers to the honesty of entrants and says that the committee is too secretive about checking, and what does it matter if there are a few mistakes as they will average out over all the entrants.

The method used for checking HF NFD logs was fully explained in the 1985 HF NFD report, and the adjudicators follow the procedures that were described. We appreciate that some groups feel aggrieved when they lose points, but if more attention was paid to the accuracy in recording calls and reports when the QSO was made, and more care was taken when the logs were copied, then their points loss would be minimized.

We would be delighted to accept claimed scores **if we could ensure that they were correct,** as it would save us hours of work, but we do not think this would be generally acceptable. Unfortunately for your unpaid volunteer adjudicators, nearly every log submitted for checking this year had errors, and some many more than others! There is no specific pattern, so we are unable to say whether these originated from incorrect recording in the original log, or occurred when the logs were copied. The group that suggested scores would average-out is completely off-the-beam, as a lot of points had to be deducted from the claimed scores and necessitated a check of over 57,000 contacts, a task that took an awful lot of man-hours!

In addition to call and report errors, a number of logs contained unmarked duplicate contacts, and the committee was sorry to have to exclude one entry under the rule relating to an excessive number of unmarked duplicates. We did not do this lightly, and although the group concerned had found and marked many duplicate contacts, unfortunately it left a much larger number unmarked.

In this age of calculators and computers, it seems surprising that people cannot add a page of numbers correctly, but there were many instances of incorrect addition of page scores and totals. A number of groups seemed to be very confused (?) about the changes in the USSR prefixes, and with tongue in cheek decided that nearly all the European USSR stations they worked must be in Asia, so they claimed the extra point(s). Over half the 28MHz logs included a claim of 12 points for a contact with a 4N0/P station (Yugoslavia), and others claimed an excessive number of points for working fixed stations in 9H1 and ZB2—and so it went on!

The future

Following the Vienna meeting of the IARU Region 1 HF Working Group, at which it was agreed to recommend to the 1987 Regional Conference that the June HF NFD becomes the official Region 1 CW Field Day, LA5QK (the Region 1 contest co-ordinator), DK2BI, HB9AGA and G6LX have been

discussing a common set of rules that can be used for future field day events. The questionnaire that was distributed at NEC Convention and to every group that entered this year's HF NFD was to obtain entrants' views on some of the proposals. These include additional sections (single-man station, 25W classes and separate swl listing), if a country multiplier should be included, and if UK entrants favoured a common Region 1 listing of the results.

Ninety groups replied, and a number also provided comments with their answers or with their NFD logs. Sixty-four groups want no change from the present Open and Restricted sections, while a few were in favour of a single manned station or a QRP section (but with a 10W limit in preference to the suggested 25W). Very few groups wanted an swl section as they felt that this might dilute the number of check-operators available to them. (What about the large number of swls who are not members of a group and those that are housebound?)

Only a few groups were in favour of including a country multiplier, as it was felt that this would provide a substantial advantage to the non-G UK countries with their separate DXCC status (in particular GD, GJ and GU). There is a lot of feeling about this and many groups offered suggestions. Typical are that all UK entrants should be classed as one DXCC country for the contest, or that all UK entrants drop the second letter of their prefix and operate under a common G callsign. Another comment was that it would make HF NFD just another dx contest. We found it strange that while so many groups did not want a multiplier, most were in favour of a common IARU listing, although a few thought that this might delay the publication of the results. (If a common listing were adopted, it would make no difference to the publication of the UK results, as each society would be responsible for its own tabulations and report. A copy of these would then be sent to the co-ordinating society nominated by IARU for the fuller common listing.)

A considerable amount of common ground has already been achieved by LA5QK and his sub-committee, and it is hoped that we will shortly be able to publish its recommendations. These will go to the 1987 Regional Conference as a part of the overall recommendation for the adoption of the new CW FD event. We have worked very hard on this and while we are not yet in a position to give specific details, we think RSGB HF NFD supporters will be quite pleased with the end-product. When further information is available it will be published in "Contest News".

In conclusion

The organization and adjudication team for the 1986 HF NFD comprised G3KDB, G3SXW, G3TXF, G4BUO, G4RWW, RS20249 and G6LX. In addition to adjudicating the 21MHz logs, G4BUO handled the entry procedures, arranged the inspections and listed the final tabulations. G6LX supervised the adjudication, edited the band reports and other material, in addition to writing this overall report.

The next HF NFD will be held during the weekend 6/7 June 1987, with a start time of 1500gmt. We look forward to excellent conditions, a bumper entry and participation from more Region 1 countries.

G6LX

Low Power Field Day 1986 results

A dramatic increase in entries reflects the growing interest and also the rule changes introduced in this year's contest. Conditions were much the same as last year with good inter-G working on 3·5MHz and longskip on 7MHz.

Several stations expressed preference for separate band sessions or even a single-band event. Your adjudicator feels that although 3·5MHz carried the bulk of contacts, the availability of 7MHz gives added interest and provides a chance for the stations away from the central area of activity.

Entrants also commented that non-portable stations using low power should score higher points. This and other suggestions will be discussed by the HFCC when considering the rules for future events.

This year's winner of the Houston-Fergus trophy is Jeff Pascoe G4ELZ/P. Section B winner is G0DYX/P and the certificate for the non-portable station check log goes to G0EOW.

Once again logs were well presented, with only two original logs this year. A neatly re-written log on 40-line sheets does help! The prize for the most amusing comment must go to G4ARI/P with his anecdote on coping with the English weather—his choice of al fresco operating using a patio table and chair proved too much for our climate.

G3SJJ

SECTION A (10W output maximum)

Posn	Callsign	TX/RX	Antenna	QSOs 3·5MHz	7MHz	Points
1*	G4ELZ/P	FT301D	Dipoles	59	43	1010
2*	GW4ALG/P	FT707	Dipoles	62	27	970
3*	G4EDG/P	TS120V	Dipoles	47	38	955
4	G3SJJ/P	FT757GX	Doublet	66	27	905
5	G3VER/P	TS120V	Dipoles	57	34	895
6	G3RPB/P	TR7	Doublet	46	38	889
7	G3XWZ/P	Ten-Tec	Dipoles	66	42	887
8	G3SFG/P	TS120V	Dipoles	61	36	865
	G4JKS/P	TS120V	Dipoles	71	17	865
10	G0FDX/P	FT707S	Doublet	69	22	850
11	G4ARI/P	TF757GX	Dipoles	66	16	845
12	G4HFT/P	SS105S	Doublet	65	14	795
13	G3UFY/P	FT7	90ftEF	52	26	790
14	G3LCG/P	ICOM730	Dipole	45	30	779
15	G3VW/P	FT757	Dipoles	49	23	753
16	G3ASR/P	TS520	Dipole	54	18	739
17	G3KTZ/P	Ten-Tec	Dipole	53	17	683
18	G0CLP/P	ICOM730	250ftEF	53	11	623
19	G0BVZ/P	FT757GX	Dipoles	52	6	574
20	GW4CC/P	FT57GX	Dipole	35	9	565
21	G3IGU/P	FT707	50ftEF	20	—	205

SECTION B (3W output maximum)

Posn	Callsign	TX/RX	Antenna	QSOs 3·5MHz	7MHz	Points
1*	G0DYX/P	Argonaut	Doublet	56	20	800
2*	G3VIP/P	FT301S	Dipoles	52	17	740
3*	GI3GTR/P	Argonaut	Dip & EF	25	37	655
4	G0BRC/P	Triton 4	Dipoles	50	16	645
5	G3NEO/P	HW8	Dipoles	34	11	604
6	G4FRS/P	Argonaut	G5RV	49	6	570
7	G3WOR/P	TS120S	Dipole	34	9	495
8	G3YRC/P	Argonaut	Dipole	31	4	389
9	G4MQC/P	Racal	Dipole	27	12	385
10	G3BPM/P	—	—	31	—	375
11	G3CQR/P	Homemade	130ftEF	31	—	365
12	G3ILO/P	Homemade	Dipole	24	—	335
13	G4MWC/P	Homemade	End-fed	23	5	240
14	G3SB/P	HW-8	Whip	18	—	235

CHECK LOGS

1*	G0EOW	50	3	G3MCK	16
2	G3SYA	32	4	G2HLU	15

*Certificate winners.

Summer 1986 1·8MHz results

Static from local thunderstorms seemed to be the main competition this year, with many stations closing down for a while or even altogether! This may explain the low level of support compared with last year's (47 entries to 32) and the number of receive errors found in the logs. Scores were much lower, with few dx QSOs being made at all, only VE1ZZ seemed able to break through the QRN.

Ian, G3WVG/P, operated from Telegraph Hill, St Mary, Isles of Scilly, and was a welcome addition to the counties list. Thank you to G3SVW/A and G4UOL for check logs.

G4DJX

UK SECTION

Posn	Callsign	QSOs	Cntys	Lost	Points
1	GW4IOI*	119	54	0	627
2	G4BUO*	119	52	5	612
3	G3ZEM	115	56	14	611
4	G3WUX/A	113	52	38	561
5	G3PDL	109	48	10	557
	G3TXF	99	52	0	557
7	G3XTT	104	49	1	556
8	G3MXJ	107	50	21	550
9	G0FDX	97	50	0	541
10	G4WQN	97	46	0	521
11	G4KHC	96	45	3	510
12	G2UG	98	44	17	497
13	G3SXW	76	43	0	443
14	G4OGB	73	43	3	431
15	G4UMS	70	39	19	386
16	G3RXP	84	44	89	383
17	G3VYI	65	40	15	380
18	GW3JI	58	37	0	359
19	G3WVG/P	56	34	12	326
20	G4VFC	50	33	11	304
21	G4ODV	45	31	0	290
22	G4LPK	52	28	8	288
23	G3GMM/A	43	29	0	274
24	GM3UM	44	27	0	267
25	G4OOS	54	34	81	251
26	G3BPM	38	27	10	239
27	G4UZN	39	24	0	237
28	G4WYG	43	29	60	214
29	G3ILO	33	22	0	209
30	G4DJX	29	20	0	187
31	G3DOT	28	20	7	177
32	G3KSH	21	15	0	138
Total		**2,274**	**1,217**	**424**	**12,483**

*Certificate winners

OVERSEAS SECTION

Posn	Callsign	QSOs	Cntys	Lost	Points
1	UP2BW*	50	34	4	316
2	OL1BLN*	54	32	15	307
3	OK1DRO	47	30	0	291
4	OK3CGP	47	31	43	253
5	OK1DRU	37	26	3	238
5	HB9AGA*	36	26	0	238
7	UP2BKT	29	23	6	196
8	OL1BIR	39	28	66	191
9	SP1PEA	29	19	0	182
10	OK3CSQ	25	19	3	167
11	OL5BPH	25	22	31	154
12	F8TM*	25	18	22	143
13	EA5CF;	22	17	20	131
14	OL4BOR	13	11	0	94
15	OK2PGT	13	10	0	89
16	OH3GD;	12	11	4	87
Totals		**503**	**357**	**217**	**3,077**

* Certificate winners.

7MHz Contest 1987 rules

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

2. Date and time. Phone: 1200gmt 7 February to 0900gmt 8 February 1987. **CW:** 1200gmt 21 February to 0900gmt 22 February 1987.

3. Sections. Single-operator entries only. British Isles entrants must also be members of RSGB. (a) British Isles. (b) European. (c) non-European.

4. Band and mode. SSB: 7·04–7·10MHz. CW: 7–7·03MHz. Entrants in the CW section are requested not to operate above 7·03MHz.

5. Exchange. RS(T) plus serial number starting 001.

6.1 Scoring.

(a)—British Isles section: five points for each completed contact with European stations, fifteen points for each completed contact with non-European stations. British Isles stations may not work each other.

(b)—European section: five points for each completed contact with British Isles stations.

(c)—Non-European section: fifteen points for each completed contact with British Isles stations.

6.2 Multiplier
(a)—British Isles section: one for each ARRL DXCC country. In addition VE, VK, W and ZL call areas each count as a separate country.
(b&c) European and non-European sections: one for each different British Isles prefix worked, ie G0, G2, G3, G4, G5, G6, G8, GD0, GD2, GD3, GD4, GD5, GD6, GD8, GI0, GI2, GI3, GI4, GI5, GI6, GI8, GJ0, GJ3, GJ4, GJ5, GJ6, GJ8, GM0, GM2, GM3, GM4, GM6, GM8, GU0, GU2, GU3, GU4, GU5, GU6, GU8, GW0, GW2, GW3, GW4, GW5, GW6, GW8 (maximum of 49).
6.3 Final Score. Total contact points multiplied by total of multipliers.
7. Documentation. Logs to be headed: date/gmt; callsign; RS(T)/number sent; RS(T)/number received; multiplier; points. A summary sheet showing the multipliers worked must be included. Duplicates must be clearly marked without claim for points. Unmarked duplicates will be penalized at the rate of 10 times number of points claimed; logs containing more than five unmarked duplicates, for which points have been claimed, would normally result in disqualification. 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.*
8. Name and address for entries. Address logs to HF Contests Committee, PO Box 73, Lichfield, Staffs WS13 6UJ, England.
9. Date for entries. SSB logs must be received by 30 March 1987, and cw logs must be received by 20 April 1987.
10. Awards. The Thomas (G6QB) Memorial Trophy will be awarded to the leading British Isles entrant in the cw contest. Certificates of merit will be awarded to the entrants placed first, second and third in the British Isles, European and non-European sections of each contest.
11. Receiving Section.
(1) Transmitting section rules 1, 2, 3, 4, 6, 7, 8, 9 will apply.
(2) A station may appear once only in the column headed "Station heard". The callsigns of the stations being worked may only repeat once in every three contacts logged. Logs to be headed date/gmt; callsign of station heard; RS(T)/serial number; callsign of station being worked.
(3) Holders of British Class B licences may enter the receiving section.
(4) Scoring
(a)—British Isles listeners should log only overseas stations in contact with British Isles stations. European stations logged, five points; others, 15 points.
(b)—Overseas listeners should log only British Isles stations participating in the contest. European listeners claim five points, others 15 points.
(5) Multiplier as per rule 6.2.
12. HF Contest Championship. Participants in this contest by British Isles stations will count towards the HF Contest Championship for 1987/88.

HF Contest Championship 1986–7 rules

1. RSGB hf contest rules do not apply.
2. No entries for the championship are required.
3. The championship will be decided on the basis of RSGB hf single-operator contests held between 1 October 1986 and 31 July 1987.
4. Points will be awarded in each contest as follows to every UK station submitting logs:
4.1 Points will be calculated by expressing the score gained by each station in each contest as a percentage of the score of the leading UK station in that contest.
4.2 The points calculated in **4.1** will then be multiplied by the following factors for the relevant contest:

21/28MHz Telephony	20	Second 1·8MHz 1986	10
21MHz CW	20	First 1·8MHz 1987	10
7MHz Telephony	20	Town and County	10
7MHz CW	20	Region Round-up	10
Commonwealth	30		

Example: If the leading station in the 21MHz CW contest scores 30,000 points, and the entrant concerned gains 6,000 points, the points awarded to that competitor in the HF Contests Championship for that contest will be:

$$\frac{6,000}{30,000} \times 100\% \times 20 = 400$$

5. Points calculated as in **4** for UK stations using the same basic callsign (with or without suffixes) and entering two or more of the individual contests will be totalled and a table published in *Radio Communication*.
6. Club stations. To be eligible for inclusion, a club station must be operated by the same single operator during each contest. In the event of a club station meriting an award, the award will be made to the operator concerned and not to the club.
7. Awards. The winner will receive the G2QT trophy. A certificate will be awarded to the runner-up.

Second 1·8MHz Contest 1986 rules

1. The general rules for RSGB HF contests, as published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply.
2. Date and time. 2100gmt Saturday 8 November to 0100gmt Sunday 9 November 1986.
3. Sections. Single-operator entries only. British Isles entrants must also be members of RSGB. **(a)** British Isles **(b)** Overseas (including EI).
4. Band and mode. 1,820–1,870kHz, cw only.
5. Exchange. RST plus serial number starting 001. British Isles stations must also give their county code as shown in the "Operating Guide".
6. Scoring.
(a) British Isles section: three points for each completed contact, with a bonus of five points for the first contact with each British Isles county and for the first contact with each country outside the British Isles.
(b) Overseas section: three points for each contact with a station in the British Isles (not EI), with a bonus of five points for the first contact with each British Isles county.
7. Documentation. Logs to be headed: date/gmt; callsign; RST/number sent; RST/number received; code received; bonus; points. Duplicates must be clearly marked without claim for points. Unmarked duplicates will be penalized at the rate of 10 times number of points claimed, and logs containing more than five unmarked duplicates, for which points have been claimed, would normally result in disqualification. Each entry must be accompanied by a cover sheet and the following 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.*
8. Name and address for entries. Address logs to "HF Contests Committee" as follows: British Isles entrants to M Harrington, BRS20249, 123 Clensham Lane, Sutton, Surrey SM1 2ND. Overseas entrants to PO Box 73, Lichfield, Staffs WS13 6UJ, England.
9. Date for entries. Logs must be post marked not later than 15 days after the end of the contest.
10. Awards
(a) The Victor Desmond Trophy will be awarded to the winning station in the British Isles section, and certificates of merit to the second and third placed entrants.
(b) The Maitland Trophy will be awarded to the Scottish entrant with the highest aggregated number of points in this contest with the First 1·8MHz Contest of 1987.
(c) Certificates of merit will be awarded to the first three stations in the overseas section, and, at the discretion of the HF Contests Committee, to the leading entrant from each overseas country.
11. Receiving section.
(1) Transmitting section rules 1, 2, 3, 4, 6, 7, 8, 9 will apply.
(2) A station may appear only once in the column headed "Station heard". The callsigns of the stations being worked may only repeat once in every three contacts logged. Logs to be headed date/gmt; callsign of station heard; RST/serial number/county code sent by that station; callsign of station being worked.
(3) Certificates of merit will be awarded to the leading three entrants.
(4) Holders of British Class B licences may enter the receiving section.

Mid-Thames Treble Night DF Contest

Date: Saturday 25 October 1986.
Map: OS Sheet 175 1:50,000 series, Reading and Windsor.
Assembly: 1900bst for start at 1920bst.
Location: Peppard Common, NGR 709818.
Competitors requiring supper should notify Mr N Woodley, 108 Wantage Road, Reading, Berks RG3 2SF, tel 0734 583812 (home) 0734 866801 (office) not later than 18 October 1986.

Northampton DF Qualifying Event results

Nineteen teams assembled at Castle Ashby for the start of the Northampton RSGB DF Qualifying Event. Station A, G4MZX, was 10km south west of the start, concealed under a fallen tree amidst thick undergrowth in Salcey Forest. Unfortunately for the operator, the area proved to be infested with mosquitos of a most vicious strain. At the end of the contest he estimated that he had lost approximately two pints of blood! Station B, G4IIO, was 25km due west of the start, near to Daventry Radio station on a stretch of disused railway track. This station was not too difficult to locate but entailed a run-in of approximately 1km. The usual splendid tea was provided by the ladies at Yardley Gobion where the results were announced and prizes presented to the winner and runner-up.

			Time of arrival	
Posn	Name	Club	Stn A	Stn B
1	M Hawkins	Chelmsford	1509	1421
2	A Simmons	Mid-Thames	1422	1521
3	D Holland	S Manchester	1423	1523
4	A Williams	Braintree	1436	1524
5	C Plummer	Mid-Thames	1422	1525
6	P Lisle	Mid-Thames	1456	1536
7	F Mepham	Mid-Thames	1438	1536
8	D Yorke	S Manchester	1458	1538
9	C Wells	S Manchester	1422	1539
10	B Bristow	Mid-Thames	1435	1541
11	D Newman	Northampton	1436	1541
12	G Whenham	Coventry	1545	1502
13	B Mahoney	Ariel	1422	1546
14	C Merry	Dartford Heath	1441	1547
15	G Foster	Stratford	1457	1549
16	B Poole	Mid-Thames	1600	1501
17	T Gage	Mid-Thames	1435	1603
18	R Goodearl	Mid-Thames	1606	1524
	I Butson	Colchester	1435	1606

D Holland and A Williams qualify for the National Final.

South Manchester DF Qualifying Event results

This event was run on the "Potteries" OS map, with the start on the outskirts of Crewe. Thirteen teams took part and both transmitters were audible at the start.

Station A, operated by G0AOU and G4SUR, was hidden 16km north west of the start, in dense woodland close to the Weaver River. The first two teams to arrive made their way straight to the station (much to the disgust of the operators). However, the remainder of the teams spent many happy minutes following antennas, falling into swamps etc, whilst totally ignoring the presence of the operator in their midst.

The B transmitter, 26 km north east of the start was operated by G4AUR and G8UQC. It was located on Alderley Edge and, unknown to the organizer and station operators, a tunnel ran under the transmitter site. Many competitors returned to their cars to obtain protective clothing, torches etc, only to find that there was nobody in residence!

Tea was provided at Jodrell Bank, where the results were announced and the South Manchester Cup was presented to the winner, Alan Simmons.

Posn	Name	Club	Time of arrival Stn A	Stn B
1	A Simmons	Mid-Thames	1435	1540
2	C Plummer	Mid-Thames	1446	1541
3	D Newman	Northampton	1449	1547
4	C Wells	S Manchester	1635	1547
5	T Gage	Mid-Thames	1609	1512
6	W Pechey	Mid-Thames	1610	1450
7	D Holland	S Manchester	1510	1610
8	G Foster	Stratford	1506	1615
9	N Woodley	Mid-Thames	1511	1627
10	B Mahoney	Ariel	1628	1514
11	T Hopkins	S Manchester	1524	----
12	D Yorke	S Manchester	----	1548

One competitor failed to find either transmitter.
D Newman and C Wells qualify for the National Final.

Chelmsford/Colchester DF Qualifying Event results

A large turn-out for this event, with 22 teams assembled at Layer Breton Heath on 18 May for the start. Following the Oxford Event some teams came equipped for swimming, but none took to the water.

Station A, G0BTH/P, was 20km southwest of the start in a wood near Stow Maries. This station featured a special balanced antenna, designed to draw competitors away from the transmitter and towards dummy antennas erected nearby. It also featured a dummy operator "Fred", whose upper half was placed near the end of one dummy antenna.

Station B, G4HKC/P, was 10km northeast of the start on the north bank of the River Colne at Wivenhoe. Those who chose the correct side of the river still had to fight their way through some fierce blackthorn to find the transmitter.

Afterwards there was tea at the Prince of Wales ph, Gt Totham, with prizes for the successful and tales of how they had managed it.

Posn	Name	Club	Time of arrival Stn A	Stn B
1	M Hawkins	Chelmsford	1534	1423
2	B Bristow	Mid-Thames	1555	1423
3	R Goodearl	Mid-Thames	1556	1435
4	A Simmons	Mid-Thames	1602	1439
5	P Larbalestier	Colchester	1603	1424
6	A Williams	Braintree	1610	1501
7	C Plummer	Mid-Thames	1613	1507
8	G Foster	Stratford	1614	1439
9	B Mepham	Mid-Thames	1623	1426
10	G Whenham	Coventry	1502	1628
11	W Pechey	Mid-Thames	1456	-
12	P Cranmer	Colchester	-	1509
13	T Gage	Mid-Thames	-	1533
14 =	A Mead	Chelmsford	1534	-
14 =	R Emeny	Colchester	-	1534
16	D Newman	Slade	-	1535
17	C Merry	Dartford Heath	1536	-
18	R DeLaRue	Colchester	1540	-
19	P Bishop	Chelmsford	-	1628

Three competitors failed to find either transmitter.
M Hawkins and R Goodearl qualify for the National Final.

Mid-Thames DF Qualifying Event results

Twenty-two teams assembled in appalling weather conditions at Chawton Park Woods, near Alton, Hampshire. The competitors, whose ages ranged from 12 to 70, heard weak but identifiable signals from both transmitters.

The A station, G3TRY/P, was located 23km north-east of the start, near to the M3 Fleet Service Area, in a dense forest of pine trees and rhododendron bushes. The area was bounded by the motorway, the main-line railway from London to Basingstoke and a golf course, and was extremely difficult to reach. Only eight competitors managed to find this transmitter. Slimline competitors possessed a definite advantage!

The B station, G4MDF/P, was located 10km from the start, at the precipitous hill at Steep, near Petersfield. It was sited to give the competitors some real exercise! A very long antenna was led up the hill and over the top. This had the effect of getting a group of competitors thrashing about at each current maximum. Eventually, one competitor appeared, on hands and knees, at the base of a thick, low yew tree, within 10ft of the transmitter, only to crawl away again. The transmitter crew successfully stifled their sniggers and laughter but they were soon found and nearly dragged from the hide.

Tea was held at the QTH of G8APB, where xyl Ann provided an excellent spread which in some measure compensated for the dreadful weather.

Posn	Name	Club	Time of arrival Stn A	Stn B
1	A Simmons	Mid-Thames	1440	1543
2	I Butson	Colchester	1439	1609
3	T Gage	Mid-Thames	1506	1618
4	C Wells	S Manchester	1623	1449
5	W Pechey	Mid-Thames	1524	1624
6	F Mepham	Mid-Thames	1520	-
7	D Newman	Northampton	1526	-
8	D Yorke	S Manchester	1527	-
9	N Rathbone	Coventry	-	1528
10	R Goodearl	Mid-Thames	-	1531
11	T Judd	Oxford	-	1533
12	A Williams	Braintree	-	1543
13	G Foster	Stratford	-	1544
14	A Sapsed	Mid-Thames	-	1544
15	C Merry	Dartford Heath	-	1546
16	R Brocks	Chelmsford	-	1546
17	N Woodley	Mid-Thames	-	1547
18	S Holly	Salisbury	-	1547
19	B Poole	Mid-Thames	-	1605

Three competitors failed to find either transmitter.
W Pechey and I Butson qualify for the National Final.

Coventry DF Qualifying Event results

Eighteen teams assembled one mile south of Lutterworth for the start of the Coventry Qualifying Event for the RSGB National Final, including two local teams who had never competed at national level before.

Two good signals were heard at the start, and the umpire gave the all clear for competitors to leave at the end of the first transmission. The two local teams required a little assistance, so their departure was delayed for approximate bearings to be given.

Station A, G4GFG/P, was located in dense undergrowth next to the river Sowe, adjacent to the village of Baginton, approximately 14 miles south west of the start. This station proved more difficult to find than the organizers had expected, and even the more experienced teams only just managed to find the transmitter before the end of the contest. One competitor found the station only by getting his headphones entangled in the antenna while crawling through the bracken, then following the wire back to the transmitter.

Station B was located on a disused railway at Galley Common, approximately 15 miles north west of the start. This operator has acquired a reputation for being a bit of a mole, and likes the competitors to know that they have been on a df when they have finished.

Afterwards a total of 41 sat down for tea at the Coventry ARS HQ, where David Holland gave his account of how he and his young daughter managed to win despite the "professional" opposition; Georgina becoming the youngest winner ever of the ladies prize.

Trevor Gage, umpire supreme and nominated representative of the RSGB, then thanked the Coventry ARS for organising the event.

Posn	Name	Club	Time of arrival Stn A	Stn B
1	D Holland	S Manchester	1526	1616
2	T Gage	Mid-Thames	1617	1501
3	C Plummer	Mid-Thames	1618	1447
4	D Yorke	S Manchester	1619	1502
5	B Poole	Mid-Thames	1620	1527
6	D Newman	Northampton	1627	1504
7	R Brocks	Chelmsford	1528	1436
8	P Lisle	Mid-Thames	1629	1544
9	M Hawkins	Chelmsford	—	1513
10	C Merry	Dartford Heath	1543	—
11	G Foster	Stratford	—	1556
12	N Woodley	Mid-Thames	—	1605
13	I Butson	Colchester	—	1616
14	F Mepham	Mid-Thames	1618	—
15	B Bristow	Mid-Thames	1619	—

Three competitors failed to find either transmitter.
D Yorke and B Poole qualify for the National Final.

Contests Calendar

1 Jan–31 Dec	UBA SWL (*Rules in December* SWL News)
7, 15, 23, 31 October	28MHz CW Cumulatives (*Rules in September issue*)
4, 5 October	VK/ZL (ssb) (*Rules in September* HF)
4 October	AGCW-DL Straight Key Party (*Rules in September* HF)
4, 5 October	IX Concurso Ibero-Americano (*Rules in September* HF)
4, 5 October	432MHz–24GHz (*Rules in August issue*)
4, 5 October	IARU Region 1 UHF/VHF (*Rules in June issue*)
5 October	ON 3·5MHz SSB *Rules in October HF)*
7 October	432MHz Cumulative (*Rules in August issue*)
11, 12 October	VK/ZL (cw) (*Rules in September* HF)
12 October	21/28MHz SSB (*Rules in May issue*)
12 October	ON 3·5MHz CW (*Rules in October HF*)
15 October	WA-Y2 (*Rules in October HF*)
15 October	LY (*Rules in October HF*)
15 October	1,296/2,320MHz Cumulative (*Rules in August issue*)
18, 19 October	Autumn VHF RTY (*Details from G6LZB*)
19 October	21MHz CW (*Rules in July issue*)
23 October	432MHz Cumulative(*Rules in August issue*)
25 October	CQ WW DX Phone (*Rules in October* HF)
26 October	70MHz Fixed (*Rules in August issue*)
26 October	DF Treble Night Event, Mid-Thames (*Details in this issue*)
31 October	1,296/2,320MHz Cumulative(*Rules in August issue*)
1, 2 November	144MHz CW (*Rules in August issue*)
3, 11, 19, 27 Nov, 5 Dec	28MHz Phone Cumulatives (*Rules in September issue*)
8 November	Australia Ladies ARA (*Rules in October* HF)
8 November	432MHz Cumulative (*Rules in August issue*)
8, 9 November	European DX (rtty) (*Rules in August* HF)
8, 9 November	Second 1·8MHz (*Rules in October issue*)
16 November	1,296/2,320MHz Cumulative (*Rules in August issue*)
24 November	432MHz Cumulative (*Rules in August issue*)
29 November	CQ WW DX CW (*Rules in October* HF)
2 December	1,296/2,320MHz Cumulative (*Rules in August issue*)
7 December	144MHz Fixed and AFS (*Rules in October issue*)
10 December	432MHz Cumulative (*Rules in August issue*)
14 December	70MHz CW (*Rules in October issue*)
18 December	1,296/2,320MHz Cumulative (*Rules in August issue*)
1987	
7, 8 February	7MHz (*Rules in October issue*)
21–23 March	BARTG Spring RTTY (*Details from G6LZB*)

VHF NATIONAL FIELD DAY 1986 RESULTS

	OPEN SECTION	RESTRICTED SECTION
Winner	Parallel lines CG	East Kent Radio Society
Runner-Up	Hadrabs & Addiscombe CG	Wirral & District ARC
Band leaders		
70MHz	S of Scotland VHF/UHF CG	Wirral & District ARC
144MHz	Parallel lines CG	S Belfast VHF CG
432MHz	Parallel lines CG	East Kent Radio Society
Microwave	Parallel lines CG	Harwell ARS
Leading GI	NW of Ireland ARS	S Belfast VHF CG
Leading GM	S of Scotland VHF/UHF CG	W of Scotland ARS
Leading GW	Warrington CG	Wirral & District ARC
Leading SWL	Martin Parry, BRS52543	

Conditions were generally rated as worse than last year, and this is reflected in lower scores and number of contacts. The weather was variable and some hill-top sites had problems with low cloud. There were the usual tales of disaster, including one group which had hoped to use a helicopter to get the gear to their mountain top, but had to carry it up by hand instead. Fewer inspections were carried out this year, but all the sites visited were complying with the rules.

The experimental introduction of 2,320MHz met with mixed reactions. Those that put in an entry for the band were enthusiastic, commenting that it helped to fill the gaps between 1·3GHz contacts. Other groups felt that the logistics of putting together a five-band entry were beyond the capability of most clubs, and there were a few calls to drop the microwave element of VHF NFD altogether. Your comments on this would be welcomed so that next year's rules reflect the wishes of the majority.

A number of bad-signal reports were received this year, leading to the disqualification of one station and warnings to others. A number of entrants suggested that there should be a limit on distance travelled, as itinerant groups did not take into account the effects they had on the ability of local groups to take part. Again, comments would be welcomed on this subject.

Another trend that disturbs the VHF Contests Committee is the number of amplifiers appearing that are able to exceed the 400W p.e.p limit by a factor of two or more, and the necessity for extremely large antenna systems to remain competitive. The imposition of anode dissipation limits and restrictions on the antennas used in the open section will be considered next year in order to reduce the dependence of success on having large financial resources.

Most logs were of a satisfactory standard but a large number of points were lost due to careless errors. When submitting computer-generated logs, please ensure that Z-fold paper is divided up into separate sheets and correctly collated. Some software leaves a lot to be desired in the formatting achieved.

Congratulations go to the Parallel Lines Contest Group which will receive the Surrey Trophy, and to the East Kent Radio Society which will receive the Arthur Watts Trophy. BRS52543 will receive a certificate as leading SWL overall. Certificates go to the band leaders and runners up in each section, and to the leading station in each UK prefix area.

G3XDY

OVERALL RESULTS—OPEN SECTION

Posn	Group	Score	Band positions 70	144	432	Microwave
1	Parallel Lines CG	3,662	8	1	1	1
2	Hadrabs/Addiscombe CG	3,147	5	6	7	2
3	Sheppey CG	3,115	7	7	3	3
4	The Hillbillies	3,081	4	3	2	6
5	Norfolk VHF/UHF CG	3,007	2	2	8	5
6	Warrington CG	2,799	16	5	4	4
7	S Scotland VHF/UHF CG	2,601	1	4	12	15
8	Flowerpot Men CG	2,203	31	9	5	11
9	Flight Refuelling A	2,105	6	16	9	14
10	PACT	1,824	14	23	14	7
11	Newbury & D ARS	1,705	29	18	11	10
12	RS of Harrow	1,679	-	8	6	23
13	Crawley ARC	1,637	12	24	19	9
14	S Manchester RC	1,417	19	27	24	12
15	Scunthorpe VHF CG	1,391	36	22	16	13
16	Telford & D ARS	1,331	13	35	17	17
17	Horsham ARC	1,280	23	15	25	24
18	Hastings E&RC	1,274	18	13	15	-
19	North Bucks CG	1,221	44	12	13	19
20	Exmoor RC	1,156	37	26	10	-
21	Wolds CG	1,132	11	37	28	25
22	Southdown ARS	1,087	22	14	27	-
23	Clifton ARS	1,052	24	25	32	27
24	Farnborough & DRS	1,048	32	29	26	22
25	Salop ARS	1,041	17	30	29	29
26	Hornsea ARC	1,006	9	44	39	32
27	Ayr ARG	982	28	10	47	42
28	Colchester RA VHFG	973	35	19	20	-
29	Preston ARS	960	3	54	35	-
30	Albright & Wilson ARS	929	20	11	-	-
31	Reading ARC	915	26	40	49	16
32	Saffron Walden & D ARS	858	34	33	21	-
33	White Rose ARS	851	10	46	45	38
34	N Cornwall CG	831	15	21	55	-
35	S Lakeland ARS	817	38	36	38	18
36	Edinburgh D VHF Group	808	-	2	18	20
37	Sutton & Cheam RS	782	-	20	22	26
38	Mid Cheshire ARS	738	25	49	30	-
39	Fareham & D ARC	725	21	50	48	30
40	SNAFU CG	706	-	61	37	8
41	Mid Sussex ARS	640	-	31	23	28
42	Southgate ARC	625	27	38	52	-
43	Tyneside ARS	585	30	34	-	-
44	Leicester Poly SU A	526	-	17	36	37
45	Welwyn Hatfield ARC	497	33	59	51	-
46	Aberdeen ARS & R WCG	488	43	43	43	31
47	Clwyd County Raynet Group	478	-	47	41	21
48	Northern Heights ARS	477	41	41	34	-
49	Yeovil & D ARC	395	-	42	31	34
50	Anglesey CG	375	-	32	33	-
51	W Kent ARS	374	39	56	57	41
52	NW of Ireland ARS	330	40	52	60	-
53	Grimsby ARS	266	45	58	54	35
54	Stevenage CG	254	-	39	50	-
55	Mansfield ARS	248	-	48	42	-
56	Dunstable Downs RC	242	-	51	40	-
57	All Very Good	234	-	60	44	33
58	Larne & D ARS	218	-	53	46	39
59	Plymouth Poly ARSCG	192	-	45	58	40
60	Saltash & D ARC	153	42	-	-	-
61	Hawick Group	115	-	55	59	-
62	Bury St Edmunds ARS	105	-	57	-	36
63	Dorking & D RS	99	-	63	53	-
64	English China Clay RC	65	-	62	61	-
65	Newark AREG	63	46	64	56	-

OVERALL RESULTS—RESTRICTED SECTION

Posn	Group	Score	Band positions 70	144	432	Microwave
1	E Kent RS	3,317	5	4	1	2
2	Wirral & DARC	2,836	1	3	6	13
3	S Birmingham ARS	2,801	8	11	3	3
4	Harwell ARS	2,652	12	23	8	1
5	Cheltenham ARA	2,514	3	6	12	9
6	Bracknell ARC	2,455	9	16	7	4
7	Blackwood & D ARS	2,389	27	2	2	14
8	Five Bells CG	2,368	11	18	4	7
9	Univ of Surrey EARS	2,212	14	12	13	8
10	Surrey Radio Contact Club	2,136	17	20	10	6
11	Abingdon CC/Crimson Kipper	2,047	4	29	30	5
12	Victory CG	1,836	30	5	32	11
13	Plymouth RC	1,786	6	13	15	28
14	S Belfast VHF CG	1,692	-	1	9	-
15	Vale of Evesham RAC	1,674	10	8	20	-
16	Guildford & D RS	1,627	20	38	26	12
17	Shirehampton & Bristol ARC	1,596	19	22	16	21
18	Chiltern ARC	1,563	22	51	19	10
19	Torbay ARS	1,536	7	19	33	23
20	W of Scotland ARS	1,534	2	27	24	29
21	Nunsfield House ARG	1,514	15	37	31	16
22	Basingstoke ARC	1,511	13	7	-	15
23	North Kent RS	1,483	21	30	18	22
24	Edgware & D RS	1,426	28	26	21	19
25	Kidderminster & D ARS	1,391	16	10	34	0
26	Cambridge & D ARC	1,311	34	31	23	17
27	S Bristol ARC	1,289	-	14	5	-
28	Selnet CG	1,244	23	32	36	20
29	Norfolk ARC	1,207	33	17	22	-
30	Shefford & D RS	1,166	25	28	27	-
31	Doncaster ARS	1,164	29	48	14	-
32	Goole R & E S	1,009	-	25	11	-
33	Stirling & D ARS	995	18	36	50	-
34	Ellesmere Port & D ARS	923	24	35	48	-
35	Hillingdon ARC	873	-	42	35	18
36	Lincoln SWC	847	32	40	39	-
37	Edenbridge ARS	827	-	44	17	-
38	Beckside DX Assoc	782	-	9	41	-
39	Bishops Stortford ARS	771	26	52	49	-
40	Thornton Cleveley ARS	731	-	43	25	-
41	Stourbridge & D ARS	720	-	39	28	-
42	E Lancs ARC	709	31	53	51	-
43	Border ARS	702	35	41	54	24
44	SEAR'S CG	689	-	24	38	-
45	Halifax & D ARS	672	-	15	47	-
46	Beacon Hill CG	651	-	49	29	-
47	RAF ARS	573	-	33	40	-
48	Burton on Trent & D ARS	567	-	45	37	-
49	Mexborough & D ARS	564	36	56	46	27
50	E Suffolk Wireless CG	527	-	34	56	25
51	Nene Valley ARC	495	-	46	42	-
52	Gtr Peterborough ARC	466	-	47	43	-
53	N Bristol ARC	444	-	50	45	-
54	Darwen ARC	435	-	54	52	26
55	Mid Argyll ARS	420	-	21	58	-
56	Bromsgrove "Lids"	419	-	55	44	-
57	R E Sharp G1GGT	300	-	57	53	-
58	Kelso ARS	284	-	58	55	-
59	Barry C of FE RS	276	37	59	57	-

OVERALL RESULTS—SWL SECTION

Posn	Station	Score	Band positions 70	144	432
1	BRS52543	2060	1	3	2
2	BRS32525	2000	-	1	1
3	BRS25429	1113	-	2	3
4	BRS28198	466	2	4	4

70MHz

This band has long been regarded as the "gentleman's band on VHF NFD" and again most operators enjoyed this year's event, although most felt that activity was generally lower than in previous years. Predictably, fewer stations were active in the cw section, and, regrettably, at least one entrant was forced to close down when requests to "QRS" were either ignored or mis-understood. It is perhaps worth noting that most cw operators expect that receive speed is equal to sending speed, and those with less experience should keep within their own ability—the good experienced operator will always try to reply at the same speed that he is receiving.

The logs generally were of a good standard, and many "secretaries" who completed a separate cover sheet for each section saved the adjudicator a very considerable amount of time and are sincerely thanked for their extra effort.

G3LCH

EQUIPMENT OF LEADING STATIONS ON 70MHz

OPEN SECTION

1. GM3WOJ/P (four operators)
   - Transmitter: 4CX350 pa, 130W p.e.p output ssb
   - Receiver: 1st rf 3N 204, mixer 3N 204
   - Antenna: 14E NBS Yagi at 40ft above ground
   - QTH: 450ft asl
2. G3SYA/P (one operator)
   - Transmitter: QQV06-40 pa, 100W p.e.p output ssb
   - Receiver: M transverter
   - Antenna: 4-over-4 stacked Yagi at 30ft above ground
   - QTH: 1,500ft asl

RESTRICTED SECTION

1. GW3UVR/P (one operator)
   - Transmitter: 4CX250 pa, 25W ssb output
   - Receiver: 1st rf J310, Mixer Diode Ring
   - Antenna: Six-element at 30ft above ground
   - QTH: 1,850ft asl
2. GM4PHG/P (three operators)
   No transmitter or receiver information except power 25W
   - Antenna: Six-element at 5m above ground
   - QTH: 225m asl

70MHz RESULTS—OPEN SECTION

		CW Section		SSB Section				
Posn	Callsign(/P)	Points	QSOs	Points	QSOs	Loc	Best dx	Km
1	GM3WOJ	1,090	87	1,578	115	74NP	G4MEL/P	567
2	G3SYA	810	87	1,091	121	84SA	GU4XEA/P	606
3	G3MPN	729	69	1,174	114	02QV	GI4ONL/P	597
4	G3ZTZ	757	71	1,131	105	94RJ	G4ADV/P	502
5	G4ALE	674	65	1,177	112	80CO	GM4DGT/P	610
6	G3PFM	764	89	1,074	121	80WP	GM0ZUK/P	699
7	G4BVY	723	77	1,067	119	01KK	GI4ONL/P	657
8	G4HNS	740	88	1,025	123	03CE	GI4ONL/P	512
9	G4IGY	730	76	991	101	94SB	GU4XEA/P	528
10	G3PSM	754	76	819	89	84TF	-	-
11	G3AMW	589	73	883	102	93RS	GU4XEA/P	490
12	G4MEL	611	70	818	94	01OC	GM3RFQ/P	577
13	G3UKV	611	86	810	117	82RQ	GM42UK/P	472
14	G4BOH	600	80	777	110	93FI	GU4XEA/P	435
15	G4ADV	447	37	842	72	70PP	GM4PHG/P	570
16	GW4HGI	385	53	884	114	82KW	G4MEL/P	360
17	GW3NSY	587	75	660	88	82LQ	GM4DZD/P	395
18	G3YYF	550	66	689	99	00HU	GM4PHG/P	635
19	G4HON	450	64	773	107	93BF	GU4XEA/P	418
20	GW3UEY	408	56	777	105	82JG	GM4ZUK/P	520
21	G4ITF	411	63	750	98	90KX	GM4DGT/P	593
22	G3WQK	490	67	661	86	00DR	GM3WOJ/P	557
23	G3SWC	512	69	634	90	90SV	GM4DGT/P	617
24	G3JKY	498	74	642	92	01DH	GM4PHG/P	595
25	G4CAX	396	56	678	88	83PF	GM4ZUK/P	412
26	G3WGV	447	75	615	97	91IH	GM4DGT/P	554
27	G3KTZ	465	70	579	90	91MA	-	-
28	GM4LVW	309	30	733	59	74UU	-	-
29	G3UAX	476	78	558	84	91GI	GM4DGT/P	546
30	G4KDT	483	39	535	47	95RF	G4ADV/P	544
31	GW4KFK	408	57	602	81	82JJ	G4MEL/P	335
32	G4DKN	441	70	515	87	91OF	GM3WOJ/P	468
33	G3LXP	373	63	564	88	91UT	GM3RFQ/P	458
34	G4KF	404	66	491	79	02DA	GM3WOJ/P	449
35	G4TZM	347	51	537	61	01NW	GM4PHG/P	572
36	G4ERG	295	43	472	65	93UK	G4ADV/P	433
37	G4RVJ	427	55	325	44	81CC	G3ZTZ/P	426
38	G3ZFZ	261	35	380	42	84KE	G3YYF/P	449
39	G4OTV	232	47	402	64	01AC	GM3WOJ/P	513
40	GI4ONL	257	19	315	25	64LX	G4BVY/P	657
41	G4GAK	0	-	418	60	93AJ	G4ADV/P	395
42	G4GXK	103	15	306	25	70UM	GM3RFQ/P	543
43	GM4ZUK	0	-	369	25	86RW	G3PFM/P	699
44	G4BJM	292	53	0	-	91NV	GM4PHG/P	498
45	G4KAL	102	20	155	27	93VJ	G4ALE/P	395
46	G4SDZ	0	-	3	-	93QA	-	-

70MHz RESULTS—RESTRICTED SECTION

		CW Section		SSB Section				
Posn	Callsign(/P)	Points	QSOs	Points	QSOs	Loc	Best dx	Km
1	GW3UVR	754	90	1,039	127	83JA	GM42UK/P	436
2	GM4PHG	420	28	831	55	75PS	G3YYF/P	651
3	G4ILI	529	80	702	106	81XU	GM4DGT/P	481
4	G4CXT	513	75	716	112	91LT	GM4ZUK/P	577
5	G3LTY	560	67	618	69	01OI	GM3WOJ/P	547
6	G3ULN	525	53	628	67	80AQ	GM4PHG/P	567
7	G3LHJ	473	53	587	61	80DQ	GM3RFD	523
8	G4OHM	413	65	643	102	82XJ	GI4ONL/P	449
9	G4DDN	384	54	665	83	80ST	GM4DET/P	588
10	G4WAD	429	69	618	98	92CA	GM4ZUK/P	549
11	G4EMK	439	68	572	92	92TR	GB4MTR	477
12	G4HLX	428	73	556	86	91FN	GM4PHG/P	511
13	G3ZOI	403	67	573	82	91KF	GM3WOJ/P	455
14	G4CWH	510	74	430	93	91XG	GM4DGT/P	589
15	G3EEO	486	71	425	70	93BA	GU4XEA/P	395
16	G4CTU	425	65	481	83	82RJ	GM4LVW/P	296
17	G4FUU	325	53	565	120	91XH	GM3WOJ/P	492
18	GM4DGT	349	27	538	40	76XA	G3SWC/P	618
19	G4HHL	366	54	520	71	81QH	GM4PHG/P	514
20	G3PJX	394	67	489	80	91TF	GM3WOJ/P	486
21	G3WMR	344	56	529	83	01BH	GM3RFQ/P	520
22	G4PIE	358	67	448	83	91PP	GM3WOJ/P	433
23	G4JEC	337	59	396	70	91XG	GM3WOJ/P	495
24	GW4OKT	277	49	440	59	83JG	GM4ZUK/P	410
25	G3WRJ	312	56	371	68	92VB	GM4PHG/P	507
26	G3TVW	365	55	359	63	01DW	GM3WOJ/P	456
27	GW6BK	280	45	369	57	81NV	GM3RFQ/P	439
28	G4SYI	289	59	330	67	91VR	GM3WOJ/P	450
29	G4RHZ	198	34	405	57	93JK	GM4ZUK/P	398
30	G0ERS	20	8	574	78	90JO	GM4DGT/P	631
31	G3NTJ	87	15	492	70	83RS	G4MEL/P	390
32	G4XFC	197	35	356	55	93RH	-	-
33	G4DYC	273	39	259	40	02MN	G4ALE/P	398
34	G2XV	257	50	210	39	02AD	GM3WOJ/P	428
35	GM0DZD	76	8	288	30	85WT	G3PFM/P	562
36	G4ANP	70	14	133	26	93JM	G4ALE/P	369
37	GW3VKL	0	0	85	22	81IJ	G4SYA/P	297

Disqualified: GM3RFQ/P, general rule 19; G4MSF/P, late entry.

LISTENER 70MHz RESULTS

		CW Section		SSB Section				
Posn	Station	Points	QSOs	Points	QSOs	Loc	Best dx	Km
1	BRS52543	-	-	322	40	83LT	G3YYS/P	412
2	BRS28198	-	-	57	17	00HX	G3PFM/P	196

Check logs are gratefully acknowledged from G3BPM, G3TWG/P, G4FMC and GW4VRO/P.

144MHz

This year's VHF NFD had generally poor conditions on 144MHz, with low activity possibly caused by the generally dismal weather—most groups having rain at some time during the contest. Several groups complained about inch-deep mud or water in their tents, and the mountain-top groups were up in the clouds for much of the contest. Log-keeping standards were varied, some being very good but others were riddled with errors. Most points were lost due to incorrect logging of /A or /P, or changing the class of licence of well-known Dutch amateurs.

In the Restricted Section the poor conditions and activity reduced the scores of most groups on previous years and made the contest very hard going. The Open Section was not as badly effected, with the ever-increasing power outputs and larger antenna systems compensating to a large extent. Many groups are now using valve amplifiers capable of in excess of 2kW output, and it is difficult if not impossible to see the need for such amplifiers with our limit of 400W output. A limit of, say, 500W total anode dissipation (or less) may need imposing unless the VHF Contest Committee can be convinced of the need for such large amplifiers.

Congratulations to the winners and the runners-up, and to all who braved the poor weather to operate the contest. Many thanks to all members of the GB2YS expedition group for their assistance with adjudication.

G8TFI and G4FRE

EQUIPMENT USED BY LEADING STATIONS ON 144MHz

OPEN SECTION

	Transmitter	Receiver	Antenna
G4LIP/P	TS700G + 8877	TS700G with BF981	100-el array at 16m, 66m asl
G3ZIG/P	IC211E + 8877	IC211E TS700G	2 × 17-el at 30m, 61m asl
G4APA/P	FT221R + 2 × 4CX250B	SSB preamp + FT221R with Mutek	4 × 17-el + 4 × 9-el at 16m, 260m asl

RESTRICTED SECTION

GI4TAP/P	IC25IE 25W	IC251 with BF981	16-el at 7m. 220m asl
GW6GW/P	IC290H 25W	IC290H with Mutek masthead preamp	17-el at 8m, 410m asl
GW4MGR/P	TS430 and MM 28–144 transverter 25W	MM144–28 transverter and TS430	16-el at 9m, 600m asl

144MHz BAND RESULTS—OPEN SECTION

Posn	Callsign (/P)	Pts	QSOs	Loc	Best dx	Km
1	G4LIP	11,803	861	03CE	DH4MAT	931
2	G3ZIG	9,160	708	02QV	HB9LU	829
3	G4APA	9,038	704	94RJ	FD1LKW	844
7	GM3WCS	8,780	701	74NP	ON6JG	756
5	GW4CDA	8,541	766	82KW	DK1EC	821
6	G4PUB	8,351	691	80CO	DF0AW	981
7	G4ZAP	8,339	725	01KK	DC0CQ	863
8	G3EFX	7,993	703	90XV	DG8SAB	852
9	GW8SJP	6,824	664	82JJ	DA4GR	810
10	GM4PPT	5,853	495	74UU	-	-
11	GW3OXD	5,721	606	82JG	DL1YAZ	805
12	G4NUT	5,300	610	91NV	DK3UZ	757
13	G6HH	5,057	460	00HU	FF6KOU	820
14	G1KAR	4,790	450	00DR	DL0NO	746
15	G4HRS	4,622	569	90SV	F6AUC	876
16	G4RFR	4,414	456	80WP	DA4MI	873
17	G3SDC	4,322	570	92NP	FC1HGO	813
18	G3NVO	3,985	532	91GI	HB9FG	817
19	G4CRA	3,863	400	01NW	EI5FK	668
20	G4ADM	3,839	576	93AC	DL6YBE	670
21	G4WVD	3,646	344	70PP	GM1AUZ	716
22	G4CDC	3,622	379	93UK	DF8KV	761
23	G4NVA	3,586	471	93FI	DC3EW	660
24	G3WSC	3,508	354	01OC	PA3BLS	650
25	G3GHN	3,476	462	01DH	DL0WN	825
26	G4SSS	3,251	388	81CC	DL4NAA	712
27	G8SMR	3,061	473	93BF	DL4NAA	663
28	GM4HAM	2,917	315	85DJ	FF2LY	789
29	G1FRS	2,779	441	91OF	DL4NAA	712
30	GW3VZG	2,762	348	82LQ	DL0WN	825
31	G3ZMS	2,526	340	90WV	DL4NAA	662
32	GW6DDB	2,522	348	73UJ	PE1DTU	604
33	G3TXC	2,503	276	02DA	FF2LY	789
34	G3ZQM	2,401	280	93BF	F6ECB	810
35	G3ZME	2,294	436	82RQ	F1KSL	734
36	G4VKE	2,160	312	84KE	F6KBF	624
37	G8GBY	2,099	316	93RS	DL4QL	735
38	G3SFG	2,020	391	91MA	GM3BSQ	-
39	G4VAT	2,014	278	01AX	DF0WZ	634
40	G3YDV	2,012	339	91IH	DB0EI	856
41	G2SU	2,009	303	93AS	DL8GP	791
42	G3CMH	1,938	335	80SQ	DK1DN	-
43	GM3BSQ	1,909	148	86RW	G4RFR	699
44	G4EKT	1,905	218	94SB	F1KSL	749
45	G8XYS	1,759	240	80BN	DK1VCD	915
46	G3XEP	1,728	-	84AF	F6HPP	-

Posn	Callsign (/P)	Pts	QSOs	Loc	Best dx	Km
47	GW0CCR	1,652	268	83JF	-	-
48	G3GOC	1,596	265	93ID	-	-
49	G3ZTT	1,593	272	83PF	F6KBF	524
50	G3VEF	1,383	212	90KX	DL4NAA	733
51	G0DDC	1,356	232	91RU	EI2FMG	650
52	GI3CFH	1,315	105	64LX	ON4ASL	849
53	GI4PHA	1,263	155	74BS	ON4ASL	773
54	G3KUE	1,227	197	84SA	PI4VRN	601
55	GM1JKJ	1,183	130	85PJ	G4WVD	544
56	G3WKS	1,069	200	01AC	GM3WCS	513
57	G6BSE	947	123	02HE	F1KSL	539
58	G3CNX	919	151	93VJ	EI2WRC	475
59	G4WVM	830	186	91UT	PA0GUS	417
60	G0AVG	758	156	92EU	GM3BSQ	458
61	G1GII	755	151	00BT	GM4FKD	572
62	G0ECC	737	88	70OJ	GM4HAM	-
63	G3CZU	583	150	91VG	F6CTT	368
64	G3PJR	299	64	93QA	F6HPP	498

144MHz BAND RESULTS—RESTRICTED SECTION

Posn	Callsign (/P)	Pts	QSOs	Loc	Best dx	Km
1	GI4TAP	3,300	304	74CO	F6KBF	774
2	GW6GW	2,816	429	81NV	DB0GI	663
3	GW4MGR	2,509	390	83JA	ON6JG	637
4	G6EKR	2,382	264	01OI	DK3UZ	651
5	G8LNC	2,362	340	90JO	DL4NAA	742
6	G5BK	2,342	385	81XU	FF6KIM	692
7	G3TCR	2,246	349	91KF	GM0BOA	607
8	G0ERA	2,087	399	92CA	GM3BSQ	549
9	G0CLP	1,832	277	84IG	-	-
10	G4GXP	1,803	317	82RJ	DF0RW	714
11	G1OHM	1,788	335	82XJ	DK0LC	621
12	G4KSK	1,786	310	91XG	DK3UZ	609
13	G3PRC	1,778	225	80AQ	PA3DYS	618
14	G4WAW	1,613	287	81QJ	GM3GBZ	574
15	G2UG	1,588	231	93BS	F1KSL	-
16	G6BRA	1,586	212	80ST	F1KSL	625
17	G4ARN	1,503	170	02MN	DL4OL	618
18	G8NWM	1,462	147	92TR	DL4OL	714
19	G3NJA	1,458	197	80DQ	F6EKJ	721
20	G4DDY	1,355	265	91XH	DF0CT	654
21	GM0BOA	1,338	95	76FA	F6FLB	747
22	G4AHG	1,336	207	81QH	GM0BRS	-
23	G3PIA	1,330	228	91FN	DK0UKW	610
24	G4RSE	1,328	164	01KW	EI9EN	962
25	G8HSG	1,310	175	93PS	F6HPP	588
26	G3ASR	1,254	210	91VR	DF0CT	675
27	GM4AGG	1,251	151	75PS	G6HH	651
28	G3FJE	1,197	192	92VB	GI3CFH	556
29	G4UHF	1,191	222	91LT	GM0BOA	552
30	G8TNK	1,182	204	01BH	GM6LNM	605
31	G8EVY	1,143	167	02AD	DL0WN	607
32	G6CSY	1,132	211	91XG	EI9ED	546
33	G3RAF	1,115	177	81RF	PA3DYS	510
34	G4YQC	1,114	141	02KD	DK1VC	540
35	GW3CSA	1,095	253	83JG	-	-
36	GM4TMS	1,075	134	76XA	G4HRS	618
37	G3ZBI	1,048	203	93BA	F6KBI	469
38	G6GS	1,027	188	91TF	Y63ZI	778
39	G6SRS	1,000	203	82WJ	GM4HAM	784
40	G5FZ	998	153	93RH	F1KSL	686
41	GM0BRS	983	130	85WT	G4WVD	588
42	G1DXY	971	221	91OQ	EI9ED	477
43	G4ATH	964	142	83MT	-	-
44	G6IUS	947	186	01AH	GM0BOA	639
45	G3NFC	922	156	92BV	PA0GUS	491
46	G4NWZ	901	161	92PG	G8YYB/A	468
47	G4EHW	847	134	92TN	GM3BSQ	480
48	G4KKJ	802	119	93JK	ON1AOI	452
49	G6SPS	788	109	01HS	DK0LC	497
50	G4GCT	781	135	81SN	GM3GBJ	557
51	G3NCL	769	183	91PP	-	-
52	G5ZG	732	114	01DW	F6EKJ	599
53	G1ELC	731	127	83RS	F/PI4GN	507
54	G4JS	715	137	83SQ	EI4ALE	499
55	G4XOT	697	160	82VJ	GM4TMS	420
56	G4BTS	669	141	93JM	F6KBF	492
57	G1GGT	632	79	90DX	PA3DYS	726
58	GW4BRS	452	72	81IJ	PE0MAR	517

144MHz BAND RESULTS—SWL SECTION

Posn	Station	Pts	Loc	Best dx	Km
1	BRS32525	890	01AL	DL2KBI	763
2	BRS25429	760	93FX	F/PI4GN	492
3	BRS52543	350	83LT	G4HRS	350
4	BRS28198	148	00HX	GW4CDA	336

Disqualified: G8SAL/P, general rule 13(i); G3AFT/P, no cover sheet; GM1AUZ/P, no cover sheet; G4EUZ/P, late entry.
Check logs from G1DWI/P, G8MLO, G0EZI, G8WKX/P, G6RZZ, G4SSD, GW2OP/P, G0FCV, G3BPM and GI8NBW/P.

432MHz

If conditions last year were described as flat, then how can you describe this year's? Scores and QSOs were again well down on recent years, although some good distance contacts were made. Under these conditions the advantage of high radiated power was well proven, and those with the more ambitious antenna arrays led the Open Section (one station using 10 long Yagis). Those in the Restricted Section suffered most, as the results show.

Logging standards were very variable, from near perfect to some that lost over a third of their claimed points, mainly from inaccurate logging or sending of the suffix. In the end the Restricted Section was decided as much by the logging standards as by the operating itself, possibly reflecting the inexperience of the operators but proving the necessity for both parties to exchange and confirm both callsigns as accurately as the rest of the information.

Congratulations to the certificate winners, and finally, to quote G3LRS/P, "Surely next year can't continue the downward trend". Let's hope 1987 provides sun, dx and an antidote for Syledis.

432MHz BAND RESULTS—OPEN SECTION

Posn	Callsign (/P)	Pts	QSOs	Loc	Best dx	Km
1	G4CLA	3,148	309	03CE	HB9AOF/P	851
2	G4THB	2,844	247	94RJ	DG7NBE/P	857
3	G8TFI	2,840	312	01KK	DH3NAN	735
4	GW4RNL	2,601	289	82KW	DK8VR/A	795
5	GW8KQW	2,580	308	82JJ	DL0KK/P	720
6	G4JNZ	2,553	314	90XV	DH3NAN	793
7	G4JAR	2,517	253	80CO	HB9CUA/P	864
8	G4LOJ	2,479	252	02QV	DK0NA	-
9	G0API	2,076	243	80WP	DJ0PQ	644
10	G4HGU	1,886	230	81CC	F5NS	793
11	G2CPM	1,598	257	91GI	DG7NBE/P	814
12	GM4DIJ	1,585	150	74NP	PA3BRJ	826
13	G4ZEC	1,356	228	91NV	HB9CUA/P	-
14	G3WFW	1,306	227	93FI	F1EIT/P	685
15	G1HHH	1,201	167	00HU	GM8TSI/P	582
16	G6TJW	1,179	171	93UK	F1EIT/P	704
17	G4NKC	1,089	196	82RQ	PA0GUS/P	538
18	GM8TSI	1,050	98	85DJ	G1HHH/P	582
19	G5LK	1,021	127	01OC	DK2GR	711
20	G4WFR	993	129	01NW	DD5IC/P	533
21	G3PGN	980	152	02DA	DG2DAN/P	518
22	G4CQR	889	161	93AC	DK8VR/A	732
23	G6LPZ	863	151	90WV	HB9CUA/P	-
24	G3FVA	861	178	93BF	DK8VR/A	733
25	G3WZT	845	172	90SV	GM4DIJ/P	511
26	G6FRS	787	181	91O F	GM8TSI/P	502
27	G6OHR	786	136	00DR	GM4DIJ/P	557
28	G3LRS	673	142	93RS	DL0AAN	579
29	GW3SRT	636	134	82LQ	PA0GUS/P	572
30	G4ZTT	631	121	83PF	GM6MGS/P	412
31	G8SDS	569	95	80SQ	PA3BLS	549
32	G0DCG	535	153	01DH	GM4DIJ/P	506
33	GW6DOK	507	81	73UJ	PA0GUS/P	647
34	G4EMW	471	92	93AS	G0API/P	348
35	G3PVD	450	77	84SA	G4JNZ/P	383
36	G6IFU	444	111	92NP	DK8VR/P	644
37	G1FBH	439	101	00BT	GM4DIJ/P	542
38	G3IZD	432	71	84KE	G5LK/P	450
39	G3PWN	410	58	94SB	G4JAR/P	446
40	G8DDC	399	83	91RU	ON4ALO	376
41	GW1RCC	360	79	83JF	G4CW/P	489
42	G1GQC	356	108	93ID	PE0MAR/P	388
43	GM6MGS	355	32	86RW	G4JAR/P	708
44	G4LIR	339	78	92EU	GI4FUM	364
45	G4MIC	307	54	84TF	G4JAR/P	-
46	GI4CPP	298	40	74BS	G8TFI/P	583
47	GM3KJF	297	48	74UU	G4JNZ/P	524
48	G8KGI	288	70	90KX	PA0RDY	442
49	G0CCC	276	79	91IH	G4CLA/P	232
50	G6LMV	260	76	0IAX	G4JAR/P	307
51	G6YIQ	239	67	91UT	PE0MAR/P	304
52	G3ZVW	197	65	91MA	G3WFW/P	262
53	G6XVW	158	59	91UG	GW4RNL/P	260
54	G4EBK	132	40	93VJ	G5LK/P	272
55	G3YJX	124	33	70PP	PE0MAR/P	631
56	G7SCF	118	36	93QA	G8TFI/P	204
57	G4UPI	109	38	01AC	GW8KQW/P	265
58	G3TCP	104	22	80BN	G4CLA/P	404
59	GM1AQV	47	13	85PJ	G4THB/P	177
60	GI4OUN	15	5	64LX	GM4DIJ/P	144
61	G0ECC	11	3	70OJ	G4HGU/P	

432MHz BAND RESULTS—RESTRICTED SECTION

Posn	Callsign (/P)	Pts	QSOs	Loc	Best dx	Km
1	G0EKR	969	132	01OI	DG7NBE/P	623
2	GW4JKV	855	147	81NV	DL0KK/P	700
3	G8OHM	783	159	82XJ	DL0AAN	609
4	G4YHF	777	153	92TR	DL6WU	706
5	G0BCG	775	138	81QJ	PA0EZ	545
6	GW0DVV	736	136	83JA	F1EIT/P	664
7	G4BRA	714	117	80ST	DK8VR/A	691
8	G2HIF	678	146	91FN	DL0KK/P	602
9	GI6ATZ	671	76	74CO	G8TFI/P	567
10	G3ZPB	631	157	91XH	DL0KK/P	494
11	G6KCE	593	83	93PW	G4JAR/P	426
12	G8JAY	572	119	81XU	DL0KK/P	642
13	G4XWT	570	171	91XG	DK3BU	549
14	G8JJR	567	96	93JK	F1EIT/P	705
15	G3TAD	548	114	81QH	PA0EZ	548
	G4HTD	548	85	80AQ	GM8TSI/P	524
17	G8PPQ	523	116	01AH	GM4SOY/P	586
18	G4CW	491	124	01BH	GM4DIJ/P	499
19	G3CAR	451	121	91PP	GM4DIJ/P	433
20	G6DZH	444	135	92CA	GM8TSI/P	396
21	G3SHY	443	94	91VR	GM4DIJ/P	450
22	G3PDH	441	64	02MN	GM4DIJ/P	454
23	G6ASH	426	85	02AD	DL0KK/P	516
	GM4SOY	426	48	75PS	G4JNZ/P	624
25	G6GMW	425	63	83MT	G1HHH/P	411
26	G5RS	413	103	91TF	G4THB/P	357
27	G8PTP	409	95	92VB	GM8TSI/P	436
28	G6VAT	404	103	82WJ	EI2FMG/P	300
29	G6PLA	399	71	01HS	GM4DIJ/P	486
30	G4PSU	393	117	91LT	GM4DIJ/P	405
	G8KGC	393	104	93BA	F1EIT/P	652
32	G6ISY	368	84	90JO	ON7WR/P	394
33	G4SBH	362	57	80DQ	PE0MAR/P	562
34	G4WDE	329	78	82RJ	G5LK/P	295
35	G1HIL	323	94	91OQ	G3IZD/P	319
36	G4AVV	302	81	91XG	PA0EZ	377
37	G4ZYU	279	81	92BV	G4JAR/P	287
38	G6RSE	278	57	01KW	GM4DIJ/P	486
39	G6COL	230	54	93RH	PE0MAR/P	348
40	G8RAF	228	82	81RF	F1EIT/P	459
41	G4BZP	220	42	84IG	G4JNZ/P	435
42	G6GWZ	215	59	92PG	G4THB/P	237
43	G4DXW	203	57	92TN	GM4DIJ/P	360
44	G4XQW	202	50	82VJ	GI4GVS	351
45	G6PNB	201	48	81SN	G4THB/P	340
46	G6FUM	200	44	93JM	G4JAR/P	369
47	GW4STZ	185	49	83JG	GM6MGS/P	410
	G0CVC	185	52	93BS	G4JAR/P	375

Posn	Callsign (/P)	Pts	QSOs	Loc	Best dx	Km
49	G6HKK	173	42	01DW	G4HGU/P	297
50	GM0BFS	169	27	76XA	G4JAR/P	604
51	G1ECC	159	37	83RS	G8TFI/P	346
52	G2AKK	141	37	83SQ	GM4SOY/P	272
53	G1GGT	105	21	90DX	G4CLA/P	325
54	GM4KHS	92	24	85SP	G4ZTT/P	269
	GM0BPY	92	21	85WT	G4CLA/P	321
56	G4GVW	91	45	02KD	GW6DOK/P	374
57	GW6BRC	89	21	81IJ	G4THB/P	381
58	GM4VYQ	15	3	76FA	GM4DIJ/P	156

432MHz SWL SECTION

Posn	Station	Points	QSOs	Loc	Best dx	Km
1	BRS32525	375	81	0IAL	PA0JNH	517
2	BRS52543	250	44	83LT	G1HHH/P	412
3	BRS25429	97	27	93FX	G3PGN/P	250
4	BRS28198	46	14	00HX	GW8KQW/P	307

Disqualified: G8DWL/P, no cover sheet; GM1BEL/P, no cover sheet; G4XIP/P, general rule 13(i); G4OCQ/P, late entry.
Check logs received, with thanks, from: G5MW/P, G6HC/P, G8DWL/M, G0FCV/P, GI8NBW/P, GM1BEL/P and GW4WMK.

Microwave

2·3GHz a success! The stations that commented on the experimental inclusion of 2,320MHz felt that this was worthwhile. In many cases it was the highlight of field day, brightening up the long gaps between 1·3GHz QSOs.

One word described conditions—poor; with in many cases heavy rain and cloud cover, which needless to say was the excuse used for poor performance. Although the weather was abysmal, the equipment for once seemed to work well with no major breakdowns, (some was still being built on site, and another had to borrow a £30k analyser to align the lo), with the 2C39 family of valves, 23-el Yagi or 1·2m dish being now almost obligatory. However, it was nice to see the increase in homebrew equipment.

The presentation and logging standards were high, but two stations were disqualified for having no cover sheets. There were over 200 stations active on 1·3GHz and over 60 on 2·3GHz, but entries in both sections were slightly down from last year. The number of check logs increased and are always appreciated.

Once again all participants enjoyed themselves, but as usual have vowed "never again", but I'm sure their callsigns will appear next year, as in previous years.

EQUIPMENT USED BY THE LEADING STATIONS 1,296/2,320MHz

Open section					
G4CBW/P	(23)	TS700 + transverter	2 *	2C39A	8*23-ele Tonna
	(13)	TS700 + transverter		2C39A	2m dish
G0ALE/P	(23)	Homebrew	6 *	2C39A	55-el Tonna
	(13)	Homebrew		2C39A	1·6m dish
Restricted section					
G3NNG/P	(23)	Homebrew		2C39A	55-el Tonna
	(13)	SSB electronics t/v		2C39A	1·8m dish
G4ICM/P	(23)	MM transverter	2 *	7289	6ft dish
	(13)	LMW transverter		2C39A	44-el JVL

GM8MJV

1,296/2,320MHz BAND RESULTS—OPEN SECTION

				1,296MHz			2,320MHz		
Posn	Callsign (/P)	Total	Loc	QSOs	Pts	Pwr	QSOs	Pts	Pwr
1	G4CBW	1,050	03CE	90	796	250	32	254	70
2	G0ALE	992	80CO	77	894	350	10	98	30
3	G4NXO	877	01KK	97	645	160	32	232	50
4	GW4CKR	812	82KW	89	667	350	19	145	40
5	G4ANT	768	02QV	67	603	200	22	165	50
6	G4HWA	739	94RJ	67	653	300	12	86	30
7	G4YTT	618	93FI	86	544	30	14	74	·15
8	G4KPX	528	00BT	69	447	50	13	81	15
9	G3GRO	504	010C	61	487	100	5	17	12
10	G3WOI	495	91GI	83	429	150	14	66	·25
11	G3UHF	447	93BF	73	407	80	10	40	·30
	GW81FT	447	82JJ	59	390	150	9	57	5
13	G4CCH	433	93UK	67	443	150			
14	G4WHO	402	80WP	57	392	300	4	10	5
15	GM4BYF	372	74NP	34	372	150			
16	G3ULT	272	91IH	68	272	50			
17	G0CZD	271	82RQ	61	271	25			
18	G1DOX	270	84KE	35	270	60			
19	G4MEJ	244	91NV	61	244	20			
20	GM4OGM	238	85DJ	26	213	100	3	25	20
21	GW8ACG	235	83JF	43	235	70			
22	G4FRS	215	910F	53	215	150			
23	G4AUF	201	90XV	42	201	60			
24	G3NPF	199	90SV	51	199	50			
25	G3ZUD	197	93RS	28	152	30	10	45	5
26	G0AXA	184	93AC	42	184	160			
27	G4RFC	168	01DH	53	168	100			
28	G1DVU	160	90WV	40	160	3			
29	GW6DOY	145	82LQ	35	145	45			
30	G8VOI	86	90KX	26	86	10			
31	GM8MBP	79	86RW	9	79	7			
32	G3ZTR	73	94SB	15	59	10	4	14	·5
33	G6NBY	65	92EU	21	65	10			
34	G4NVR	52	93VJ	16	52	1			
	G8YEO	52	80SQ	14	52	2			
36	G4UCW	26	02HE	6	26	2			
37	G8UBN	20	82RQ	6	20	·6			
38	G3PYB	18	84TF	4	18	10			
39	GI4KIS	17	74BS	3	17	1			
40	G8ZXC	10	01AL	8	10	·5			
41	G6CZI	11	80BN	3	11	2			
42	GM3THI	1	74UU	1	1	3			

1,296/2,320MHz BAND RESULTS—RESTRICTED SECTION

				1,296MHz			2,320MHz		
Posn	Callsign (/P)	Total	Loc	QSOs	Pts	Pwr	QSOs	Pts	Pwr
1	G3NNG	528	91FN	70	422	25	16	106	25
2	G4ICM	495	010I	58	404	25	17	91	7
3	G3OHM	455	82XJ	66	346	22	19	109	20
4	G0FCT	344	80ST	46	290	25	10	54	2
5	G4PKE	314	91LT	72	314	25			
6	G8TB	305	91XH	69	305	12			
7	G3IGO	295	91XG	69	295	25			
	G4ODA	295	92TR	39	257	25	6	38	1
9	G4PDS	278	81XU	49	278	20			
10	G3COJ	219	91PP	49	219	20			
11	G8NEH	216	90JO	46	216	20			
12	G4PRJ	210	91TF	54	210	25			
13	GW4TZW	167	83JA	34	147	15	6	20	1
14	GW4TTU	154	81NV	28	154	1·6			
15	G4YPK	151	91KF	41	151	25			
16	G6KUI	149	93BA	39	149	2			
17	G6KWA	140	02AD	32	140	·5			
18	G4UER	130	9100	42	130	2			
19	G4RMD	129	91VR	39	129	10			
20	G3NAT	95	91XG	29	95	2			
21	G3ZKI	69	810H	13	69	2			
22	G8BHD	69	01BH	28	64	1	3	5	·4
23	G4ELZ	68	80DQ	12	68	25			
24	GM8BDX	56	85WT	11	56	8			
25	G0BEU	50	02KD	10	50	15			
26	G2AKK	38	83SQ	8	10	10			
27	G6YVF	22	93JM	9	22	1			
28	G4KXQ	20	80AQ	6	20	·5			
29	GM0DZP	9	75PS	3	9	2			

Disqualified: G3GAF/P, no cover sheet; GM3ZMA/P, no cover sheet; G4GBF/P, late entry
Checklogs: (23) GI8NBW/P, G4ZTR/P, G3VCT/P: (13) G4BCH/P.

May 1986 144MHz and SWL Contest results

This year the contest was well supported, with activity similar to last year. As usual on a contest weekend the weather and conditions were generally described as abysmal with tents hang-gliding and antennas collapsing, but nevertheless was enjoyed by all.

The scoring system used this year was based on county multipliers, and from the comments received was well liked. The multiplier system is used to try and encourage activity within the UK, and not used specifically to affect the overall placings. Some stations would like slight changes next year: ie GM/GI counties to count twice, EI counties to be included, regions only, counties + countries + squares, pts/km rather than radial rings, coinciding with European contest; these will be considered for next year.

Comments were of a general nature, with the decline in operating standards and the increase in QRM being a common topic. Some comments received: "Good multiplier system, seems to work well" *(GW4CZZ/P)*; "Multipliers are a good idea but create extra work" *(BRS25429)*; "Stop messing about with the scoring system" *(G6HH/P)*; "Flat damp but enjoyable" *G4WET/P*; "How does LIP do it" *(G8EQD/P)*; "Need more room on the entry sheet" *(G4LIP/P)*; "Enjoyed the county chasing aspect, more please" *GM0DZD/P)*; "Don't like this multiplier system" *(G3WQK/P)*; "The county multiplier system added interest—contests with exchange of location only are becoming boring" *(G4UHF/P)*.

Congratulations and certificates go to G4LIP/P and G4CAN/A for winning their sections, and to GW4NXO/P and GJ6TMM/P as runners-up; BRS52543 will receive the leading swl certificate.

GM8MJV

MULTI-OPERATOR SECTION

Posn	Callsign	Loc	QSOs	Points	Mult	Bext dx	Km
1	G4LIP/P	03CE	985	1,097,272	88	F1ADT	954
2	GW4NXO/P	81LQ	869	736,428	84	DL8ZAW/P	872
3	G4CDA/P	93AD	864	722,064	84	FC1HMN	921
4	G4APA/A	94BO	699	624,510	90	DL0UD	709
5	GIVIP/P	74DO	493	597,120	96	DF8VU	1,028
6	G3EFX/P	90XV	751	577,290	70	DF3NU	785
7	G4UHF/P	91LT	763	570,868	86	DK8ZB	723
8	G4GFX/P	82LB	665	536,014	83	DL2OM	753
9	G4ANT	02QQ	705	510,426	63	HB9RCJ	730
10	GM4ZUK/P	86RW	401	438,207	77	ON4ADC	804
11	GD4IOM	74QD	553	435,200	68	DF8VU	942
12	GW3OXD/P	82JG	675	433,458	69	PA3DWD	734
13	G6HH/P	00HU	624	411,120	60	DF3NU	739
14	G4RUD/P	93EC	730	398,736	78	FC1HMN	1,108
15	G8ZHP	92TR	541	374,547	57	DC3SA	794
16	GW6GW/P	81KS	618	332,304	69	DL4EBX	717
17	G4BCH	01KO	476	324,645	69	HB9RCJ	667
18	G0FBB	01EH	659	318,969	63	F1ADT	746
19	G8TIR/P	02KD	521	317,205	63		
20	G4IWB/P	79JX	376	308,154	66	PA3CNX	753
21	GM0CCC/P	85DJ	343	307,692	84		
22	GW4CZZ/P	83ID	580	301,350	75	DD3JN/P	735
23	G4WET/P	92CA	595	295,526	77	DF7DJ	653
24	GI4KIS/P	74BU	297	267,552	72	PA3AEF	780
25	GM4RZW/P	85PH	353	250,250	77	PE1IML	606
26	G4WWD/P	91PC	551	236,558	61	HB9RCJ	725
27	G1SVH/P	00DT	451	205,958	67	GM4ZUK/P	702
28	G3SFG/P	91MA	535	204,813	63		
29	G4VHF/P	92SD	459	202,230	70	DL2OM	591
30	G5LK/P	91VG	513	197,119	59	FC1HMN	782
31	G3FKF/P	91BD	401	169,536	64	DL2OM	663
32	G4WVX/P	91MP	425	136,045	65	F1ADT	785
33	G1AHM	83OP	267	119,448	72	G4XNL	383
34	G8EQD/P	93FK	303	107,694	62	DD8QB	656
35	G8CA/P	80LV	343	105,204	44	DA4GR/P	740
36	G4SKM/P	93JK	262	97,930	70	GM4LER	746
37	G4APD/P	92HJ	401	95,874	57	DG4BE	720
38	G4WRA/P	93AF	411	87,503	53	EI5FK	489
39	G3AHD/P	83MJ	250	81,374	58	FD1FHI	702
40	G8LNC/P	90JO	193	78,652	53	DD5TD	704
41	G1ELC/P	83TQ	236	76,980	60	GJ6TMM/P	491
42	GM4UYZ/P	85RU	181	74,664	61	G4SBH/P	591
43	G0AEN	81UJ	239	69,135	55		
44	GM0DZD/P	85WT	152	62,964	54	ON4ADC	675
45	G3BBC	91UM	319	59,885	59	GI4KIS/P	525
46	GW8GIZ/P	83JF	237	58,812	58	GM6LNM	
47	G4XOT/P	82XI	255	56,836	52	F1HDI	512

Posn	Callsign	Loc	QSOs	Points	Mult	Bext dx	Km
48	G0CRW/P	01BB	246	54,943	47	DL0UD	541
49	G6CTC/P	92DB	220	48,316	47	GM4ZUK/P	544
50	G4BTS/P	93JM	168	39,856	47	DL2OM	682
51	G4VUA/P	92QV	160	38,658	51	LX2GB	584
52	G1ARL	91TR	176	21,793	37	DL0UD	522
53	G1JDU	83WL	102	21,285	43		
54	G0ELM	01FR	84	17,834	37	GM4ZUK/P	610
55	G1ORC	83XN	146	17,784	36	GM4ZUK/P	379
56	G8VQM	92LP	95	13,727	37		
57	GW4MGR/P	83JA	730	6,337	*	DL2OM	787
58	G3WQK/P	00DR	566	6,160	*	DL9SD	826
59	G4NUT/P	91NV	685	5,483	*	F1ADT	812
60	G4CRA/P	01NW	544	3,936	*	DA2CD	673
61	G4WAR/P	92LM	437	2,557	*	DG6PY/P	599
62	G6UNJ/P	84KH	134	862	*	PA3BLS	570
63	G6XVW	91UG	168	616	*	PA3DWD	424

SINGLE-OPERATOR SECTION

Posn	Callsign	Loc	QSOs	Points	Mult	Bext dx	Km
1	G4CAN/A	80SO	496	273,546	78	DL3SBA/P	758
2	GJ6TMM/P	89WG	359	222,314	58		
3	G1JKX/P	95BI	286	200,520	72	G4IWB/P	638
4	G4SBH/P	80DP	362	191,352	67	GM4ZUK/P	703
5	G1DOX	84JC	401	183,768	57	GJ3YHU	546
6	G4NBS	02AF	362	176,260	70	GM4ZUK/P	549
7	G3XBY	92DG	326	160,992	72	DH8NAA	795
8	G6XVV	93JK	291	153,384	77	DF8VK	727
9	G6HKM	01FT	333	149,184	63	GM4ZUK/P	602
10	G0CLP/P	84IG	282	115,983	63	DF8VU	877
11	G1KDF	83NN	204	114,576	84	PA3CEG	
12	G8YKM	91OG	193	50,217	57	GM4ZUK/P	638
13	G8ZRE	83NE	187	48,760	53	GM4ZUK/P	410
14	G4YFN	91MK	190	41,998	46	DL2OM	601
15	G4DFI	01BL	131	38,743	53	GI4KIS/P	532
16	G6NUM	93MA	103	31,700	50	ON4ZN	474
17	G6FJF/P	920G	145	28,126	41	DJ0VZ	548
18	G4FVK	92VN	85	24,221	53	GM4ZUK/P	480
19	G4OVG	01FM	134	23,865	37		
20	G4VFK	92JW	93	23,808	48	GM4ZUK/P	453
21	G1HLT	93JD	100	20,880	45		
22	G1MPM	91LS	85	19,260	45	GM0CCC/P	440
23	G3BPM	80OW	50	15,334	41	GM4ZUK/P	667
24	G1PDW	01BS	50	14,040	40	GM4ZUK/P	599
25	G8FKP	91PQ	69	13,974	34	GJ6TMM/P	855
26	G4RYV	91OI	64	13,653	41	GM4ZUK/P	630
27	G6MXL	80XR	56	13,608	36	G4APA/A	430
28	G1MWY/P	93BM	108	13,230	35	G4SBH/P	340
29	G0DWJ	92FG	64	12,388	38	GI4KIS/P	400
30	G1DWQ	90AT	78	11,900	34	G4APA/A	421
31	G8PCA	01HP	87	11,552	32	GI4VIP/P	535
32	G1LPB	82XR	81	11,418	33	G4IWB/P	376
33	G1FUT	02KH	41	10,540	34	GI4VIP/P	504
34	G4ZNM	00BS	46	9,900	30	G1JKX/P	526
35	G0ATR	92KP	58	9,120	38		
36	G3ORX	81VK	48	8,672	32	G4APA/A	352
37	GM1RED/P	86JJ	46	8,153	31		
38	G4GDY	92GJ	42	6,090	30	G4IWB/P	372
39	G4WSL	91VQ	50	5,750	25	GD4IOM	403
40	G6XWH	91RG	51	5,628	28		
41	G8TBL	01AI	30	4,392	24	GD4IOM	440
42	G0BXH	91VV	59	3,795	23	GD4IOM	387
43	G2DHV	01BK	38	1,998	18	GW8KQW/P	258
44	G1GAW	91TM	32	1,360	17	GW4MGR/P	255
45	G0ETA	91VV	19	506	11	GW3OXD/P	209
46	G0EML	82PR	80	465	*	GJ6TMM/P	387
47	G1GGT/P	80FR	15	432	9	G1SVH/P	270
48	G6ZYT	91MK	21	378	9	G4GFX/P	159
49	GW6VZW	81LQ	58	342	*	G4APA/A	334
50	G8YGD	91PF	90	341	*		
51	G1SPZ	91VS	75	263	*	G4IWB/P	403
52	G1AMX	95FB	31	247	*	G4UHF/P	363

SWL SECTION

Posn	Callsign	Loc	QSOs	Points	Mult	Best dx	Km
1	BRS52543	83LT	121	43,195	53	GJ6TMM/P	510
2	BRS25429	93FX	107	36,850	55	DF7DJ	675
3	BRS32525	01AL	124	35,984	52	GI4VIP/P	521
4	BRS28198	00HX	90	20,196	34	GD4IOM	499
5	RS31976	01HO	48	14,310	30	GI4VIP/P	531
6	BRS87779	90JU	42	5,664	24	PA3CNX	454

Check logs received from G6DZH/P, PE1EWR, G3KZJ, GM1BVT/P, G0EZL, G8YQT, G8LWU, G6IGK, GM4WLL, DG4BE and G8XTV.
"*" in multiplier column signifies no multiplier list received.

144MHz Fixed Contest and Affiliated Societies VHF Contest 1986 rules

Following the successful introduction of the affiliated societies team contest in this event last year, the 1986 contest will be run under similar rules. The contest will still be open to individual entries, both single and multi-operator, as before. Affiliated societies are encouraged to enter as many stations and teams as they can. Individual station scores and overall team results will be separately tabulated, and certificates will be awarded to the leading stations and team in each RSGB Zone.

1. Date: 7 December 1986

2. Time: 0900-1700gmt

3. Teams. A society entering one team will have its placing determined by the aggregate scores of the five highest scoring stations in its team. A society may enter more than one team, in which case the aggregate scores of the five highest scoring stations will be placed in team "A", the next five highest scoring stations in team "B", etc.

4. Eligible entrants. Operators entering on behalf of an affiliated society must be a member of that society, but need not be a member of the RSGB. Other individual entrants must be members of the RSGB. All stations representing a society must be operated within 50km of the normal society meeting place. No station may represent more than one society. In the case of a society with national coverage, eg RNARS, each team may define a different society meeting place, but this should be a place of recognizable significance, eg a naval base. For all purposes, other than the indication of affiliation, each such team entry will be considered to be entirely separate. No operator shall use more than one callsign during the contest period.

5. Sections. There will be separate single- and multi-operator sections for tabulating station scores. A team may consist of both single- and multi-operator stations.

6. Entries. Each individual entry shall conform to the general rules. Each log must be accompanied by a 427 cover sheet, and should show the RSGB zone that the station operated from. RSGB zones are defined on page 18 of the January 1985 issue of *Radio Communication*. All entries from one society are to be sent in one package to the adjudicator. Packages underpaid and bearing postage due stamps will be returned to the sender. Each package must include a declaration signed by an officer of the society that each entrant is a member of that society, and the normal meeting place address must be given. A note stating the number of teams representing the society, and their scores, should also be included.

7. Awards. Certificates will be awarded to the following:
The leading single operator station in each RSGB zone.
The leading multi operator station in each RSGB zone.
The leading affiliated society team in each RSGB zone.

8. General Rules. The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply: 1, 2, 3, 5, 6, 8, 9, 12-23.

9. Adjudicator. All entries and check logs to: VHF Contests Committee, c/o J H Quarmby, G3XDY, 12 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED.

NB. Although the contest now includes an inter club element, entries from individual single- or multi-operator stations are encouraged.

70MHz CW Contest rules

0900-1400gmt 14 December 1986

The general rules, published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply. Only F1A and A1A modes may be used. QTH information must be exchanged. All entries and check logs to: VHF Contests Committee, c/o J Pilags, G8HHI, 43 Bartons Drive, Yateley, Camberley, Surrey, GU17 7DW.

432MHz Trophy and SWL Contest 1986 results

It was gratifying that support for this event was significantly higher than last year, with entries from GI, GM and NE England especially welcome. Most stations agreed that conditions were unspectacular, but activity was quite high. Westerly stations reported the best conditions at the start, easterly stations at the end, and northerly stations were pleased throughout. Certainly the weather was more favourable in the north, and GM6MGS/P, near Aberdeen, achieved a scoring rate of 16 points/contact, to be compared with 8·5 from G4RNL, 12 from G8TFI and 13 from GM8MJV.

The listener section was closely fought this year. BRS32525 unfortunately fell foul of the new tougher adjudication standards to drop into second place behind BRS25429.

Subject to Council approval, the 1951 Council Cup is awarded to the Warrington Contest Group G4RNL/P, to be shared by their nine operators. Certificates are awarded to G4RNL/P, GW4LIP/P, G4LOJ, G8HHI and BRS25429, together with the adjudicator's congratulations.

G4JLG

SECTION O—ALL OTHER STATIONS

Posn	Callsign	Pts	QSOs	Loc	Best dx	Km	Ant	Pwr
1	G4RNL/P	2,232	280	93AD	DL6WU	822	8×21Y	+26
2	GW4LIP/P	2,124	263	83KB	LX2GB	735	4×21Y	+26
3	G8TFI/P	1,879	158	80EF	GM6MGS/P	749	4×16Y	+26
4	GW4MGR/P	1,702	222	83JA	DB2VY	825	4×19Y	+26
5	G4THB/P	1,601	156	94RJ	F5NS	570	4×21Y	+26
6	G4FRE/P	1,537	163	02KD	DL6WU	603	4×17Y	+24
7	G4BVY/P	1,245	161	82LB	DB8KJ	665	4×21Y	+26
8	GM8MJV/P	975	79	85RU	G8TFI/P	629	2×21Y	+20
9	G3WOI/P	933	141	91GI	GM6MGS/P	624	2×48MB	+16
10	G4BVE/P	921	149	93FI	DB2VY	746	2×21Y	+25
11	G0EKR/P	842	93	01OI	GI4GVS	599	4×19Y	+20
12	GM6MGS/P	832	56	86RW	G8TFI/P	748	4×21Y	+17
13	G4NOK/P	781	127	93FM	PA0EZ	475	2×19Y	+15
14	G4UEM/P	723	130	91SX	DB2VY	607	1×21Y	+24
15	G0AWP/P	694	90	94OA	G8TFI/P	493	1×21Y	+17
16	G3WTP/P	567	94	92QB	GM6MGS/P	556	1×21Y	+22
17	G3IGO/P	411	92	91XG	PA0RDY	359	1×88MB	+16
18	G6BRA/P	372	53	80ST	GM8MJV/P	560	1×21Y	+10
19	G6TEF/P	329	86	92LJ	GM6MGS/P	514	1×8H	+17
20	G4LDR/P	327	51	80WX	GM6MGS/P	663	1×17Y	+10
21	GW4JZF/P	299	70	82JG	GM8MJV/P	400	1×19Y	+13
22	G4VRC/P	210	48	91RF	G4THB/P	351	1×15Y	+0
23	G6MXL/P	174	29	80WP	G4THB/P	430	1×24QL	+13
24	G4XOM/P	156	47	82UL	G8TFI/P	267	1×48MB	+9
25	G3ILO/P	89	17	82WQ	G4THB/P	321	1×19Y	+0

SECTION F-FIXED STATIONS

Posn	Callsign	Pts	QSOs	Loc	Best dx	Km	Ant	Pwr
1	G4LOJ	984	98	02QN	DB2VY	525	1×27QL	+26
2	G8HHI	967	138	91OH	GM6MGS/P	636	2×21Y	+26
3	G8ZHP	806	99	92TR	LX2GB	673	8×21Y	+23
4	G8OHM	473	87	92AJ	GM6MGS/P	506	1×21Y	+18
5	G1LSB	465	65	02CT	DB2VY	617	1×21Y	+19
6	G1KDF	409	63	83NN	GM6MGS/P	375	1×21Y	+20
7	G4NBS	336	52	02AF	GM6MGS/P	549	1×21Y	+20
8	G0EHV	313	35	94FW	G8TFI/P	542	1×48MB	+17
9	G4VBG	305	34	94FW	G8TFI/P	540	1×21Y	+20
10	GI6ATZ	269	19	74BN	G0EKR/P	592	2×21Y	+17
11	G8VPE	258	33	02TP	G8TFI/P	452	1×21Y	+15
12	G8IFT	238	51	82XJ	GM6MGS/P	507	1×21Y	+17
13	G4UDE	185	31	82LU	GM8MJV/P	335	4×21Y	+17
14	G8TZJ	114	14	84OA	G8TFI/P	425	1×17Y	+19
15	G8BKL	110	25	82UI	GM8MJV/P	390	1×14Y	+11
16	G4IDF	91	21	82VE	G4THB/P	269	1×11Y	+10
17	G0EFS	36	27	91UM	GW6GW/P	207	1×19Y	+18

SECTION SWL—LISTENERS

Posn	Station	Pts	QSOs	Loc	Best dx	Km	Ant
1	RS25429	259	40	93FX	G8BIS	362	1×19Y
2	RS32525	233	54	01AL	PA0EZ	365	1×19Y
3	RSS52543	226	36	83LT	G8TFI/P	402	1×19Y
4	RS28198	130	16	00HX	G4THB/P	375	1×48MB

Check logs received with thanks from G84XN, G6DZH and PE1EWR.

1,296MHz Trophy Contest results

Everybody described conditions during this contest as very poor, but the east coast stations found a short opening to Germany about half-way through. Very few contacts were made in the last few hours, and most entrants would have preferred an earlier start. Special thanks to GW4MGR/P who, after receiving a bad signal report, realized that there was a fault on their power amplifier and closed down for the rest of the event; and to GM6MGS/P who operated from the Aberdeen area, hoping that a few more stations might beam north.

Activity seemed lower than 1985, with the number of contacts significantly less. Altogether a disappointing event to adjudicate, and, judging from comments, a disappointing event to operate. Hopefully things will be better in 1987.

Subject to Council approval, the VHF Contests Committee Cup will be awarded to GW4LIP/P. Congratulations and certificates go to GW4LIP/P, G3CKR/P and G3XDY.

G4JLG

SECTION F—FIXED STATIONS

Posn	Callsign	Pts	QSOs	Loc	Best dx	Km	Pwr	Ant
1	G3XDY	357	43	02OB	DD8DA	418	+24	4×23Y
2	G4SIV	170	26	92TR	PA0EZ	379	+22	2mD
3	G4NBS	147	26	02AF	G8TFI/P	338	+7	—
4	G8IFT	139	26	82XJ	G8TFI/P	264	+22	4×23Y
5	G8HHI	92	20	91OH	G4HWA/P	344	+15	15/15Y
6	G6OYL	72	19	93JK	G8TFI/P	393	+19	1·4mD
7	G8CHW	34	17	91TQ	G8TFI/P	275	+1·1	15/15Y
8	G4CBZ	25	5	80EF	G8TFI/P	270	−0·9	20LY
9	G1KDF	22	10	83NN	G4KIS/P	242	+10	1×55Y

SECTION O—ALL OTHER STATIONS

Posn	Callsign	Pts	QSOs	Loc	Best dx	Km	Pwr	Ant
1	GW4LIP/P	576	72	83KB	PA0EZ	566	+24	8×23Y
2	G3CKR/P	537	75	93AD	PE1CMO	478	+25	8×23Y
3	G0ALE/P	407	55	01QI	GB4XN	445	+25	2mD
4	G8TFI/P	393	38	80EF	F6DKW	452	+23	1·2mD
5	G4HWA/P	289	31	94RJ	PA0RDY	423	+25	4×23Y
6	G3WOI/P	263	53	91GI	PE1EWR	347	+21	4×23Y
7	G4FRE/P	245	30	02KD	DL0HC/P	442	+17	4×23Y
8	G0EKR/P	200	34	01KI	GB4XN	434	+20	2mD
9	G4KPX/P	136	31	00BT	G4HWA/P	400	+17	2×24Y
10	G3IGQ/P	119	34	91XG	PA0RDY	359	+15	3mD
11	G6BRA/P	86	13	80ST	G3XDY	290	+6	1×23Y
12	G0AWP/P	57	13	94OA	GW4LIP/P	209	+15	1·2mD
13	G5KN/P	44	17	92NG	GW4LIP/P	175	+10	1×23Y
14	G6CSY/P	36	12	01BH	GW4LIP/P	295	−0·9	1×23Y
15	GM6MGS/P	24	4	86RW	GW4LIP/P	432	+7	2×55Y

Check logs acknowledged from GB4XN, GW4MGR/P and PE1EWR.

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 **January 1987.**

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the **December** issue should reach them by **21 October** and for the **January** issue by **15 November.**

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.

Bury (BRS)—14 Oct (Construction contest), Meetings every Tuesday, 8pm. The Mosses Centre, Cecil St, Bury. PRO G0CUK, tel Bolton 706191.

Chester (C&DARS)—7 Oct (Committee meeting), 14 (Quiz with Ellesmere Port RS at Chester), 21 ("Avionics", G1LML), 28 ("Basically speaking", G4FJQ). 8pm. Chester Rugby Union Football Club, Hare Lane, Vicars Cross, Chester. Details G6IFA, tel 336639.

Crewe (S Cheshire ARS)—13 Oct (AGM). 8pm. Crewe LMR Sports Club, Goddard St, Crewe. Details G1PUV, tel 07816 73185.

Fylde (FARS)—7 Oct (Cassette/slide, "Aerials for dx", G6CJ), 21 (Informal with dx). 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel 725717, or PRO tel 737680.

Leyland (Central Lancs ARC)—1 Oct (Trip to *HMS Inskip*), 6 (Noggin & Natter), 20 (TBA), 3 Nov (TBA), 5 (Trip to Red Rose Radio). 8pm. The Priory Club, Broadfield Drive, Leyland. Sec G4YWG.

Liverpool (L&DARS)—7 Oct (AGM, 8pm prompt). The Churchill Conservative Club, Church Rd, Liverpool 15. Sec G1EXJ, tel 728 8811.

Manchester (South MRC)—3 Oct (Video lecture, W0ORE), 10 ("Six metre project update No 2, G4HON), 17 ("Cryogenics and super conductivity", G3VIW), 24 (Mystery lecture, G8TYY), 31 (Pumpkin Hunters df night). 8pm. Sale Moor Community Centre, Norris Road, Sale. PRO G2AKR.

Morecambe (MBARS)—Please note new details. Meetings Tuesdays fortnightly, 7.30pm. Morse classes alternating Tuesdays. New club address c/o Trimpell Sports & Social Club, Outmoss Lane, Morecambe LA4 5SZ. Details G3PER, tel Heysham 52659.

Ormskirk (O&DARS)—2 Oct (Junk sale), 14 (Visit to Skelmersdale Telephone Exchange, 8pm), 6 Nov ("Amateur tv", talk and demonstration by G6AWD). 8pm. The Community Centre, Chapel Street, Ormskirk. Sec G1KDF, tel Ormskirk 74868.

Penrith (EVRS)—16 Oct ("QRP and construction", G3RJV). 7.30pm. Ullswater Centre, Penrith, or the Crown Hotel, Eamont Bridge. Details G4XPO, tel Culgaith 462, or G4XET, tel Kirby Thore 61745.

Stockport (SRS)—8 Oct ("Logic circuitry", G8OMH), 15 (Informal natter night in the bar), 22 ("Shocks and socks", G4SSN). 8pm. Magnet Inn, Wellington Road North, Stockport. Sec G4FFW, tel 061-224 7880.

Thornton Cleveleys (TCARS)—6 Oct (Judging of construction contest), 13 (Informal club on the air), 20 (AGM, members only), 27 (Informal club on air), Morse class, G3ZRZ. 7.45pm. 1st Norbreck Scout HQ, off Fleetwood Rd, Bispham, Blackpool. Details G4BFH, tel 853554.

Warrington (WARC)—7 Oct (Open forum), 14 ("Spectrum analysis", G3OGO), 21 ("VHF NFD and other contests", G4HGI), 28 (TBA), 4 Nov (Open forum). 8pm. Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Warrington. Sec G0CBN, tel 0925 814005.

Woodford (RATEC)—20 Oct ("Clandestine radio", G3LEQ). 8.15pm. British Legion Club, Moor Lane, Woodford, Nr Bramhall. Details G4SFU, tel 061-485 3912.

My thanks this month go to Bolton & DARS, Northern Amateur Radio Confederation, Oldham ARS and The Merseyside Special Event Group for their kindness and hospitality during my visits. Also to the many clubs within the region for their news sheets, magazines and news contributions. I would also like to compliment the West Manchester RC on its excellent organization of the Red Rose Rally at Haydock. Well done all of you.

RR1.

REGION 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, Beverley, N Humberside HU17 7LX. Tel 0401 50397.

Halifax (H&DARS, G2UG)—21 Oct ("Your key to good morse", G4SON). 7.30pm. Running Man ph, Pellon Lane. Details G0DLM, tel 0422 202306.

Hull (H&DARS, G3AMW)—3 Oct ("Antenna forum", G3RDM), 10 (DF hunt with G6EBH, meet at Peter Pan Park 7pm), 17 (Social evening), 24 ("Technical video", G4VSP), 31 (Junk sale preparation). West Park Recreational Centre, Walton St. Details G0DMP, tel 0482 862149.

Keighley (KARS, RS84851)—14 Oct (Informal meeting), 28 (Junk sale). 8pm. Victoria Hotel. Details G1IGH, tel 0274 496222.

Leconfield (RCT ARS, G4GGD)—9 Oct (Informal at Molescroft Inn), 23 ("Region update", G4EJP). Normandy Barracks. Details G4SMB, tel 0401 51200.

Leeds White Rose (WRARS, G3XEP)—1 Oct (Natter night), 8 (Natter night), 15 ("The TDZ portable transceiver", G3TDZ), 22 (Natter night), 29 (Bring & Buy sale). Moortown RUFC. Details G4ATZ, tel 0937 842790.

Maltby (MARS, G4SKM)—3 Oct (Activity night), 10 (How to align ex-WD receivers), 17 (Cheese and wine party), 24 (Scanning receivers), 31 (Early days of amateur radio). 7.30pm. Hellaby Community Hall. Details G3ZHI, tel 0709 814911.

Otley (DARS)—Tuesdays, 8pm. RAOB Club, Otley. Sec G0CLD, tel Otley 464213.

Pontefract (P&DARS, G3FYQ)—9 Oct (Visit by Goole ARS to give atv demo), 16 (Raynet junk sale), 23 ("G2DAF receiver construction", G4LOS), 30 (Committee meeting). 8pm. Carleton Community Centre. Details G0AAO, tel 0977 43101.

Ripon (R&DARS, G4SKM)—New meeting location: Air Raid Shelter behind Ripon Town Hall. Details Liz Bulman, The Lodge, Lister House, Sharow.

UK FM Group (Northern, G8KFM)—5 Oct (Monthly meeting). Royal Hotel, Barnsley. Details G4UNA.

World Assn of Christian Radio Amateurs (WACRAL, G3NJB)—3-5 Oct (Conference weekend at Cliff College, Nr Sheffield). Details G3AGX, tel 0482 822276.

Wakefield (W&DRS, G3WRS)—7 Oct (Getting through after getting through), 14 (WRS members on-the-air competition), 21 (Home construction display), 28 (Bonfire party). Community Centre, Prospect Rd, Ossett. Details G4VRY, tel 0532 820198.

Wakefield (NWRC, G4NOK)—5 Oct (Wakefield mobile rally at Outwood Grange School), 9 (Night on the air), 16 (Photo night), 23 ("DX chasing", G4RCG), 30 (Monthly meeting). White Horse ph, Fall Lane. Details G4RCH, tel 0532 536633.

Wharfedale (WRG, GB3WF)—Details G4OWG, tel 0532 502158.

Wawne (Wawne Raynet Group)—6 Oct (Contest with county Raynet), 20 (Training and group meeting). EP Cell, Meux Rd. Details G4EJP, tel 0401 50397.

York (YRCA, G4YRC)—14 Oct (Informal), 28 (Computers/wine making and tasting). Ashcroft Hotel. Details G1FTA, tel 0904 704634.

REGION 4—RR M Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey DE3 2BJ. Tel Derby (0332) 556875.

Alfreton (ADARS)—6 Oct (Visit to EMEB Radio Station), 13 ("Morse", G3MAM, and night on the air), 20 (ATV demonstration, G6ULR). 8pm. ECP Sports & Social Club, Carnfield Hill, Alfreton, Derby. Sec G1SFR.

Derby (D&DARS)—1 Oct (Junk sale), 8 ("Meters", G3SZJ) 15 ("New Zealand", G4UUQ), 22 (TBA), 29 ("DXpedition to Lundy Island", G5LP). 7.30pm. 119 Green Lane, Derby. Sec G3KQF, tel 772361.

Derby (Nunsfield House ARG)—3 Oct (Railways), 10 (Junk/surplus sale), 17 (Telephones), 24 (Demonstration by Lowe Electronics), 31 (Hoppers choppers). 7.45pm. Nunsfield House, Boulton Lane, Alavaston, Derby. Sec G4PZY, tel 767994.

Grimsby (GARS)—2 Oct (AGM and awards night), 16 (Grand junk sale). 8pm. Cromwell Social Club, Cromwell Road, Grimsby. Sec G4EBK, tel Grimsby 887720.

Glossop (G&DARG)—30 Oct (Natter night). 7.30pm. Nags Head Hotel, Charlestown Road, Glossop. Sec G4GNQ.

Nottingham (ARCON)—2 Oct (Activity night), 9 (Microwave night), 23, 30 (Activity nights). 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. Sec G4PJZ, tel 624764.

Scunthorpe (SARC)—7 Oct (Natter night), 14 (Construction from junk competition), 21 (TBA), 28 (Main construction competition). 7.30pm. Grange Farm Hobbies Centre, Franklin Cres, Scunthorpe. Sec G4ZGJ, tel 732268.

Sleaford (S&DARC)—26 Oct ("Satellite working", G4CHO). 8pm. Village Hall, Great Hale, Sleaford. Sec G2HHK, tel 0529 304454.

Worksop (WARS)—7 Oct (Maltby Club visit for quiz), 21 (AGM). 7.30pm. Woodhouse Inn, Woodend, Rhodesia, Worksop. Sec G4ZUN, tel 486614.

REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or at work on 0582 21151.

Daventry (DARC)—1 Oct ("Norway", G3DOT). Conservative Club, Daventry. Morse classes, hf operating, RAE instruction, rtty/computer operating on Wednesdays in the Raynet Control Centre. Sec G0DPA.

Dunstable (Dunstable Downs RC)—10 Oct (Badge engraving service, G3WLM), 24 (Talk on radio test gear (provisional)), 31 (Visit to RAF Croughton (alternative date)). Room 3, Chews House, High Street South, Dunstable. Sec G6EES, tel Dunstable 607623.

Cambridge (C & D ARC)—Fridays. Visual Aids Room, Coleridge Community College, Radigund Road, Cambridge. Details G4TRO.

Leighton Buzzard (Leighton Linsdale RC)—6 Oct (Junk sale). 7.30pm. Room A64, Vandyke Community Centre, Vandyke Road, Leighton Buzzard. Sec Debbie Jones, tel 0908 649238.

Milton Keynes (MK & DARS)—13 Oct (AGM). The Meeting Place, Hodge Lea, North Milton Keynes. Sec G3ZPA.

Northampton (NRC)—23 Oct (AGM). 8pm. Kingsthorpe Community Centre. Sec G4YJP.

Shefford (S & DARS)—23 Oct (Grand autumn junk sale), 30 (Visit to British Aerospace, Stevenage), 6 Nov (Unveiling of club project). 8pm. Church Hall, Ampthill Road, Shefford. Sec G4PSO.

Wisbech (W & DAREC)—Thursdays, 7.30pm. RAFA Club, Astral House, Old Market. Sec G4ODH.

REGION 6—RR N P Taylor, G4HLX, 87 Hunters Field, Stanford in the Vale, Faringdon, Oxon SN7 8ND. Tel 03677 503.

Didcot (Vale of White Horse ARS)—7 Oct (Talk by Nigel Lay, G8FXG), 21 (Junk sale). 7.30pm. The Waterwitch, Cockcroft Road, Didcot. Sec G4SYL, tel Didcot 816845.

Harwell (HARS)—21 Oct ("History of telecommunications"). 8pm. Harwell Lab Social Club. Sec G6MRP, tel Abingdon 848617.

Maidenhead (M&DARS)—3 Oct (Junk sale), 21 ("The 70cm Bracknell repeater", T Fox, G4EMO). 7.30pm. Red Cross Hall, The Crescent, Maidenhead. Sec G8RYW.

Reading (R&DARC)—Meets in the White Horse ph. Details G8XBE, tel 0734 867483.

Slough (Burnham Beeches RC)—6 Oct ("Computer languages"), 20 ("Power supplies", G4XOW), 3 Nov ("AMRAC", G4ZRT). 8pm. Haymill Community Centre, 12 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.

Biggin Hill (BHARC)—21 Oct (Antenna demonstration). 8pm. Downe Village Hall, 24 High Street, Downe, Kent. Sec G0AMP, tel 0689 57848.

Cray Valley (CVRS)—16 Oct (Natter night), 18-19 (JOTA), 23 (40th anniversary celebration). 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. Details G3TAA.

Croydon (SRCC)—6 Oct (Surplus equipment sale). 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS, tel 01-657 0454.

Crystal Palace (CP & DRS)—18 Oct (Junk sale). 8pm. All Saints Parish Room, Upper Norwood SE19. Sec G3FZL, tel 01-699 6940.

Dorking (D & DRS)—14 Oct (Informal). 8pm. Star & Garter. 28 (Junk sale). 8pm. Ashcombe School. Sec G3AEZ, tel 0306 77236.

Guildford (G & DRS)—10 Oct (RSGB: G3NFV, RR7; and G3AEZ, Zone C Council member). 8pm. Model Engineers HQ, Stoke Park, Guildford, Surrey. Sec G4PLO.

Redhill (RATS)—21 Oct (EMC G3AEZ). 8pm. Constitutional & Conservative Club, Warwick Road, Redhill, Surrey. Sec G8JXV.

Surbiton (308 ARC)—7 Oct (AGM), 28 (Junk sale). 8pm. The Coach House, Church Hill Road, Surbiton, Surrey. Details G0CFH.

Sutton & Cheam (S & CRS)—6 Oct (Natter night), 17 (Junk sale). 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Sec G4FKA, tel Epsom 21349.

Thames Ditton (TVARTS)—7 Oct (QRP project). 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton, Surrey. Sec G3ENI.

Wimbledon (W & DRS)—10 Oct (AGM), 31 (Junk sale). 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.

Crawley (CARC)—8 Oct (Informal, courtesy Ray, G3LNM QTHR), 15 (Committee meeting, Derek's G3GRO), 22 (Microwave Modules, G4EFO, at Leisure Centre, 8pm), 12 Nov (Junk sale, T S Cossack, London Rd, Crawley). Crawley Leisure Centre, Haslett Ave, Crawley. Details G4IQM, tel Crawley 882641.

Dartford (DDFC)—11 Oct (Two-station night hunt, Slade), 14 (Pre-hunt meeting), 19 (Club hunt), 25 (Three-station night hunt, (RSGB) Mid-Thames), 4 Nov (Pre-hunt meet). Pre-hunt meetings after 9pm. Horse & Groom ph, Leyton Cross, Dartford Heath. Details G8DYF, tel Greenhithe 844467.

Dover (South East Kent YMCA ARC)—1 Oct (Natter night), 8 (Fire Service Communications), 15 (Natter night), 22 (Top band foxhunt). Dover YMCA, Godwynehurst, Leyburne Rd, Dover. Details John H Dobson, Flat 3, 145 Snargate Street, Dover, Kent CT17 9BZ.

Eastbourne (Southdown ARS)—6 Oct (Surplus equipment sale), 3 Nov ("Microwaves", G4PRJ). 7.30pm. Chaseley Home, South Cliff, Bolsover Rd, Eastbourne. Tuesdays and Fridays, various activities, Hailsham Leisure Centre, Vicarage Lane, Hailsham. Details G4XNL, tel Eastbourne 638653.

Edenbridge (EARS)—8 Oct (HF night and judging of construction contest), 12 Nov (Junk sale). Scout Hut, High Street, Edenbridge. Details G8VCH, tel East Grinstead 24748.

Gillingham (Bredhurst R&TS)—2 Oct (Inter-club quiz), 16 ("Ack George"), 30 (QRP/homebrew components contest). 8pm. Parkwood Community Centre, Parkwood Green, Rainham, Gillingham. Details G0AMZ, tel Medway 376991.

Hastings (HERC)—15 Oct (Junk auction). 7.45pm. West Hill Community Centre. Details G4NVQ, tel Hastings 420608.

Maidstone (MYMCAARS)—3 Oct (Mobile rally '87 Briefing), 10 (Natter night, RAE and cw), 17 (Junk sale), 24 (Natter night, RAE and cw), 31 (Construction of a valve amp for 29MHz). All lectures and RAE start 8.30pm, cw 7.30pm. Details G0BUW, tel 0622 30544.

Meopham (MPRC)—12 Oct (Surplus equipment sale). 7.30pm. The Club House, Vigo Rugby Football Club, Vigo Village, Meopham. Details G6TXP, tel 0732 883812.

Worthing (W&DARC)—1 Oct (Ragchew evening), 8 (AGM), 15 (Ragchew evening), 22 (SSTV), 29 (Ragchew evening). 7.30pm. Lancing Parish Hall, South Street, Lancing. Details W&DARC, PO Box 599, Worthing, West Sussex BN14 7TT. (Roy Jones, G4SWH).

REGION 9—RR AH Hammett, Rosehill, Ladock, Truro, Cornwall TR2 4PQ. Tel 0726-882 758.

If more Region 9 clubs would like their meetings and events published, would they kindly let me know in plenty of time. Let the rest of the country know what you are doing.

Axminster (Axe Vale ARC)—3 Oct (AGM). 7.30pm. The Cavalier, West Street, Axminster. Sec G3VW.

South Molton (Exmoor RC)—2 Oct. Meeting at new club premises: South Molton Comprehensive School, Old Alswear Road, South Molton. Sec G4JBR.

Exmouth (EARC)—8 Oct (Visit to Royal Observer Corps HQ at Exeter). 22 (Natter night), 5 Nov (Construction competition). 7.30pm. The Scout Hut, Marpool Hill, Exmouth. Sec G4RUT.

Barnstaple (North Devon RC)—First Wednesday of each month, 7.30pm. Micro Centre, The Strand, Barnstaple. Sec G4LST.

Plymouth (P Polytechnic RC)—Wednesday afternoons at the northern end of the Science Block. A call on 144·625MHz would ensure the shack being open. 26 Oct (Foxhunt in Plymouth City Centre. Assemble at 10am outside the Students Union. A sense of humour is required). Sec G4ZTZ, c/o Students Union.

Redruth (Cornish RAC)—2 Oct (Main club meeting, subject tba), 13 (Computer section; "BBC programs for the handicapped", G4MSV), 23 (Constructors evening), 6 Nov (Surplus sale) 7.30pm. Treleigh Church Hall, Redruth. Sec G4USB; computer section details G8JML.

Saltash (SARC)—First and third Fridays of each month. Burraton Toc H Hall, Saltash. Sec G0AKH.

Torbay (TARS)—18 Oct (RSGB video "Amateur Radio in Space"). The club is running three JOTA stations on the 18 and 19 Oct. PRO G4SBH.

West Devon Raynet Group. Sunday evenings, 7pm on 145·225MHz. Details G6BBJ, controller.

REGION 10—D H Phillips, GW4KQ, 17 Pentre Gardens, Grangetown, Cardiff CF1 7QJ. Tel 0222 35648.

Abergavenny (A&NHARC)—16 Oct ("Meteor scatter", G4ASR) 7.30pm Pen-Y-Fal Hospital, Abergavenny, Gwent. Sec GW4XQH, tel 0873 4655.

Barry (BCoFERS)—9 Oct (AGM), 30 (Junk sale). Sec GW0AGA, tel 0446 736260.

Bridgend (B&DARS)—First and third Fridays in month, 7.30pm. 9 Nov 10.30am (Bridgend & District Amateur Radio Rally, Leisure Centre, Angel Street, Bridgend). Sec. GW1OUP, tel 0656 723508.

Cardiff (CRSGBG)—13 Oct (AGM followed by a general meeting). 10 Nov (Film show). 7.30pm. Pantmawr Hotel, Tyla-teg, Pantmawr estate, Whitchurch, Cardiff. Sec GW0CUM, tel 04463 3212.

Chepstow (C&DARS)—7 Oct (Constructors night), 14 (Natter night), 21 (Guest speaker, Mr E J Case, GW4HWR, Council member RSGB Zone E). 28 (Visit from Thornbury ARS), 4 Nov (Natter night). Sec GW1FJI, tel 02912 2808.

Loughor (LAR&EC)—Alternate Thursdays, 7.45pm. Sec GW8TYS, tel 0792 893392.

Rhondda (RARS)—16 Oct ("SWR and all that", GW4HWR). 7pm. Sec GW4BUZ, tel 0443 432542.

Swansea (SARS)—25 Oct (A 53-seat coach to the radio exhibition at Granby Halls, Leicester, is being organized). Details from GW4HSH, tel 0792 404422.

I shall be pleased to hear from club secretaries and will arrange to visit their clubs on a mutually convenient date should this be required. I shall also be pleased to hear from non-club members and will always try to sort out any problems.

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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, GW6TM)—9 Oct (Talk tba), 13 Nov (Surplus sale). Second and third Thursdays of the month. 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Note new sec GW4KGI, tel 0745 823674.

Dolgellau (Meirion ARS)—2 Oct ("Japanese morse", G3CSG), 6 Nov ("Remote controlled aircraft", GW4KDP). Dolserau Hall Hotel. Note new sec, GW4KDP.

Porthmadog (P & DARC)—16 Oct ("Basic fault finding", GW2HCJ), 20 Nov (AGM). 8pm. Harbour Cafe, Ffestiniog Railway, Porthmadog. Sec GW1EGQ, tel 0766 2684.

Rhyl (R & DARC GW4ARC)—6 Oct (Activity night), 20 (Junk sale), 3 Nov (Activity night).

7.30pm. 2 Rhyl Scout HQ, Vale Road, Rhyl. Sec GW8OYT, tel 0745 37284.

REGION 13—RR A J Scott, 2 Manderston Grove, Duns, Berwickshire TD11 3PP. Tel 0361 83221.

Berwick on Tweed (Border ARS, GM0BRS)—3 Oct (Nominations for AGM), 17 (AGM, 8pm sharp), 25/26 (Club stn in CQ WW DX Contest). Tweed View Hotel, Berwick-on-Tweed. Sec GM1IRN, tel 0289 82491.

Galashiels (G & D ARC, GM47EQ)—For winter programme contact GM0AMB tel 0896 55569.

Kelso (KARS, GM4KHS)—18/19 Oct (Special JOTA station GB4BAS operational in club room), Mondays, 7.30pm Abbey Centre. Sec GM3VLB, tel Kelso 24664.

Club secs are reminded that to ensure an entry in "Club News" they have to send information to me by the deadlines published at the beginning of this feature every month. *RR13*

REGION 16—RR A Owen, G4HMF, 102 Constable Rd, Ipswich, Suffolk. IP4 2XA.

Braintree (B&DARS)—6 Oct (Consumer & public protection) 20 (Constructors' contest), 3 Nov (Junk and Jewels sale). 8pm. The Community Centre, Victoria Road (next Bus Station), Braintree. Details G0EMK (Temp. 88 Coldnailhurst, Braintree CM7 5PY, tel 0376 25587).

Brentwood (BARC)—New club. First and third Tuesdays of each month, 7.30pm. The Heritage, Shenfield Road, Brentwood. Details G8WYM. Tel (daytime) Basildon 403153.

Bury St Edmunds (BStEARS)—21 Oct (Used equipment sale). 7.30pm. Westgate Primary School, off Hospital Road, Bury St Edmunds IP3 2EE. Tel 0359 50271.

Chelmsford (CARS)—7 Oct (AGM), 4 Nov (Junk sale). 7.30pm. Marconi College, Arbour Lane, Chelmsford. Sec G4KQE, tel 0376 83094.

Colchester (CRA)—2 Oct (AGM), 16 ("Spy sets", G3EUR), 30 ("Antenna construction for uhf/vhf," G4TZM). 1930. Colchester Institute, Sheepen Road, Colchester CO3 3LL. Details G3FIJ, tel 0206 851189.

Felixstowe (F&DARS)—6 Oct (Social), 16 (visit EADT), 20 ("Testing and trouble shooting," G4SYG), 3 Nov (Social). 8pm. The Feathers ph, Walton High Street, Felixstowe. Details G4YQC, tel 0473 642595 (daytime).

Ipswich (IRC)—8 Oct (Planning JOTA), 29 (TBA). 8pm. Rose & Crown ph, Norwich Road, Ipswich. Details, G4IFF, tel 0473 44047.

Kings Lynn (Norfolk CAT Student Union ARC). Thursdays, 8pm, St John's School, London Road, Kings Lynn. Morse classes Fridays 7.30pm. Details G4OZG, tel 0553 768701.

Leiston (LARC)—7 Oct ("RTTY by computer"), 4 Nov (AGM and surplus sale). 7.30 for 8pm. Sizewell Sports & Social Club, King George's Avenue, Leiston. Details G0CJX.

Loughton (L&DRAS)—10 Oct (Informal), 24th (DF hunt at 1945). 8pm Loughton Hall, Rectory Lane, Loughton. Details G4FKI.

Stanford-le-Hope (SLH & DARC)—6 Oct (Videos), 13 (VHF night on the air), 20 (Monthly discussion), 27 (Top band and dxing). 8pm. St Joseph's Parish Rooms, Scratton Road, Stanford-le-Hope. Details G4LTH, tel 0375 674301.

Vange (VARS)—2 Oct (bring and buy), 9 (On the air), 16 (Film night), 23 ("Radio-controlled models", G3ASH), 6 Nov (Bring and buy). 8pm. Barstable Community Centre, Basildon. Details Mrs D Thompson, 10 Feering Row, Basildon SS14 1TE, tel 0268 552606.

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL. Tel 0703 812435.

Bishop's Waltham (Amateur Radio & Computer Club, AMRAC)—3 Oct ("Enigma—over the shoulder", G3VA. 8pm. The Crown, Bishops Waltham, Hants. Sec G6DLJ, tel (0703) 847754 (also Prestel Mailbox 703847754).

Andover (ARAC)—1 Oct ("A night of conversation". 15 ("Counterpoise design"), 5 Nov ("Fireworks in the shack", G4THW. 8pm. Wolversdene Club, Andover. Club net, 8pm. Tuesdays S18—G0ARC/A. Sec G0AMO, tel Andover 51593.

Basingstoke (BARC)—6 Oct (AGM), 3 Nov ("Constructors competition"). 7.30pm. Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G4WIZ, tel Tadley 5185.

Eastleigh (Itchen Valley ARC)—10 Oct ("The repeater service", G4EPX), 24 (Junk sale). 7.30pm. The Scout Hut, Brickfield Lane, Chandlers Ford. Club net, Thursdays 8.30pm S21-23-G6IVR. PRO G0EQG, tel Winchester 55339.

Fareham (F&DARC)—8 Oct ("Packet radio", G4CJO), 22 (Lecture tba). 1, 15 and 29 Oct (Natter nights). 7.30pm. Portchester Community Centre, Portchester, Hants. Sec G3CCB, tel Fareham 288139.

Farnborough (F&DARS)—8 Oct ("EMC", G3KND), 22 (Surplus equipment sale). Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. PRO G4SBU.

Horndean (H&DARC)—2 Oct (AGM). 7.30 for 8pm. Murchiston Hall, London Road, Horndean. Sec G4BEQ.

Liphook (Three Counties ARC)—1 Oct ("HF antennas and feeders", G5RV), 15 ("Oscar operation", G3RWL), 29 (On air—natter night). 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.

Portsdown 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.

Southampton (SUARS)—1-13 Oct (Special event station GB0SUR on hf, 144 and 432MHz to coincide with "Fresher's Conference" and to publicize club in the university. Meetings Wednesdays 1pm. 65 University Road, Southampton. Contact G0ERI, tel 0703 559122, ext 2137 (daytime).

Southampton (SARS)—Results of agm: chairman, G6MHW; treasurer, G3VSL. First and third Wednesdays of each month except August. Millbrook Community School, Green Lane, Millbrook, Southampton, 7.30 for 8pm. Sec G4VKB, tel Southampton 737892.

UK FM Southern Repeater Holding Group (GB3SN)—6 Nov (AGM). Chineham House, Shakespeare Road, off Popley Way, Basingstoke. 7.30 for 8pm. For information or to join the group and help support the repeater please contact Mrs Jan Steele, tel Fleet 613311.

Waterside (WSWC)—28 Oct ("Home Construction"). 7.30pm. Community Centre, Blackfield, Southampton. Sec G0BPA, tel 0703 893937.

Weymouth (SDRS)—7 Oct (Preparations for JOTA), 4 Nov ("Packet radio revisited", G3VPF). 7.30pm. Royal Engineers Training Camp, Camp Road, Wyke Regis, Weymouth. Sec G0FIT, tel Dorchester 67596.

Winchester (WARC)—17 Oct (Film, presented by G4AXO). 7.30pm. Durngate House, Winchester. Sec G4ZNO, tel (0703) 772191.

REGION 18—RR Ian Gibbs, G4GWB, 61 The Gables, Widdrington, Morpeth NE61 5QZ. Tel 0670 790090.

Morpeth (Northumberland ARC, G4AAX, G6AAX)—16 Oct (Visit to RAF Boulmer). G4DGQ teaches French for QSOs for an hour on each club night, Thursday evenings. Old Telephone Exchange, Cresswell Rd, Ellington, Morpeth. Sec G0EVV, tel 0670 513026.

Newcastle (Tyneside ARS, G3ZQM)—1 Oct (Informal), 8 (Constructors evening), 12 (Special event station GB2FBC from BBC Radio Newcastle new building), 15 ("The weather for UHF/VHF propagation"), 22 (Informal), 29 (Activity evening, club station etc). Note new address: Scout Centre, Harbottle St, Byker, Newcastle. Sec G4KOT, tel 091 2341148.

REGION 19—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

The Watford RC has unfortunately closed due to sudden loss of its regular meeting venue. Ex-members are using the saloon bar of The Beaver ph, Courtlands Drive, Leavesden, Watford, from 8.30pm on Wednesdays (where better). Details G3YXZ, tel Kings Langley 65490.

Borehamwood (B & Elstree ARS)—13 Oct ("QRP demo and lecture", G3JPJ), 10 Nov ("Demo and lecture on rtty", G0DDJ). Organ Hall Community Centre, Bairstowe Close, Borehamwood, Herts. A tour of the BBC Brookmans Park station is being arranged. Sec G0DDJ, tel 01-207 3800 after 7pm.

Chiswick (ABCARC)—21 Oct (Members' holiday activities). 7.30pm. Chiswick Town Hall, High Road, Chiswick, London W4. Sec G3GEH, tel 01-992 3778.

Edgware (EDRS)—9 Oct ("Syntony", G4HFL), 23 Oct (Informal; "Club history", G3MNO). 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec G4RMD tel Hatfield 64342.

Feltham (Thorn EMI ARC)—7 Oct (Wood & Douglas, talk and exhibition of their equipment). 7.30pm. Lower bar of Sports Club, Mow Lane off Victoria Rd, Feltham, Middx. A small charge is made to this club. Sec Dave Austin, tel 01-890 3600 ext 2617.

Grafton (GRS)—New venue: now meets second and fourth Fridays of the month at T S Wizard, White Hart Lane, Tottenham, London N17, 8pm. The club wishes to become active again on the air and wants workers for vhf and hf gear. Sec G4PSH, tel 01-368 8154.

Harpenden (HAR)—7 Oct (AGM 7.30pm), 14 (On the air), 21 (TBA), 28 (On the air). 8pm. Silver Cup ph, Harpenden, Herts. Details G4JOV or G1BJC.

London (Civil Service ARS)—6 Oct (Lunchtime talk, G3KMA), 20 (Lunchtime operation, G1CSR and G3CSR. C.S. Rec Centre, Monck Street, SW1P 2BL. The shack is available for licensed members from 1130am to 1030pm. Contact Bob Treacher, tel 01-212 8823.

Southgate—9 Oct (Lecture on dbs and atv), 23 (Informal). 7.45pm. Holy Trinity Church Hall (upper), Green Lanes, Winchmore Hill, N21. Details G4YLL, tel 0992 30051.

SW Herts UHF Group—This group runs GB3MR (RB14) at Stanmore and GB3SWH (10·368GHz) at Bushey Heath, and is building a 1·8GHz beacon/repeater GB3BH—probably operational by the time this issue is published. The group give talks and demos to clubs. Details G4KUJ, QTHR. Donations always welcome by G3THQ.

Uxbridge (Brunel University ARS)—4-11 Oct (Special event station GB2UBR on 3·5, 14, 144 and 432MHz). 7th (Open day; exhibition of equipment), 15th (AGM). Sec G6ZYT, tel Reading 663975 before 2 Oct. Students Union, Uxbridge, Middx UB8 3PH. tel Uxbridge 39125.

Welwyn (WHARC)—6 Oct ("The work of the RSGB", G4FRX), 20 (Film show). 8pm. Ninth WGC Scout HQ, Knightfield, WGC. Net on 145·375MHz (S15) Mondays 8pm. Details G0AII, tel 0707 326138.

The above clubs are the only ones reporting this month. Would club secretaries please note: **(1)** Your address and telephone number should be given, not QTHR. **(2)** Dates should be stated, not 2nd Monday if not the first day of month or whatever. Please see Chiswick for ideal short, sharp effective reporting method. *RR19*

REGION 20—RR C R Hollister, G4SQQ, 34 Battersby Way, Henbury, Bristol BS10 7SU. Tel 0272 508451.

Bristol (BRSGBG)—27 Oct ("Satellite tv", joint meeting with the Bristol Group of the Royal Television Society). 7.30pm. Small Lecture Theatre, Queens Building, UoB, Clifton, Bristol. Details G4SQQ, tel 0272 508451.

Bristol (N Bristol ARC)—3 Oct (Talk by Microwave Modules), 10 (Talk on satellite communications), 17 (natter night), 31 (RSGB video show). 7pm. SHE, 7 Braemar Cres, Northville, Bristol. Details G4YQQ, tel 0272 690404.

Bristol (S Bristol ARC)—1 Oct (Demonstration of the use of modems, G4WUB), 8 (Packet radio activity evening, G4WRW), 15 (Final preparations for the Bristol Rally, G4SQQ/G4KUQ), 19 (2 Bristol Rally, GB2BRR), 22 (Bristol Rally debriefing, G4SQQ, and vhf activity evening). 7.30pm. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol BS14 OLN. Details G4RZY, tel 0272 834282.

Cheltenham (CARA)—3 Oct (Natter night), 17 (Joint meeting with GCARC; G3IEE talks about and demonstrates his collection of wartime equipment). 7.30pm. Stanton Room, Charlton Kings Library, Cheltenham. Details G4VXE, tel 0242 26723.

Yeovil (Y&DARC)—9 Oct (Briefing for GB4OYC, G4JBH), 16 (Answers to questions on hf propagation, G3MYM), 16-19 (40th anniversary "open days", GB4OYC operational), 30 (Natter night). Details G3GC, tel 0935 75533.

Weston-super-Mare (WsMRS)—13 Oct ("Raynet", G0CEN), 27 (Constructors night). 7.30pm. 17 Moor Lane, New Bristol Road, Worle, W-S-M. Details G1DJW, tel 0934 514429.

I look forward to meeting many members at forthcoming events in the region. *RR20*

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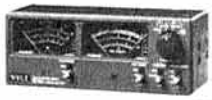

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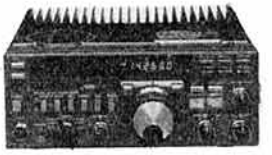

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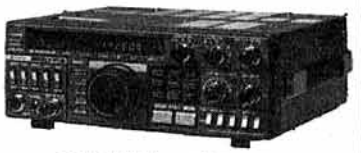

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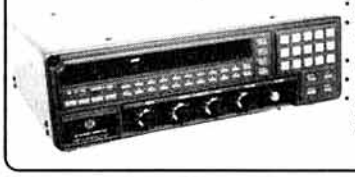

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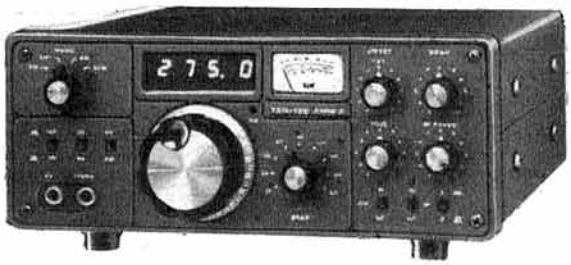

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PRICES. These include postage, packing and VAT where applicable, and are subject to change without notice. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.

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***Items marked with an asterisk may not be available immediately; please telephone before ordering to confirm availability.**

ORDER FROM: RSGB Publications (Sales), Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

(For details of RSGB newsletters and Raynet supplies, contact the Circulation Dept at RSGB HQ)

THE
RSGB News Bulletin
PAGES

Satellite in danger of 'dying'

Word has probably got around the satellite user fraternity by now but, just in case it hasn't...

DON'T USE OSCAR 10 - EVEN IF YOU HEAR IT IN MODE B

OSCAR 10 has severe problems at present, which are likely to take some time to solve; latest word is that it will be "....some months" before it can be used again. Problem is that the bird is uncommandable at the moment because of suspected radiation damage to its memory, so even if you hear Mode B operation by those who haven't got the message, please don't use it otherwise we'll have a dead spacecraft before very long. For the latest information, listen to GB2RS or the AMSAT nets.

Reason for the radiation damage is thought to be the incorrect inclination achieved by the bird when it went into orbit. The difficulty in correcting the problem is that there's a limited time slot available for each command station to get into the Integrated Housekeeping Unit (IHU), so the new Mk IV software is having to be programmed in byte-by-byte. The satellite needs to be powered down so that a proper sequential power-up sequence can be carried out, just as it was after launch. At present the satellite has switched to its emergency battery and the voltage of this is getting dangerously low - hence the need not to use it. So once again;

DON'T USE OSCAR 10 AT THE MOMENT

New Call Book

Don't forget - the October edition of the RSGB Amateur Radio Call Book will be out fairly soon.

Just as a reminder, this is the first time the RSGB has produced a Call Book twice in one year. It is completely updated, with a number of new pages of special information about the many RSGB news services available to amateurs everywhere.

DATES AND VENUES FOR OCTOBER

NEW MORSE CENTRES FOR SCOTLAND AND N IRELAND

A number of new Morse Test centres are imminent in two Scottish regions - Central and Dumfries & Galloway. Three centres in Northern Ireland are also scheduled to open for business during November, one for Belfast, one to cover Counties Antrim, Londonderry and Tyrone and one for the Counties Armagh, Down, and Fermanagh. These three centres are a bit "non-standard" insofar as they'll hold one test every three months. As usual, more information on the new test centres as and when we have it - check GB2RS, the DataBox and Prestel, and Headline News for the latest.

Special "disabled" test scheme starts

The list over the page shows the dates and locations of all the available test centres from 1 October onwards as we went to press. If you'd like to take a test at any of the centres shown and they're 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 isn't a suitable centre for you shown overleaf, contact RSGB Headquarters in a few weeks' time. By then we may have been notified of some additional centres where the Morse test can be taken, and one of these might be more appropriate for you.

Morse tests are carried out in groups of three and their duration is 30 minutes. 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.

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

One important addition to the Morse test scheme is that the Society has now agreed with the Department of Trade and Industry an interim scheme for disabled Morse test candidates who cannot attend a Morse test centre in the usual way. Candidates to whom this applies are invited to apply for the standard Morse test application form from Headquarters. When completed, this form should NOT be returned to HQ - it should be sent directly to the Chief Examiner, Neville Ianson, G3GDO, at 6 Maple Close, Louth, Lincs LN11 0DW. The necessary arrangements will then be made. This system is operative with immediate effect, although we should stress that procedures may change later. See over the page for the list of centres and dates.

NEW RSGB BOOK OF REVIEWS TOOK A YEAR

Elsewhere in this issue of Radcom, you'll find an advertisement for Angus McKenzie's (G3OSS) new book, entitled "The Buyer's Guide to Amateur Radio". What the advertisement does not tell you is that the author, its editor, RSGB committee and Council members have taken something like a year to produce the 475-page book.

It is undoubtedly a magnificent work of reference, and there has never been anything like it before. Angus McKenzie's experience of amateur radio equipment is probably unrivalled in the UK - or for that matter anywhere in the world - and the odds are that you will learn something new about a rig which you have had in the shack for years and years - we did!

There's also advice for anyone wanting to buy a new or secondhand rig; in fact there's even a chapter dealing with your relationship with the man from whom you are buying your equipment.

The major section dealing with the rigs themselves is, of course, the core of the book. Note that each review begins with a list of the equipment's facilities (even down to the stand clips underneath the rig) and continues with a section entitled 'subjective tests and ergonomics' which tells you about its functions, performance and any differences compared with direct competitors and others in the same maker's range.

Angus continues with his now well-known laboratory tests on each rig. Here he summarises such areas as rf sensitivity, intercept points and testing of blocking performance. Close-in measurements are included, as is reciprocal mixing, maximum transmitted power, and much more. Spectrum analyser and various B & K-type plots accompany the written comments in many cases.

Good reviews should always be followed by sensible and helpful conclusions to aid comparisons, and these are. Here is Angus on the Trio TS940S, for instance: "In almost all parameters this rig behaves splendidly. Reciprocal mixing performance is not as good as the 930 though... Some extremely important modifications are available at additional cost from Lowe Electronics which result in the rm improving by 12dB and a.m. distortion reducing to only 0.75%... Its speech synthesiser makes it particularly suitable for blind operators."

Published by the Radio Society of Great Britain. Price £6.88 to members, including post/packing.

Each major review rounds off with a selection of laboratory test results. In all, this book of reviews is very, very comprehensive, and a must for all amateurs, whether they are buying, selling or not even thinking of changing their equipment.

Well illustrated with photographs, this book will prove to be a useful addition to any amateur's shack. There are literally hundreds of pieces of equipment mentioned, tested and reviewed; there are also some useful chapters covering subjects like: receiver performance, microphones, ATUs, power and SWR meters, antennas, transverters, RF cables and connectors, technical testing, test equipment, preamps and so on.

18 MHz not yet available in USA — says ARRL

The American Radio Relay League recently raised the question of access to the 18.068-18.168 MHz band for radio amateurs in the USA with the Federal Communications Commission. The League had understood that US Government operations in that band had ceased and, on that basis, filed a "Request for Rule-Making" to gain early access to it. However, ARRL discovered a few days after making the application that its information had been incorrect and that the US Government was still using the allocation for "....important....operations". It is understood that these will continue until June 1989.

Notwithstanding this setback, ARRL is still seeking ways in which US amateurs can join those of the 57 nations whose amateurs currently have access to the 18 MHz allocation - including, of course, we in the UK.

Morse Tests: dates & locations

COUNTY	TOWN	DATE
South Glamorgan	Penarth	18/11/86
Leics	Wigston Magna, Leicester	22/11/86
Avon	Northville, Bristol	28/11/86
Herts	North Watford	28/11/86
West Midlands	Sandwell	29/11/86
Essex	Canvey Island	29/11/86
Gwent	Newport ARS	1/12/86
Co Durham	Great Lumbley	3/12/86
Guernsey C I	Guernsey ARS HQ	4/12/86
Kent	West Kent ARS	5/12/86
Northants	Tiffield, Northampton	10/12/86
Nottinghamshire	Mapperley, Nottingham	13/12/86
North Yorkshire	York	13/12/86
West Sussex	Horsham	14/12/86
Mid Glamorgan	Rhydyfelin, Pontypridd	11/01/87
Buckinghamshire	Bletchley, Milton Keynes	11/01/87
South Glamorgan	Penarth	20/01/87
Avon	Northville, Bristol	23/01/87
Leics	Wigston Magna, Leicester	24/01/87
Lancs	Oldham Rally	25/01/87
Herts	North Watford	30/01/87
Co Durham	Peterlee	02/02/87
South Glamorgan	Barry Rally	01/03/87
Tyne & Wear	Blue Star Rally	07/03/87
Mid Glamorgan	Rhydyfelin, Pontypridd	08/03/87
South Glamorgan	Penarth	19/05/87
South Glamorgan	Penarth	14/07/87
South Glamorgan	Penarth	22/09/87
South Glamorgan	Penarth	17/11/87

CONNECT INTERNATIONAL – packet radio newsletter is launched

No it isn't a new cellular radio system - it's the title of the latest RSGB newsletter. Because of the very rapid increase of interest in packet radio, the Society has decided to produce this new newsletter devoted to the subject. Intended not only as a newsletter but also as a focal point for informal technical discussion,

Connect International will be available in mid-October and it'll complement the existing newsletters dealing with HF DX, VHF/UHF matters and microwaves. After October, it will be published monthly.

Annual subscriptions in the UK cost £7.20, but note that there will be a common renewal date of 1 July in each year - so the initial cost of a subscription from October 1986 to July 1987 will be £5.40. If you'd like to subscribe, send a cheque for £5.40 to the Circulation Department at RSGB Headquarters and mark it for the attention of Tim Charles. Please make cheques payable to RSGB. If you ask Tim nicely he'll also be delighted to send you information about all our other newsletters, which are becoming more popular all the time....

European/airmail rates also available from Tim Charles.

Don't forget - the latest brand-new newsletter for all packet devotees, Connect International, available as of mid-October.

Where's our news then?

We're sorry that there are only three pages of news this month, as opposed to the usual four or more. Reason is that this particular issue of RadCom is bursting at the seams (as a matter of fact that's why there's no Members' Mailbag either) and we've also had a colossal number of Members' Ads come in this time. So we've had to allocate five pages to those - something had to give and in this case it had to be the news. Back to the full quota next month, we hope.

G8VR resigns from Council

Well-known VHF operator and compiler of the 4-2-70 column in Radcom, Ken Willis, G8VR, has resigned from Council and as the Society's EVP; however, he's still firmly in charge of the "VHF/UHF" feature in the magazine. He is planning to extend his writing activities for the Society in the future.

Talking of VHF and UHF, there was a 144 MHz Sporadic E opening on Saturday 20 September; stations in the southern part of the UK were working YU, YO and HG. Most unusual so late in the year; none of the usual theories seemed to work when applied to this event. Reflecting layer probably somewhere over Southern Germany, but apparently no thunderstorms, wind shear, etc. to account for it. Reports to Ken Willis for next month's column. Some good tropo over the same weekend as a result of the nice settled high - one RSGB staff member copied an Austrian 430 MHz repeater fully quieting on an AR2001 and its little external antenna!

RAYNET: Zone Reps wanted

Because of the resignations of Ivor Shaw, G3KWT, and John Arrowsmith, G4IWA, there are vacancies for RAYNET Zonal Representatives in Zones 2 and 9. Zone 2 consists of North, South and West Yorkshire together with North and South Humberside. Zone 9 is formed of Staffordshire, Shropshire, West Midlands, Warwickshire and Hereford & Worcester. RAYNET members resident in these zones may forward a nomination for their Zonal Representative to "The Secretary (RAYNET)" at RSGB Headquarters. Nominations should be supported by five RAYNET members who are currently registered within the Zone and they must be received not later than 5.15pm on Friday 31 October 1986. They should be accompanied by a declaration that the nominee is normally resident within the zone, is a currently registered RAYNET member and is willing to serve if elected. The period of appointment is normally three years. If more than one nomination is received by the specified date, an election will be held during the month of December 1986.

Gotta debenture?

The Society is attempting to contact the last few remaining debenture holders who have not redeemed their £25 (min) Lambda Investment Company debentures.

Despite its best efforts the Society has not yet been able to contact the people on the following list, despite correspondence sent to their last known address. If any member can assist the Society in tracing any of the following, we'd be most grateful if they would contact the Secretary at RSGB Headquarters.

Unclaimed debenture stock certificates are held by the following:

V T England
P Kiddle
A G W Leigh
J M McBride
W M Pollock
Sgt S K Westwater
R M Wilson
Mr Tims
Mr Wright
G E Hason

RMG vacancies

The Repeater Management Group has vacancies for two corresponding members. It is looking for members living in Northern Ireland and the London/Hertfordshire area to liaise between the repeater groups and the RMG in these areas. If you feel that you could assist the Society in this way, please send a stamped addressed envelope to the Repeater Management Group Chairman, Mike Dennison, G3XDV, so that he can send you more information. Mike's address is 5 Lambs Walk, Whitstable, Kent CT5 4PJ.

THE Members' Ads PAGES

FOR SALE ••••••

60' VERSATOWER, Ham II rotator, Hy-Gain 204BA and DB10-15A beams, £800, can split. Drake R-4C with CW filter, T-4XB, MS-4, AC-4, spares, £500. Heath SB-200 linear, pwr meter, Cantenna, £300. Trio TS130S, 500Hz filter, £450. R600 RX, £200. BNOS 25A psu, £140. Scope, £50. Philips tape recorder, £20. All in recent use. BC221 freq meter, £30. Avo model 7, £30. Variac type 100R, £30. Dip meter, £15. Roller-coaster, coils and variable capacitors £30. Buyer collect (Glos), carriage extra. G3BFR, NOT QTHR, tel: 04536-3994.

TRIO 9000 multimode, vgc c/w service manual, accessories, orig pkg, £300 ono. Microwave Modules cvtrs, 23cm-2m, 70cm-10m, offers? Creed 444 teleprinter 45/50 bauds, vgc, PAG RTTY t/u, £40. All complete in ex condx. G4PFF, QTHR Cambs, tel: 07677-7792.

MM432/28S tvtr, £90. HW101 SSB TCVR c/w psu, spare valves, manual, £120. Vintage Collins TC3 and CR300 RXs gwo, £15 ea. Radio controlled boats, gliders. Can deliver 50 miles. All items gwo. G1LSG, QTHR, tel: Felixstowe 278010.

YAESU FTDX150 hf rig, 100W; £200 ono; excellent condition; mic, speaker, h/brew speech processor; also 12Vdc lead, manual, spare PA valves; great for new licensee. Owner new upgraded - nearly DXCC! G0AHC QTHR (Brian) Birmingham 021-458 2946.

FT102 tcvr little used c/w narrow SSB and C/W filters, matching Yaesu MH-1B8 dynamic hand mic and SP-102 filter/speaker mint condition, C/W handbook and original packing, £650 G3UVE tel 0424-215983.

2EL GEM QUAD £150, 31ft alloy mast with rotary guy points £25. Home made rotator £25. TS520 ac/dc fitted cw filter £300 ono. G3UBL QTHR 0480-53811.

BBC B with single/double density disc interface and double sided 40/80 track disc drive. Exchange for FTV901R with 2m/70cm modules or part exchange on GEN/COV hf tcvr or cheap 2m mobile tcvr cash adjustment. G6ZYG not QTHR. Tel: Rushden 318493.

80 FOOT telescopic tower, trailer mounted, recently overhauled, exchange for 40ft trailer mounted or will consider sale. Contact G0AAD, 0977 43101. Pontefract & District A.R.S.

DETACHED four bedroomed renovated cottage within easy reach of sea and broads. 60 foot western tower with planning permission. Reluctant sale within next six months due to bereavement. £100,000. G4RTH QTHR, 0692-402642.

ICOM IC-202S 2 metre SSB/CW transcever, portable. Excellent condition £100 ono, Palm IV 70cm channelised handheld excellent condition £80 ono or the pair for £150 with no offers, buyer collects/pays carriage. G4SDK not QTHR tel: 021-588 6504 (Birmingham) evenings/weekends.

YAESU YD844A microphone £18. YH-GAIN 5BDQ half wave doublet antenna for 10 through 80 metres unused £95. Sinclair ZX Spectrum 48K computer, ZX printer, five program tapes, b&w tv monitor, manuals £85 also radcoms. Buyer collects. G3KCT (0763) 44550 QTHR.

HALLICRAFTERS SX17 vintage comms RX 1938 Super Skyrider 13 valve £17 also SX28 good condition £70. Heathkit RA1 plus QPM1 QMULT £40. BC221 with PSU £25. Prefer buyer collects. Realistic DX400 digital RX £100. G4HHZ QTHR 04215-68705 evenings, 0962-822401 day.

YAESU FT-209RH 5 watts including speaker microphone, car adapter/charger, mains charger, £240. FDK MULT-750XX mobile, base 2 meter transceiver, 20 watts, 1 watt £285 both ex condx, Rogers G6ZTL Coningsby, Lincoln. 0526-42899. Buyer collects.

FRG9600, goes to 950MHz, mint condx plus PSU £350. Sommerkamp 788DX 26-30MHz £185. Icom240 £110. Digiscan frequency expander £30. Wanted: FRG7 gen coverage RX also Sony portable RX. Tel: Ashford Middx. 244265 G4VZZ QTHR.

YAESU FR101S, all band, am, fm, ssb, hf receiver, excellent condition, no mods £185 ono, tel: Southampton 432900.

EX PMR 70cms TCVR, 6 ch, 3 fitted 40W output c/w circuit diagrams £60 ono. 50W 2m linear 10W 1W preamp £40. G6XDM QTHR phone (0908) 613739. Milton Keynes.

DRAGON 32 micro complete with Sanyo cassette recorder and software tapes books £80 ono. GM3WIJ QTHR 0224317019.

FT290R c/w NICADS chgr and microwave modules linear MM144/30LS. G8YPN QTHR tel: 0748-3140.

4CX250 W2GN 2mtr amp EIMAC 630 bases with PSU £200 G4TZN QTHR S.Yorks 0909 567561.

KW 2000B PSU and VFO 4B serviced 1981 many spare used and unused valves including new 614BS complete with shure 201 mike handbook circuit diagrams mod sheets £180. G4IWE QTHR tel: Caterham (0883) 45018.

TS711E ex condx. £575 ono. G4FDX Toddington (05255) 2166.

TS770E 2m/70cm multimode TCVR 12V/240V ex condx c.w. original packing £575. Totsuko TR2100M 1/10WT 2m SSB portable TCVR £95 ono. G8WPD QTHR tel: 0298-79481.

PACE NIGHTINGALE modem for Prestel etc., c/w Commstar Eprom. Full documentation. For BBC micro. £65 post paid. See page 5 centre pages Radcom July 1986. G3RDG 01-455 8831 QTHR.

MICROWAVE Modules MML50S amp preamp 144-146MHz FM SSB ex condx cost £106 accept £75 ono still under warranty little used. Phone: Sunderland 0783-42700 Pat G1STR QTHR.

ATLAS 180 and 210x: ex. cond: £200 each. 18AVT/WB Vertical, 80-10: £50. G4BER QTHR Lyndhurst (042-128) 2691.

DG5 DIGITAL readout to suit TS520S series. I have two, one in need slight attention, also have technical manual £130. Datong auto speech processor as new £55. G0DQW QTHR evenings only 0743-241194.

FT101Z 9 HF band TCUR good condition c/w mike £400.G3AUB QTHR.

FT290R complete with nicads, charger, case and accessories. MM25W linear plus preamp and light duty Kenpro rotator (never used outside) all in excellent cond. Ideal for first station £350 ono. Tel: Andy (G1HBN) QTHR 01-460 1611.

VIDEO RECORDER Sanyo Beta VTC9300P complete £75 ono. Pye Cambridge 70 c/m boot mounting type U10B with manual, 10 pairs of crystals, Magmount whip £75 ono. buyer must collect. QTHR G3OUX tel: 0652-635162 after 2 pm.

YAESU FT707 fitted 250Hz cw filter vgc £330. buyer collects or carriage extra. G4KLX QTHR tel: 062-982 2037.

FT101ZD instruction "manual", original, 6 bands SSB/CW plus circuit AM/FM, £5. "AM" unit as new, £9. YAESU FSP-1 extension speaker or mobile, 8 ohm, £5. "Sentinel" auto HF pre-amp 2-40MHz 9-12V £12. G3MBL (Bury St. Edmunds) QTHR. Tel: 0284-60984.

YAESU FC-902 ATU - oval metering and 500W handling capacity. Good condition. Buyer arranges collection. Holland, G0BXR, tel: (0482) 643165. (Not QTHR).

RTTY station comprising terminal ST5C (BARTG) Spectrum 48K computer, Morsen interface, Alphacom line printer, Philips computer monitor 80, £135 complete. TET HB33M 3ELE tribander, very little use £145. Both items buyer inspects, collects. G4XWI QTHR Gravesend 66479 evenings please.

VHF CONTROLLER Rotator Sprint 100 £28. DRAE VHF wavemeter £22. Trio SP70 speaker £8. Connectors various 50p each. Morse instruction tapes £5. AirMin 1938 Morsekey £4. AM Radio Operating Manual £4. 1986 call-book £4. Postage extra. Telephone evenings (Kings Lynn) 674015, (Dennis) G8NKU QTHR.

IC251E MUTEKED £375. MML432/100 £199. CN650 1.2-2.5GHz SWR/PWR meter £60. Mutek GLNA432E masthead preamplifier £90. FS7 2m/70cm SWR/PWR meter £20. 4CX250B coaxial line 70cms amp plus PSU bits £50. VHF Communications 44 issues £15. G6OYL/G6ADE. QTHR after 6pm 0709815649.

FT725RVH 25watt 2m. TCVR, four memories, scanning mic. £130. Mosley TA33JNR HF beam £50. FTV107R TVTR with 2m. module £110. Daiwa DK210 electronic keyer with hi-mound MK704 paddle £35. Clark 40' telescopic mast (current price £3,275!!). Offers. G0ASC, QTHR 0845-24945.

AOR2001 scanner, 25 to 550 MHz, AM, NBFM WBFM, 20 mems 5, 12.5, 25 kHz channels with factory service manual £235. Mike, G0/ZL1BTB, 0392 833286.

PALM 2 6ch 2M handheld uses only 1 crystal per channel +/-600 shift built in. No toneburst 8 crystals included £75. ARE Communications UHF convertor (as advertised) £60. Terminal unit for computer £50. Roger G6HQK QTHR Wolverhampton 69285.

FT290R multi mode TCVR, hardly used, ex condx, six months old £250 also YAESU FR400 £50. Tel:041-429 7357 after 6 pm.

QTH, with 30ft lattice tower and good neighbours. Three bedroom semi, large lounge and kitchen extension, all double glazed, gas central heating, garage, nicely screened gardens, freehold £35,500. G4EHT Lichfield, Staffordshire. Phone: Lich 262475.

TR2400 h/held c/w charger, ST1 base charger, 12V charger and SPKR/MIC £150. TR7500 2M FM mobile £120. G4MH HF Minibeam, unused £50. Delivery free 50 miles from Birmingham otherwise carriage at cost. G3NXC QTHR. Phone: 021-706 3109 after 7.30 pm.

G8GEA must sell 16E 2m Tonna vgc £15 63 metres of LDF4-50 brand new ends still sealed and 3 brand new couplers will not sell separately £190. Four 19E 70cm Tonnas vgc £12 each. Buyers collect G8GEA QTHR 0342-311475.

TR10 TR7730 2M mobile 25W, good condx., mobile mount, manual, orig. packing. £160. G3WWO QTHR or 0692-60745 evenings. carriage extra.

TR10 TR9130 multimode, mint £320. ICOM ICZE c/w adaptor, spare nicads, case etc., £100. LOWE Tx40 10m FM with 20W amp, mint, £30. 432MHz 18el Parabeam £18. Ant switch, 2 way N-type, £8. G4NZK QTHR 021-453 2880.

TR10 TH21E, little used, mint condition with original packing and two nicads £145 ono also ICS M.P. 64 unit for RTTY/CW transceiver for Commodore 64/128, all leads, manual, etc, can be upgraded for Amtor £115 ono. Paul Leach G4AMZ not QTHR 0625-610852 Macclesfield.

FT290R as new, Mutek f/end, nicads, chgr, case helical £260. Daiwa LM2056 masthead linear pre/amp 50W from FT290R shack controller allowes two aerials £50. Jaybeam 3 band vertical 10-15-20 mtrs ground or mast mounted £25. p/ex FT221 or offers? G0EGX Tiptree 815978.

HOME BREWERS - I have several big valve amps rated 50 watts continuous audio, would make ideal base for 100W SSB linear. Have personally made one into top band TVTR, etc., also fine for guitars, £12 each. Derek GODLN 01-657 0716 evenings.

DRAKE TR7 PS7 power supply RV75 synthesised V.F.O. MS7 speaker MN2700 2KW A.T.U. Drake desk mike all filters noise blanker AUX7 DR7 Balun fitted in ex condition £1200. Ring Stuart G4OOK QTHR 0642-211685.

FT301D TCVR 160-10M all solid state digital display 100W out RF processor notch filter noise blanker 25kHz calibrator 600Hz CW filter microphone FP 301D psu, digital clock. Ident facilities all perfect as new £450 G3HRO QTHR tel: 01-460 7660.

COLOUR GENIE computer used once. Split screen RTTY transceive CW receive ready to go on air. Tape recorder never used, cables, switches, hardware, handbooks, b/w TV £140. Will split. G3ZLN Ipswich 49139.

COMPLETE 2M station. TR9130 base/mobile multimode, FT207R handheld, FP757GX 10A psu, SWR meter, portable 9 ele Tonna, mast and car battery. Lots of cables and connectors. Will split. Offers in writing QTHR, or tel: (04215) 61181. Also 70cm linear (Alinco 25W) £65. G1LHF.

KW 2000B HF TCVR exc £200. Home brew Z match SWR bridge £20. FDK multi 700E 2M 25W FM pristine condx £130. Icom IC255E 2M FM many features £140. G3WRO QTHR tel: Harlow (0279) 30609.

TR10 TW4000A UHF and VHF FM transceiver. Including 70cms and 2 metres mobile antennas. All in mint condition. £365 ono. GW3YKZ telephone: 0633-858314 not QTHR.

YAESU FL2100Z £390, FC102 £110, Hygain DB10-15A 10/15M 3EL Yagi £60, buyer must collect. G4YHC, QTHR. Tel: 021-355 6604.

ONE YAESU FRG 7700 without memory and one YAESU active antenna FRA 7700 £320 and one Heatkit SW717 £55. (Recently repaired). Phone: Wood, Clochan 378.

EDDYSTONE EA12 RX gwo £175 ono. Lafayette HF bands TX (cw/am) gwo £30 ono. G4VAM Paul 0733-62848.

YAESU FT102 HF TCVR c/w matching SP102 filter/ spkr, YH77 earphones and MH18B microphone, £500. LAR HF Omnimatch atu £40. Altai griddip meter £35. All in ex condx. G3YIU, QTHR, tel: 021-430 6926.

OSCILLOSCOPES Tektronics 545A £90. S.E. LABS EM102 £190. Advance audio gen £19. AVO7 £15. Pye Olympic low band AM £49. Shure noise cancelling hand microphone £12. Teletype ASR33 £10. GPO multimeter £6. Sae for other gear. G4YVJ Brighton 416963 or 415945.

14AVQ 10m section new £10 ono. TAU high power ATU built from kit into black cabinet roller coaster dial including Z match on 160 cost £150 accept £80. Wanted: Heathkit scope etc., phone Leeds 863058 G3JNY new address.

MML 432/50 PA £60. SEM 100W 2M PA £60. Tonna 1296 23 el Yagi £20. Type 10 calibrator AC mains £5. Telemax T7S HET wavemeter, looks like BC221, 85 to 1000 MHz £20. All carriage extra. G3CBU QTHR 0256-58921.

KENWOOD TS440S c/w auto atu 270Hz CW filter and remote control mic 3 month old £950. Reason for sale, want simpler rig with transverter output. QTHR phone: Keith GOCGB 0322-70073. .

TR10 7930 2m FM 25W little use, mint condition £250 ono. Wanted: Heathkit SB102, SB220, Drake R4C, T4XC or similar. G4AMT QTHR. Tel: 0736-87560 before 7 pm please.

144 MHz SSB station:- TR10 TR7010 TCVR, £75; Mirage B108 PA/preamp, £100; 25 amp psu, £75; 20' scaffold pole c/w rotator, control, cable, 11 ele antenna, £60; R206 HF RX, £25; all with manuals G6CUE, QTHR. 01-309 7214.

MOSLEY TA32J 2 element Tribander boom 6' L 26'8" WT 181bs traps new 1984 25m RG8U all gc £55 carriage extra. G2DPA QTHR Beverley 0482-882673.

R600 RX ex condx £210. Buyer collects or pays carriage, G1SFL not QTHR. Tel: 0472-750480.

TS430S £525. Optional AM filter £25. Matching speaker £25. FM board £25. ST930S with auto ATU one month old £1,200. G3TBF 045382-4853.

RTTY DRACON 32 computer interface to Radprint TU, Hanimex monitor audio added. Programme other tapes ready to plug in to rig and away see log £200 ono. Norman G4SFO QTHR. Tel: Rugby 810344 evenings.

FT101E CW filter, separate FV101 VFO, spare PA valves YD148 desk mike gwo £350. G2BQY Peter QTHR Westbury, Wilts. 826698.

TR10 ST130S HF transceiver with PS30 power supply, AT130 ATU, DFC230 ext VFO and mobile mount £550. YAESU FRG7700 hf rx with 140-170MHz converter and FRT7700 HF ATU £275. G4LTI QTHR. 0695-78326 (Lancs).

HONDA generator, petrol; 4KW; 230, 110 and 12V; Little used £425 vgc. Buyer collects. GOCVK tel: 0942-47792 QTHR Wigan.

TR10 HANDHELD TR2500 including flexiwhip and PB25, boxed £190. TR10 mobile FM 25W transceiver TR7800 14 memories, offers. Wanted:- solid state linears 70cms also 2mtrs 100W+ and PEP wattmeter for 70cms. Will part exchange any above. Mike G3TSL (0772) 635560.

SHACK CLEARANCE - FT101B, 2mtr transvtr, HW17A, GWhip, FL1, speech processor, AM25B, 756 keyboard, BC221E, electronic voltmeter RF probe, PLX Rtty catronics boards, top band TX, Amtor h/brew MK11, Xitex morse, transvtr, many other useful items. Sae fuller details G4DEL QTHR.

SILENT KEY G3VTJ TR10 TS520 TCVR £325 ono. Heathkit 30ft tower dismantled £35. MM 1296 MHz Gasfet preamp £45. Daiwa ant tuner CNA-1001A 3.5-30MHz £95. Details from A. C. Bevington G5KS 021-552 4456.

EDDYSTONE 840A GEN/COV RX, absolutely as new condition, in original box. 500Kc/s to 30Mc/s, flywheel tuning, noise limiter, BFO, etc., £75. G3RXL - Fleet (0252) 629019.

BREMI BRL 200 linear vgc £50 ono or suitable for conversion. Tel. after 6 pm: 0228-35177.

TR10 R2000, VC10 CVTR, YAESU FRT 7700, Revcome and long wire antennas, 6 months warranty. Uniden CR2021 RX all boxed, good condx. Books, mags, etc., suit swl £550 ono. Phone: 0255-813707.

70CMS UNIT for FT726 new boxed £250 or swap for HF unit. G3NOH QTHR. 01-997 4756.

FT101Z EXTERNAL VFO in first class condition original packing £65 plus postage. G4RCG QTHR day 0532-539820, evenings 0924-362144.

POWER tranformer 115/230V 50/60Hz primary 6.4V-6.7A, 5V-4A, 470V-200ma sec £10. Filament transformer 190/250V 50/60Hz primary, 5-10V 2X1.25-2.5V 160KVA 50/60Hz sec £10. Bird low pass filter 420MHz with coaxial relay 6V 50/60Hz BNC connector £25. 2XLF chokes 10H 250ma £1 each. G4JMX QTHR.

SINCLAIR QL computer with Psion software and manual vgc boxed and still under guarantee £150 ono, or swap for MM2001 or similar. Tel: Ruislip (0895) 631825 evenings and w/e. G8YQS not QTHR.

ICOM IC245 2 metre transceiver, ICOM ICRM2 remote control £225 the pair. G1MYL tel: Brookwood 2011.

FDK 750E 2m multimode 10W ex condx £220, power supplies, SE1F SP134 4A £10, Farnell SSE 8A £15, Packer VHF wavemeter WM2, £12, WELZ SP45M SWR/ power £30, MMT 432/144R TVTR £100, Slim Jim £5. Ray, G8VPV tel: 0742-848310.

ST5 RTTY terminal unit, £70 Creed 7E/RD teleprinter 45 and 50 BAUD £10. Jaybeam 4 element quad, 2M £15. G6JRQ QTHR tel: 051-339 5894.

HAMMARLUND SP600 GEN/COV RX .54-54MHz £110. Transdata terminal 110/300 band £85. Starphone UHF unmodified £25. ITT2020 £100. 51/4" TEAC disk drives, need alignment £25. Call G4CKW 0296-85129 (evenings) 0494-716646 (daytime).

MARCONI Instruments signal generators TF1060 450-1250MHz £35. TF867 15KHz-32MHz £35. Rohde and Schwarz Polyskop 500KHz-400MHz £35. Airmec wave analyser 5-300MHz £25. Muirhead Decade oscillator 1Hz-110KHz in 1Hz seps £15. All working, buyer collects. G3KTF QTHR tel: 0621-891755.

ICOM 290E multimode packing bracket leads checked Thanet exchange for SX400 or AOR2002 or R70 or sell £325. Creed 444 mint. Plenty paper plus ST5TER unit micro and 45 BAUD £100 the two. B/Stoke 882/825. W. H. Abbey, 21 Moat Close, Bramley, Hants. RG26 5AD.

TR2300 SYNTHESISED 2M FM TCVR, 12V mobile/ portable, ex condx, listen-on-input, good nicads, chgr, box, manual £100 ono. PF5 70cm FM handheld, working RB14, leather case, new nicad cells 1984 £35 ono. Chris G4OKW QTHR 0206-303931.

SSTV DRAE receiver £100. RTTY to TV converter microwave modules MM2001 £100. Prices plus postage if applicable. G4KWA tel: 01-777 9061.

FT 902 DM vgc £675. FT 480 R vgc £325. FDK 725X 2MTR FM 25wt £185. Azden PCS 3000 vgc £195. FTV 107 t/vertor 2M wired for FT102 £125. Tel: Byfleet (09323) 54004 7 pm - 9 pm.

YAESU 209/RH speaker mic not mint but works fine £165. TR10 2500 speaker mic hard/soft cases spare bat £170. Eddystone 1400 solid state marine receiver vgc £150. Hammerlund HQ180 excellent condition, timer, handbook £150. 01-534 3460 evngs 01-553 7308 days.

TET HF ground plane 10-15-20 complete with radials good condx £35. Trapped dipole 80-40, Unadilla traps and Balun worth £40 alone. 10SWC top £25. Carriage extra, prefer buyers collect. G3CRH QTHR 05436-6364 West Midlands.

FRG7700 GEN/COV RX, FRT7700 ATU, FRA7700 active antenna, and FRV7700 2M converter. Immaculate £250. Tel: 01-552 6026 G4XWK QTHR.

LS202E 2M hand held multi mode nicads and charger £180. G4WTE Medway (0634) 221061 QTHR.

JRC NRD-515 gen/cov receiver with 96 channel memory unit, speaker, remote control, 600Hz and 300Hz filters, manuals and original packings, mint condition £1,060 ono. G6FLQ tel: 0636-813946 Notts.

TOWER 35ft fixed 4 section galvanised with rotator mounting plate and alignment bearing £60. JVC colour camera duff £50. G4KXN Chelmsford 266776.

M800 "DURST" photographic enlarger b&w or colour - variable neg sizes to 21/4" x 31/2" complete with colour analyser filters etc. £475. G1KAE QTHR tel: 01-423 6159.

YAESU FRG7 GEN/COV RX vgc, manual £130. KW200A TCVR gc spare valves £150. Super 8 sound cine camera, 35mm SLR 28mm 55mm 135mm lens, flash, editor, splicer, light meter - Bargain £250. Development tanks, print dryers included. G4VQU QTHR tel: Mansfield 25123.

SUPER SCANNER AOR 2002 mint £350. Pair TR10 mini handhelds TH21E complete with chargers, heavy duty nicad pack + VOX headset only £235 may split. 25W RF switched 2 metre linear amplifier £26. Please telephone Nigel G4PJJ 0452-75542 (Gloucester).

FT902 DM vgc £675. FT480 R vgc £325. FDK 725X 2MTR FM 25WT vgc £185. Azden PCS 3000 good con £195. FTV 107 t/vertor 2M wired for FT102 vgc £125. Tel: Byfleet (09323) 54004 7 pm - 9 pm.

POLYSKOP SWOB2 0-1.2 ghz, N connectors, 50 ohms Z, 235.00 Broadband linear power modules 2m, 6m versions 20 dB gain, 1"x3" size, 12.6v dc. 10W out 30.00. GO/ZL1BTB (0392) 833286 after 5.30 pm.

144MHz 4CX250B linear with PSU £275. SSB electronics 144-432 transverter with 10W PA £100. Prototype PW modem board £20. Valve voltmeter £5. Wood and Douglas 70cms 10W PA £25. 2KV EHT PSU £50. G8RWC QTHR Camberley 0276-32195.

TS700 TR10 Kenwood allmode TCVR ex condx £300. Also linear amp MML 144 100S 10W in 100W out with preamp £75. Both ono. G3FUI QTHR tel: 894809.

UNIQUE opportunity Bulletins/Radcoms complete run vols 12-60 to vol 53 hardback thereafter in binders £95. Buyer collects or pays carriage. G2YS QTHR (0923) 776864.

FT-207R 2M handheld TX/RX keyboard microprocessor synthesised, case, helical antenna, recently serviced, £170: Sanyo charger £5, YM-24 loudspeaker/mic £15, NC-2 charger/DC adapter £30. The lot £195, no offers. Taylor, G3UCT, 1 Harewarren Close, Wilton, Salisbury, Wilts. SP2 OLY. Salisbury 744133.

35 FEET square section tower in 7ft sections £120. J beam 4M 4EL YAGI vgc £15. Collins USB and LSB filters type F250 £20. 150W Advance CVT £10. G3SNN 045-270407 QTHR.

FT200 FP200 FAN G3LLL RF clipper alignment instructions and circuits all units spare valves £150. 2M indoor 4ELE quad ideal loft installation or FB WX/P material cost only £7. G3INU QTHR tel: 0438-369128 (Stevenage).

ALUMINIUM scaffold pole, 15 feet £10. IBM golfball printer £25. Maplin Spectrum RS232 interface £8. Maplin Spectrum keyboard £14. Maplin modem £25. Thin walled aluminium pole, 10 feet £5. G8YUE tel: 01-568 0994.

1500W VARIABLE PSU, partly dismantled for repair. Transformer 0-51V 3V steps 30A continuous, large Heatsinks, fan, finned rectifier, 2mH 30A choke, V&I meters, fully enclosed. Buyer inspects and collects, offers. Dave G3UNA QTHR Ruislip 01-429 0716.

IC505 6M transceiver 10W five mins use boxed as new £295 ono. Kubota 1.2kVA generator A1200-3 110/ 220Vac 12Vdc (too high for new car boot) unused. Offers. HQ-1 mini-beam 6-20M excellent condition

£100 ono. (0582) 606983 Bedfordshire.

FT101E TRANSCVR, good cond, £300. MM transverter 2m, £50. 12AVQ trap vertical, £40. 14 element 2m Parabeam £30. Hirchman 250 rotator £35. Tel: Dave G4DPZ QTHR 0245-73331 extension 3263.

KW 10MTR FM base station TCVR mains or 12/14VDC 40 channels with 100k offset, 1ST1F 2 section crystal filter. In mint condx c/w mic and manual exchange for Datong FL2 FL3 AMF filter. Consider selling, offers? G5LH QTHR tel: 091-266 2490.

CUSHCRAFT R3 high performance half wave vertical antenna, no ground system needed. Gain 3dB. Well used £90. G4SCB QTHR tel: 0603-502394.

CLANDESTINE wireless. Unique opportunity to acquire two of the famous "Polish" spy sets (an A1 and an A2). Both need full restoration but are complete, original, unmodified with circuits. £100 each. G4TMO Ottershaw 3892 after 6 pm (Surrey).

FT290R case nicads charger Microwave Modules 144/30 LS linear amplifier all ex condx £300. No offers. 0943-78305.

TIME RECORDER - ancient Gledhill-Brook slave clock unit with electronic master. Solid oak case, brass works, collectors item. Excellent condition, working £120 ono. "Clock in and out of the Shack". Buyer collects (Leicester). Contact Cliff G6KVU QTHR (0533) 606862.

YAESU FRG 7700 GEN COV REC vgc £250. GOEYN tel: Mansfield 556509.

ICOM IC22A FM mobile 1+10W - XTALLED all Simplex and rptrs - original box and handbook also REVCO 5/8 wave mobile antenna - £120 complete including postage (no offers). GM4UFA QTHR 041-959 8465 6-7 pm only.

ALTRON AQ6-20 3-ELE space saver beam, modified to improve 15M performance. Snip £50. MET 144/14T NBS YAGI £20. Slim Jim free if collected. Wanted TS120S or FT7 for mobile use. Cash available. Tel: Newbury 60263 after 8 pm. G4RKO QTHR.

ICOM 290H VHF multimode 1W/30W boxed. WELZ SP-400 SWR/PWR 130-500MHz 150W. Mutek SNLA144S preamp. LAR VHF OMNI match. FP1Z PSU. MM 144/100LS linear amp 1W/3W. £570 ono. G4WDI QTHR Ashwater 219 (Devon).

RACAL RA17 GWO rack mounted, rack included first £130. Could deliver Bradford A to Z area. Dave Jowett G8FJR QTHR 0274 881171 evgs, 0274 753559 days.

DRAE SSTV TXRX as new cond £250. Reason for sale going for colour. G3TRB Tel: Worcester 775206.

TS-530S TCVR 1.8KHz SSB and 500HZ cw filters fitted £380. Dentron MLA2500B linear amp 2KW pep £390. Tokyo ATU HC-2000 2kW pep £100. AQ6/20E 3 element mini beam, never used £85. Daiwa SWR and power meter CN620A £20. MBA-RO, Morse - Baudot - ASCII reader £70. Microwave modules MMS1 morse tester £60. Datong morse keyboard sender £60. LF30A filter, 1KW dummy load. Ferguson VHS video recorder £125. G4OOW QTHR. Tel: Hinckley (0455) 612091 after 7 pm.

TR10 TH41E 70CMC h/held, latest model, mint, CW nicad, charger, VOX h/set, rubber duck, case £150. TOP2.7 AM-CW TX £20. 4EL 2M quad unused £10. Class D w/meter £10. Phone: 01-452 9436.

TR10 830S SP230 notch if shift CW filter MC50 mic boxed as new mint cond £750. GW4VDP QTHR. Tel: Holyhead 2197.

STANDARD C78 70CM FM portable fully synth with CPB78 10WATT matching amp ni-cads charger rubber duck £210 ono. G3HSC morse course two LPS two EPS plus literature, records in good condition £3-50. G3BDK QTHR Towcester 52309.

FT980 £1,000 ono. Complete 70CM fast scan station, offers. Wanted, T1154 accessories. Phone: 353-3896.

VERSATOWER P60, socket mounting, vgc £350. AR22, Stolle rotators £25 each. Oscar Ten antennas with Mutek head amp c/w feeders and control cables £75. Four Jaybeam 2M 6-EL quads £15 each. G8AWZ tel: Norwich 898192. Buyer collects.

FT227RB VHF FM transceiver c/w mic manual and mobile mount vgc £145 ono. Welz SP400 SWR and power meter £40. Heil HM5 microphone as new £30. G4MVS QTHR 01-644 8249.

KENWOOD TS830S. 500Hz filter. vgc. £650. Buyer collect. G4ALV QTHR. Tel: 01-460 3852.

TR10 TS-830S (registered at Lowe's), with workshop manual and matching antenna tuner AT230. A superb set-up for £700. Recent house move so not QTHR. G4PHC. Phone: Minehead 6936 evenings.

AOR AR2002 sensitive VHF/UHF RX as new £350 - save £75. G3VXZ QTHR Maidenhead 27350.

TR10 TS930s fitted 500HZ FILTER, mint condx £900. TR10 AT230 mint £125. TR10 TR7800 2M TCVR £175. Junker hand key used but good £25. EC10 RX, mains or batt £60. All plus carriage. Going QRT. Phone: Nottingham 582358.

ST5 TU £57. KW Z match £30. YAESU FP4 13.8V 4amp PSU £30. 20ft 2in alloy mast £5. 15ft 2in aluminium mast £5. Altron swingpost unused £35. Last three items to be collected. R. Middleton, 49 Wolseley Road, Stafford ST16 3XW.

YAESU FT101E TCVR in mint condx in orig packing with manual £330. Buyer collects. G3BCI QTHR. Tel: 0202-760231.

VIDEO monitors 9" solid state, Ikegami PM96 £45. Hitachi VM904A £35. Ampex VM9A £45. KGM (P31 green phos) £40, £25, £15. KDK FM2025 (2M) £95. Wanted 9" monitor long persistence. Ring: 01-640 6020.

FT980 complete with usual bits £1,200 ono. G4JEF QTHR Tel: Rattlesden (04493) 7764. Wanted: ICOM 740 and/or ICOM 730 G4JEF QTHR Tel: Rattleden (04493) 7764.

MOSLEY 3EL tribander complete with some spare elements. Has been in store for 3 years. Only half the cost of a single triband element. £40. Prefer buyer collects. G3CRH QTHR 05436-6364, after 6pm.

CD45 rotator head. Only with mast bracket. Perfect working order. Ideal for switching for two rotatable arrays from Ham IV rotator. £85. GM4KLO QTHR 041-639 2729 anytime.

YAESU FRDX400 RX c/w options 2m FM marker all filters handbook spare valves £120 ono. Oscilloscope Solartron CD513 valved single beam 5MHz BW as seen £35. G8DKK QTHR Luton (0582) 424809.

EXCHANGE Marconi TF995B/5 AM FM signal generator 0.2 to 220 MHz for HF RX FRG7 type. Cash adjustment. Tel: Ron 01-337 7117 G6EKW QTHR.

YAESU FT901 FC902 Western TRI band beam exc condition £550. QTHR Tel: 075-485 309.

4CX250B, SK610A base, chimney, chassis, fan, C804's, transformer etc. £65. Creed 444, as new, £10. Telequipment D51 dual trace scope, no probes, £20. Sanyo VTC 5300P video with tapes £40. G1SIO QTHR 01-391 0450.

FT101E. CW, filter, FM, manual, mint. £375 ono. (External VFO available.) Wanted: FT101ZD. QTHR Bedford 711-538. Office: 01-935 7119.

SECRETS of Ham Radio Dxing £5. TV1 manual £2. Aluminium mast collapsible £15. Traps 80m and 40m unused £11 per pair. G2DYM. Balun matching unit FMU £15. Wanted: SEM Transmatch with Ezitune. G4ICP not QTHR 0376-84478 evenings.

RACAL RA17 £95 ono. Please write G4ZOM 171, Grampian House, North Mall, Edmonton N9 0EG. No callers, letter first please. Not QTHR.

RAYNET talk-thro unit. YAESU FT230R + FT730R cross connected to provide cross band talk-thro 144/432. Rigs can be used as separates or talk-thro. £400 complete with portable mast, dual-bant antenna, duplexer, cables, etc. G4LTI QTHR. Ormskirk, (Lancs) 78326.

MARCONI TF801D £75, Commodore CBM8032 £200, CBM8250 dual 1MBYTE drives £400 (includes Superscript word proc.), bench PSU £10, Kokoshi mechanical filter and carrier crystal £15, Gunn oscillator £10, Marconi deviation meter TF934/2 £20, misc. components, sae for list, G3OOU QTHR, Downland 52170.

FOR SATELLITE working. YAESU FT480R £300. YAESU FT780R £350. Jaybeam 8XY/2M with circular polarisation harness £35. 70cm 12 turn helical £35. Mutek GFBA 144E with ATCS 144S £120. Drae 24amp power supply £100. AR40 rotator £50. Mark, Exmouth 266272.

HF TCVR FT 101 £245 ono and complete HF station for sale - shack clearance. Offers? David GOFDV Luton (0582) 423495 anytime day/evening.

YAESU FRG-7 comms RX, excellent condx, no mods. Boxed with manual, two books and aerial wire £115 ovno. Philip Le-Brun, 22 Russet Road, Chelt, Glos, GLS1 7LW. Tel: 0242 571279.

SEM Z-match 160 to 10 £35. Hansen FS710H automatic SWR and peak reading power meter £35. Heathkit valve voltmeter V-7AU £35. Lafayette GDO 1.7 to 180Mc/s £25. All carriage extra. R. Middleton, 49 Wolseley Road, Stafford, ST16 3XW.

KW2000B, PSU, ATU, vgc complete with 5 band vertical aerial and KW manual £250. Buyer collects G6SWT QTHR tel: 01-504 1020.

FRG7700 with FRA7700 and FRT7700 immaculate. £360 ono. Would separate. G1LIM not QTHR. Phone: 051-424 6955.

YAESU FT480R, vgc, plus MML144/25 25 watt linear £330. Jaybeam 28-ele multibeam 70CM's. As new £15. 5-ele beam 2M as new (missing boot) £10. Oscar mobile 7/8 whip and mag base £15. Clive G4XFL QTHR tel: Dudley (0384) 56574 evenings.

JAYBEAMS: two 16-element 2M antennas c/w 2-way 144MHz power splitter, all used once only. £100 ono. Would split. FT221R with Mutek front end. Original packing £325 ono or £400 the lot, no offers. Tel: Mike, Cambridge (0223) 871663.

PYE SUPER LYNX TV camera 1" Vidicon, working less lens £25. 38CM VDU tube M38121GH with main board etc., working needs case £15. Pye Motafone, MID band, in portable case £15. G4ULR QTHR tel: 0603-51656 (Norwich).

THREE 1.2M6 disk drives, Remex 8 inch RFD4000 series, £40 each. New IC's: 10 of TMS2564JL, £25; 30 of HM6116P-2 £45; 8 of M58725P £12; 40 of 4116 type £10 lot. 50 + new boxed metal valves £20 lot. Nick, G4JUZ QTHR. Tel: 01-789 2622.

TRANSVERTER for 70CM MMT432/28 good condition £120 also MET 17 element Yagi for 70CM £20. G6XRA Gloucester 0452-613887.

CLEARANCE! Pye A200 68MHz £35. FM Westminster bootmount £42. AM dashmount £10. Bootmount £12. F30AM base £60. Amphenol 'N' type relay £15. VHF/UHF signal generator £100. Exchange any above, w.h.y? Wanted: transistorized HF mobile working or not. G3XDA QTHR tel: 0775-66533.

CLOSEDOWN, little used station. FT.102 with FM/AM and NB Filter £500: Ten-Tec 228 ATU/SWR/DL £45: FT.230 £175: TR.9130 £350: Matching B09A Base station system £30: Weltz SP45M £30: Advance and Coutant metered PSU's for above £30 each: KR400RC rotator £70: 'J' Beam 8XY £20: Mains BC221 £20: Original packing, manuals etc. Offers considered or the lot with desk top accommodation, LS's antenna switching free. G3CIM QTHR. Tel: 0603-38282.

DR7500R ROTATOR plus word map indicator £90. 20mtrs 6 core cable £10. BNOS 12/12A PSU £80. TR10 DM801 grid dip £40. All excel condx HQI £45. 06/2M quad £20. HF5 vertical £20. Few parts missing hence prices. G4LTM QTHR tel: 061-351 1152.

HEATHKIT SB104A solid state transceiver, power supply, speaker £250. Matching linear SB230 1.2KW conduction cooled £400. Collins R.390A receiver in case £250. All with original handbook. G3UWD QTHR tel: 0778-422498 (Lincs).

FT101ZD MK2 c/w mic, fan, manual, original packing, gc, plus free Welz CP5 vertical antenna, £420 ono. FT203RH, FNB4, charger, mint, £210. FT290 needs some attention, hence £40. Welz antenna tuner, AC38, vgc, £45. Welz power/SWR meter, SP15, vgc, £35. MM 2M 25W linear and preamp, gc, £48. Tonna 9-ele 2M portable antenna, £10. YAESU lightweight headphones, £3.50. AEC SWR meter, £10. Books: "Amateur Radio Software", "Amateur Radio Awards", "Radio Comms Handbook", "ARRL Antenna Book", "Waves and Wires", "Shortwave Propagation Handbook", all gc, £18 the lot. Rad Com's, 1982, 1983, 1984, 1985, £3/year or £10 the lot. Prefer buyers inspect and collect. G4TJK, tel: 0462-894720.

YAESU FL2100Z linear amplifier used two hrs only vgc 1200PEP £475. Phone: George 0292-268055.

HW8 QRP TCVR, ex condx, no mods, £85. Jesper, G4/OZ1XB, tel: 09277-64094.

COAXIAL RELAY very large approx 2kW 1GHz in gwo. 28V DPDT latching N-type sockets £20. 2 OFF new boxed 4X150A with 12V heater £10 each. G6ELH QTHR. Watford (0923) 30254.

COMPLETE STATION: hardly used, immac condx, orig boxes, TS520SE TCVR, fitted CW filter, AT200, mic, low-pass filter, dummy load, manuals, many extras, £495. Buyer collects. K. Mellor, tel: Coventry 27116 evenings.

LIBRARY: I have complete "Wireless Worlds" 1949 to 1983 - 25 yrs; are bound. Sensible offers please. Pitts, Westmoors, Trezelah, Gulval, Penzance, Cornwall.

SCANNER RX HX2000 hand held, freq 60-90MHz 118-174MHz 406-496MHz AM/FM in 5/10/12.5KHz steps, 20 memories, nicads, chgr, antenna, excellent condition only £199. ZX Spectrum Plus, interface, microdrive, 30 tapes programs, £199 the lot. Homebrew transmatch atu, internal 4:1 Balun, OK up to 400W, £39 or w.h.y? G4JYH, QTHR, or tel: 01-886 0126 daytime.

FOR SALE one YAESU FRG7700 receiver without memory and one YAESU FRA7700 active antenna £320. One

Heathkit SW717 receiver £55 recently mended and one AIWA AR158 receiver £5. Phone: Wood, Clochan 378.

TRIO TS830S, mic, service manual, boxed, £650. Trio TR2600E, two PB26 nicads, BC2 charger, 6AA pack, SMC30 speaker/mike, case, clip, etc.,£280. AEA PK80 Packet TNC, £170. ICS AMT2 Amtor/RTTY/CW/ Ascii TU, £170. Datong PC-1 General Coverage Converter, £90. Kenwood MC60 desk mic, preamp, K/pip tone, £40. 9A 13.8V PSU, £40. Lowe FX-1 Wavemeter, £20. Himound key marble, £15. Twin SWR/ PWR meter, £10. All equip exc cond, prices ono. Inspection/demonstration welcome. Dave, tel: (07356) 5185.

COMPLETE AERIAL system Mosley TA33 Senior, rotator c/w feeder and control cable versatower P40. Buyer dismantles and collects £340. G3TFK QTHR, tel: 054-74 373.

LOW BAND AM radio telephones. Quantity Cossor Commander 5W 6ch. Pye Motophones 5W 3ch. Cossor Commander 10W 6ch. Cossor base station, spare modules, valves, etc. Cheap - phone to haggle on prices. Buyers to collect. G6HSC QTHR, (07875) 2846.

DRAKE LINEAR L4B with PSU, perfect £770. Racal solid state HF Synthesizer for type 15 A tcvr: £50 feeds signal and 20MHz for mixing. G8LT QTHR, tel: 0327-860321.

TRIO ST780 2M/70cm dual band with base mike vgc little used £700, 2 years old. G4PYU QTHR 07376-3773.

TRIO ST830S high performance tcvr. All bands 160-10m, fitted with YG455C narrow filter, speach processor, notch filter, VBT, etc. Also AT230 matching atu, mic, original packing. All as new condx., £725 lot. Graham G4VUX QTHR (Watford) 0923-48331 after 6 pm.

TRIO TS530SP tcvr Sp230 MC50 base mic, all in mint condx unmarked boxed with manuals. Still under Lowes guarantee with passport. First £650. Move forces sale. Consider small HF in p/exch. G0CZU QTHR, tel: 0946-67599.

TRIO TH21E c/w nicad pack and charger, used twice only. Sale due to lack of activity £120. G3ZFN QTHR, tel: Stowmarket 674366.

LINGAR SENTINEL 2M 10W in 50W out with preamp £45. Datong PCI GEN COV convtr, HF RX on 2M multimode £75. FDK multi 700EX 2M 25W FM unmarked. No mods £135. G3MEW QTHR Portsmouth (0705) 820315.

YAESU FT203K h/held, mint, leather case, charger and speaker/mike and manual, original packing, £160, buyer collects. Mono R to R tape recorder/ player, loads off reels and tape, beautiful sound, £20. No offers, buyer collects. G6XRB, QTHR or phone: Leeds 524108.

SELL or exchange church organ, Domus Eight. Value £1,500 +, two manual full pedal board, as new, for NRD525 and scanner. A. O'Connor, Northampton (0604) 402861 anytime.

ICF 7600D Sony SWRX 0.5-30 mains adaptor ext. ae. hardly used. Excellent cond. original carton £100 ono. Alda 103 SSB/CW HF TX/RX 80, 40, 20m with mic no PSU hardly used, vgc £150 ono. Collect or carriage extra. Morrison 0939-32180.

YAESU FT-980 mint condition electronic keyer and cw filters fitted £995. No offers G4IQL QTHR, tel: 01-653 3456.

YAESU FT209RH 2M hand held complete with spare battery pack, quick charger, slow charger and speaker microphone £250. YAESU FC-757AT full automatic tuner £195. All in mint condition. G4IQL QTHR, tel: 01-653 3456.

HQ-1 MINI-BEAM with coax £125. Hirschmann rotator £25. G4LSB QTHR, tel: Dean 43329 after 6 pm.

DATONG model DF direction indicator complete with 4 matching ant cost £245 new, little used as new £180. Wanted: ICOM IC4E hand held must be clean and not modded. G4LUE QTHR tel: Barnsley 716339.

KW 600 linear £180. Kenwood TR7500 with PSU YAESU FT.221 £210. YAESU FT-2050 linear and PSU also available real bargain SB300 receiver three filters spare new valves £25. Smoothing need attention. G3TFK QTHR tel: 054-74 373.

HONEYWELL dot matrix printer NFPA type II index number 600605 similar print quality and performance to Epson FX80 etc., £100. Board containing 2X280 2XP10 1XDART 1XCTC TMS4500 CRT5037 all in sockets 1488/89 RS232 receiver and driver £8. Chris (0234) 851129.

"LORIN KNIGHT" home made HF tcvr with YAESU FL110 linear, 60W o/p, covers 80-20-15m, well constructed. Rama frequency counter, Adonis 503G mike. The lot £150 ono. Demo with pleasure, John G4RCU QTHR, Rugby 68397 after 6 pm.

YAESU FT203R/FNB4 FM handie 3.5 watt c/w charger £165. MH12 speaker/mike £15. YH2 headset £12.50. All as new and boxed. BIT 20W amp for h/held £25. Mobile 2M 7/8 antenna (SMC) boxed £12.50. G1CQL QTHR tel: 0425 54946.

IC751, SM6, RC10 £960. AT500 autotuner £320. Both boxed as new. YAESU FL2100Z WARC linear £450. Consider offer for all. YAESU FRG9600 £350 ono. Trio 50-54MHz transverter TV506 matches TS520 or any 28MHz transceiver £95 ono. G8BCG QTHR tel: 061-485 6944.

KENWOOD TS-830S, ex condx c/w original box and spare drv. amp. 12BY7A tubes. Hardly used. No mic. £600. No offers please. G4ROI QTHR tel: 01-337 6462.

IC 720A immac condition hardly used £575. Brand new 80TK D/S D/D half height 40/80 switchable cased with PSU perfect for BBC B, master etc., £95. G6RDU QTHR tel: 06845 (Malvern) 68676 after 6 pm.

STANDARD C58 2m FM/SSB mobile/portable tcvr. Aligned/serviced by agents August. C/w 25W amplifier, mobile mount, chgr, helical, case, mike, handbook. In original boxes. Buyer inspects/ collects. £190 ono. G3YTU Sussex. Tel: 0444-458992.

TELEPRINTERS. Creed 54 boxed complete £35. Two Creed 75's, one for spares £25. 6S6 tape reader £10. 1952 Lifeboat handcranked distress TX, working! Offers? All above for £50. Please call for full details. G4BHT QTHR tel:06048-11413.

PRO 30 handheld scanner ex condx c.w chgr, nicads and manual. Buyer collects or carriage extra. Tel: G1UFC Lymington 79764, £120.

YAMAHA ORGAN E45 cost new £5,000. Professional instrument, terrific specification 180 watts output. Would consider HF VHF or UHF equipment in part exchange with cash adjustment or sell for £2,500 ono. Telphone: 01-590 9074 G4HQK QTHR in April 1986 callbook.

2 MTR FM Trio 7730 with mic and PSU in vgc. Owner fed up with clap-trap on band £170. Phone: 021-357 2009.

18 AVT HF vertical 10, 15, 20, 40 and 80 metres rated 2KW £100. Morriss G4GEN QTHR tel: 082-571 2205.

TRIO TS830S tcvr c/w MC50 mic and CW filter £590. SP230 matching spkr £20. ICOM IC02E handheld c/w spkr/mic spare nicad case charger £195. All items in mint condx and boxed G4VWB QTHR Derby 0332 551945.

TRIO TR9000 2M multi mode, plinth, loud speaker and PSU - vgc. Exchange for good GEN/COV RX. G6WJX QTHR tel: 0223-835948.

TS530S SPKR mic h/book filter BC221 SEM Z-match. 2KW h/brew ATU 1.8MCS h/brew ATU 9R59DS + spkr Toko key. SWR bridge all leads etc., box junk £600 ono. Peter 0642-456327 days. (Move forces sale).

JRC NRD 525 fitted narrow SSB filter used 2hrs, 8 weeks old. Cost £1,200 o/a £850. ICOM 751 fitted FL70 CR64 RC10 FL52 cost £1,460. TX unused, 7 months old o/a £1,000. MMS2 advanced morse trainer cost £169, o/a £110. AD370 active antenna, unused, cost £64, o/a £45. Trio CD10 callsign display unused, cost £119, o/a £80. Hansen FS 603M 5/20 power SWR meter unused, cost £62, o/a £40. 1979-80 Muirhead M100M G/C receiver 10KHz to 30MHz digital readout to 10Hz vgc. Large heavy offers. G6SFD tel: Dronfield 413413.

FT707 TCVR with separate power unit in mint condition £460. G3VO QTHR tel: Clitheroe 41007.

TRIO TS780 70cms/2mtr multimode base transceiver, as new, bargain £750. BNOS LPM144-10-100 linear with pre-amp £110. Mike (0772) 635560. Preston, Lancs.

TS430S in mint condition AM filter complete with original packing and new workshop manual, £625. No offers. Phone: 0905-620041 anytime. G6JNS QTHR.

TRIO R1000 GEN COVR RX £220. SM220 monitor scope £200. Hi-mound HK808 key £28. "All unused boxed". KB-4900 ASCII/Baudot/CW keyboard unused £85. HQ1 mini quad £90. Channel master rotator for HQ1 £30. Prefer inspect collect or postage extra. John G4TEN tel: 0258-53075 (Blandford) QTHR.

VERSATOWER P60 vgc new cable, winch less ground post £275. As above less head unit £250. P40 as above £210. TET HB443DX 4EL 10-15-20-40 super performance as new £200. (Save £150). IC701 PSU mic recent service by Thanet £400. RM3 controller £45. (Suits other coms). FT101E mic fan 10MHz DC CORD £310. CW filter £16. Little used handbooks and original packing SSM 2M/4M tranverters perfect £35 each. New 6/40A 4X150A 4CX250B matched pairs. Offers. Many other bargains. GM3BQA QTHR tel: 0620-2519.

50MHz 5ELE Tonna £28. 50TA 144MHz 100 watt solid state linear amplifier £75. Creed 444 teleprinter £20. Tel: 0453-83 3411.

ASTRONOMERS: exchange my Bresser 4" Catadioptic Newtonian reflector with full equatorial tripod, immaculate, current value £379, for 144 MHz multimode. Any considered except FT290. Must cover 144MHz - 148MHz. May sell for sensible offer. G6HHV QTHR tel: 051-327 5804 Merseyside. Consider FTV901 etc.

FT225RD MUTEK - fitted front end 11 simplex/rptr: xtals £550 mint. Large PSU Variac input selectable output 20-500V suit lab or works. £100. G8LT QTHR tel: 0327-860321.

TRIO TH41E 70CM handheld c/w speaker mic and BNC adaptor also drycell empty case, carrying strap and leather case ex condx less than 1 year old £200 ono. GM1FMP QTHR tel: 041-649 5371.

EDDYSTONE 770R VHF RX 19-165MHz. CW AM FM NBFM. £90 plus carriage. G4DYO QTHR tel: 0734-732393.

THREE ELEMENT hi-gain beam 10-15-20 TH3 MK3 14ft boom, buyer dismantle collect £100 ono. G3LYT QTHR tel: 0406-362501.

IC551 50MHz tcvr new £450. 4EL 50MHz beam new £40. Datong UC/I converter £60. BC221 XTAL CAL. Offers. GP1 DBscope 10MHz £90 ono. MMC435/600 70MC ATV converter new £20. Green TG 2400 TX o/p analyser gc, offers. GM3TRI QTHR tel:0738-26941.

MUTEK TVVF 144A 28/144MHz TVTR mint condx £230. Tel: Shorne 3797.

SWAN 350 HF SSB/CW transceiver £190. Liner 2; 2m SSB transceiver £70. Wanted: SEM Transmatch or similar HF ATU. YC7B digital readout for FT7B. IC202S 2m transverter with 10m IF. Palm 4 G0FAJ (QTHR under G8GHU). Tel: Weymouth (0305) 789022.

TS430S, FM board, AM filter, SP430, YAESU FC707 ATU, MC40S mike, homebrew PSU, vgc £700 ono or part exc for KW2000 etc., and/or good 6x6 colour enlarger Durst etc. Phone: 051-256 9814.

WANTED•••••••••

WESTERN DX33 penetrotor in working order. Len, tel: 0322-63605 Swanley, Kent. G1SCI.

MICROSCOPE slides of rocks in thin section labelled or not also slides by Thos. Murby & Co., London. Commercial or amateur. G3JMO QTHR (0642) 486155.

ANY SURPLUS 1/4" full track mono rec/rep heads make immaterial. Fred Unwin, 91 High Street, Long Buckby, Northampton NN67RE.

HRO with b/s coils and psu in gc. G3BPE QTHR 0373-826939.

DRAKE T4XC TX with or without power supply 1.5MHz filter for R4C. G4LW QTHR phone Trowbridge 3166.

YAESU YO901 multiscope also FTV101DM external VFO or FV-901DM cash waiting. Audio filter Datong FL2/FL3 wanted. For sale Hygain V multimode Eprom converted continuous coverage 28MHz to 30MHz SSB AM FM £100 ono. Icom 211E offers G0AQL Fareham, Hants. 0329-284105.

V.F.O. GV101Z to match FT101Z. Tel:Buckley 545177.

WANTED cassettes of 12 to 18 wpm plain text or facsimile morse tests. I will be grateful. G6MEN P.O. Box 32, Shrewsbury, SY11ZZ.

WANTED SM220 and BS-8 or MC-85 desk mike for TS940S or DRAE slow scan TCVR. Have KDK FM-2030 2M (coverage 143KHz to 149KHz) for part exchange, monies adjusted each way. Write to A. G. Ward GI4VQK.

FT902DM HF TCVR must be mint condx with cw filter fitted and handbook. G3WL QTHR tel: 0752 43544.

ROLLER coaster, turns counter, James Millen type or similar. Pair of mast clamps for AR22/40 rotator. Drake TV-3300 low pass filter or trio LF30A. Daiwa CS-401 4 way antenna switch. GW4TVQ QTHR ring Neath (0639) 820356.

UHF TX/RX type 450L (ex link) with control panel, manual, cabinet £20. Rack-mount deviation meter (valve) £5. Boot-mount rangers with control box £5. 2/4m converter ex-Cambridge front ends £5. Any

offers? QTHR G3OWB 0223-358601 evenings.

JUNKERS MORSE key or RAF type "D" key required. 813 Valve holder also wanted. Tel: 0789-750259 anytime.

FT101ZD similar TCVR considered also Tentec Argonaut or similar also old type 160m TX telescopic (or semi) 30' mast. G2CYN Bedford 711-538. Office: 01-935 7119.

ADMIRALTY Communications Handbooks, volume 1 and 2 issued during world war two. Fair price paid. Tel: 0602-981910 evenings.

2M MULTIMODE 10W mobile TCVR, FDK 270A or similar also 2M SWR meter and 2M 8 or 10 element Yagi antenna. G1UWB Brian (Hants) tel: 0705-813130 work or 0705-462699 evenings.

FT290R TCVR linear mobile whip with or without nicads. Reasonable price for rig in good condition G3PHJ QTHR Huntingdon 0480-811445.

WANTED FT1017D plus accessories, top condx eqmt only. For sale: Dressler D70 70cms linear £395 ono also IC505 6m TCVR £420. Alex GM8BDX QTHR tele: 0361-83221.

YAESU FL - 2010 linear amplifier (match FT290R). Tony G4KHT QTHR telephone: Hull 0482-843457.

WANTED circuit diagram + instruction manual for Ferguson Videostar colour camera. Expenses paid I have copier. G4IZW not QTHR. Hamilton House, Carleton, Carlisle, Cumbria.

GOOD HOME available for unwanted/surplus copies of "Q five", "GI", "Sou-Wester", "-Ei-VHF-er-", "IRTS News" and "Contact". Cliff GI4CXW QTHR, tel: 0365-24500.

IC2E £100 offered. G4DLN QTHR. Tel: 0401-24233 evenings.

FT221R, + Mutek 2 mtr multimode base stn, slight fault on VFO knob £250. FT7B, mobile HF TXVR £250. All above complete with mikes, manuals, leads, or exch both for HF base stn TXVR. Both recently serviced. GOBTP QTHR Doncaster 725859.

GERMAN WW2 COMM/NAV equipment. Parts, literature for specialised collection. British gear and/or cash in return. Will collect, leads appreciated. AR.77 receiver. WS No. 11 OZ8RO R. Otterstad, Vejdammen 5, DK-2840, Holte, Denmark. Tel: 010-452-80 1875.

DENCO range three plug in coils for valve use. Blue, yellow, red, plus 465Kcs 1FT's. G8HDJ QTHR, tel: Lincoln 754328.

WANTED Western Electric or Westrex ex cinema or domestic loudspeakers, horns, amps, etc., also PX25 and PX4 valves or any equivalents, will collect. Please phone 01-445 0613.

TR10 SP120 and VFO120 to match 130 series. Must be gc. GI4SNC QTHR tel: 05047-66151.

CLASSICAL books on radio, particularly antennas, propagation, construction, components. Ancient or modern, any edition. E.g. Jasik Kraus Terman Mit series w.h.y.? Also complete volumes QST, etc. G4XMK QTHR tel: (Surrey) 08833-4718.

ERASE head for Philips EL3549 reel to reel recorder. G3MWO QTHR tel: 0359-70218.

CRANK UP tower, rotator, 3-5 element HF beam(s). Tower must be 60 foot. Sensible price for good working items with significant number of years use left. Ipswich (0473) 311665 after 7 pm.

70MHz TRANSVERTER 28MHz IF prefer solid-state. National NCL-200 linear any condx. Any other defunct HF linears for parts w.h.y.? G4BWP QTHR 0638 751830.

ICOM 230E control unit (front panel) to replace unit stolen from car. Please help me get back mobile. Jim G6LNS QTHR tel: (0253) 31040.

50MHz or 70MHz receive converter type CC-69, part no. UC2302J, for TR10 JR-599 HF RX also manuals for TR10 TX599 and JR599 HF TX/RX, can copy and return originals if available. G8ITB Richard Perzyna. Tel: 01-698 4403 not QTHR.

"BULL"! The great bulletin hunt goes on. any bulletins from July 1925 to December 1945 are required. Bound volumes preferred. G6JNS QTHR or phone 0905-620041 anytime. Please note later issues now obtained i.e. post-1945.

EXCHANGE 48K Spectrum c/w interface I micro-drive books leads and boxed for either Belcom 102L or Sommerkamp TS788DK or SPC300 or SPC3000 or HD PSU 30-40amp or FV707. G4XPP QTHR.

TR10 AT230. Would consider AT250 if price reasonable. Twin gang 176pF, or near, variable capacitor. Frequency meter. G4NHZ QTHR Derby tel: 0332-673992.

FT901 service manual photostat or original, buy or borrow, G3EPE QTHR tel: 0253-890467 after 2 pm.

BAND-SPREAD coils for HRO RX amateur bands 160-10M. Tel: Chris Jones 0491-873228 after six pm.

WANTED 2M valve linear with PSU to run approx 250W PEP, must be in good cond. Also transmatch type ATU G1HQL QTHR 0403-55011.

R390 RECEIVER for rebuild project. Condition immaterial providing mains transformer OK. Sensible price paid. G0DFF QTHR. Tel: 05827-63389.

HELP has anyone any circuits or manual for ex-GPO 300/300 modem type 2B/2C? Will pay any costs and return postage etc., to photocopy. G4EUM not QTHR. Tel: 01-549 9398.

3ELE beam TH33, TB3JR or similar must be vgc HF linear FL2100 or similar AMT1/2 for use with BBC B plus software. John G4TEN Blandford 0258-53075 QTHR.

FOR SALE YAESU FT480R complete with matching PSU £325 ovno. Also YAESU FRG7 GEN COV RX no mods vgc £125 ovno. Homebrew ATU INC. Phone: Dave 0757-618943.

YR901 MORSE code teletype reader. Ring Gicia, 061-626 5597 after 5 pm.

45FT TELESCOPIC mast or higher required. G4ZMH c/o 32 Dam Road, Barton on Humber, South Humberside.

TRI STAR 777 circiut diagram needed, can you help or direct me also size of cw crystal required? G4PND QTHR tel: 777-2340.

FAS1-4R remote aerial switch required to fit into FC-102 ATU. GM4HKW QTHR tel: Kirriemuir 0575-73455.

RADCOMS 1970 to 1983 needed by impoverished member wishing to catch up after 15 years QRT. Could collect midlands and south or pay carriage. Please state price and years available. G3VDH QTHR tel: (0288) 81379 (Devon).

SONY ICF 7600D RX must be mint. Blackburn 673184 9 am - 4 pm or 0257-480500 evenings.

AUDIO OUTPUT transformer for RCA AR88D RX contact C. J. A. Petit. BRS 88892. New QTHR as Geoff GU0BGP. Homedale, Le Vauquiedor, St Andrews, Guernsey, C.I. Tel: 0481-38694.

KW2000 series tcvr in good cond. also KW107 atu. Alan G4BLI QTHR (0752) 41437.

EX-WD RADIO equipment, A42 man pack and any ex-WD synthesised HF equipment also looking for any 2nd world war ex-WD wireless sets. Phone: Keith (091) 4693955.

WANTED by Congleton ATC: Datong model D70 morse tutor. Wanted by Hartshill, Stoke on Trent ATC: Manual for KWM-2A TX-RX, purchase or loan, all replies acknowledged. FLT/LT V. J. Reynolds, Staffs Wing Radio Officer. G3COY/G4ATC QTHR.

CHEAP TV, colour or mono, suitable DXTV on UHF and band one VHF. All replies answered G4KEL QTHR.

EDDYSTONE 640 RX. Condition immaterial but must be complete. G3ENB QTHR tel: 0723 365093.

NOSTALGIA TRIP! Quality 25W output transformer to suit KT66's or EL34's e.g. Partridge Parmeko or radio spares "Deluxe" 10K A-A or 6.6K with 43% screen taps or complete amp. Good price. w.h.y? GW3NWS QTHR phone: 0633-880146.

HYGAIN 18AVT 18AVQ base section or complete if reasonably priced. G3UIN tel: 0604-416155.

SONY ICF-7600D RX range 153-30000KHz boxed mint condition £75. Phone any evening except Tuesday. Storrington, Sussex (09066) 3972.

WHITE STICK operator: G1FAZ will pay £50 for: Sony TC800 series open reel portable tape recorder. Also: crystal set in mahogany box. Must be in gwd and vgc. Chris Williams, 158 Tennal Road, Harborne, Birmingham, B32 2HN. tel: 021-427 5040.

2m and 70cm FM mobile transceivers 10W output or more. Condition unimportant but must be in good working order. Willing to travel 50 mile radius of London to collect right rig(s). G4UHM not QTHR tel: 0245-468149 evenings and weekends.

These subsidised flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Members' Ad form printed on the back of a recent address label carrier used to mail RadCom to the advertiser: this will automatically provide proof of membership and should not be more than 2 months old. No acknowledgement of receipt will be sent and advertisements not clearly worded, or which do not comply with the conditions of acceptance, will be rejected. NO CORRESPONDENCE CONCERNING THIS SERVICE WILL BE ENTERED INTO.

Trade or business advertisements, even from members, will not be accepted for "Members' Ads", these should be submitted as "Classified" or "Display" advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements and accepts no responsibility for errors or omissions, or for the quality of goods offered for sale. Advertisements for citizens' band equipment will not be accepted. Refunds will be sent for any advertisement which are rejected for any reason.

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The following abbreviations are in common use for Members' Ads:-

TX - Transmitter RX - Receiver
TCVR - Tranceiver
tvtr - Transverter cvtr - Converter
gen/cov - general coverage
sig/gen - signal generator
vgc - very good condition
gc - good condition
ex condx - excellent condition
c/w - complete with

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TEL: 09252-29881

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DURING OCTOBER AND NOVEMBER BRENDA & BERNIE WILL GUARANTEE TO OFFER YOU THE BEST POSSIBLE PART-EXCHANGE DEAL AGAINST THE FABULOUS YAESU FT767 ALL BAND TRANSCEIVER OR ANY OTHER OF THE NEW YAESU RIGS.

REMEMBER WE WILL HAVE A VAST STOCK OF EQUIPMENT AT THE LEICESTER SHOW INCLUDING ALL THE WELL-KNOWN MAKES. OUR POLICY IS THAT WE WON'T BE BEATEN ON PRICE.

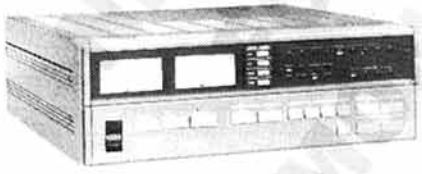
SO SHOP AROUND AND THEN CONTACT US AND WE WILL ENDEAVOUR TO BEAT ANY GENUINE OFFER.

FIRST AGAIN WITH THE NEW MODELS

NEW FT290
WITH CLIP ON NICAD PACK

YAESU FT727G
DUAL BAND
HANDHELD
TRANSCEIVER

144-146MHz
430-440MHz
Up to 5W on each band
Built-in VOX
C.A.T. Interface



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The long awaited Solid State HF Linear with Built-in Automatic A.T.U. is about to arrive from YAESU
500 Watts P.E.P. from a 100 Watt drive Built-in Antenna Switching

YAESU FT767GX

HF General Coverage Transceiver, 100 Watts out, with VHF and UHF options plus 6 Metres Auto ATU, Built-in Power Supply.

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THE WORLD's No1 HANDHELD RANGE

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FT203R/FT703R

The FT203R/FT703R is packaged in a lightweight, high-impact plastic case providing comfort and convenience with high durability. The small size is made possible by using chip components.
Thumbwheel frequency selectors (with 5kHz up button) plus standard repeater shift. Volume and Squelch controls are on the top panel along with jacks for the antenna (BNC), external microphone and earphone.
With the optional external YH-2 Headset, the internal VOX system provides voice-actuated transmit/receive switching, for "hands free" operation when mobile or walking. (As FT209R).
Also included is an S/PO meter for monitoring of relative power output and signal strength. (As FT209R).
The FTE-2 1750Hz Tone Burst Generator, which is standard, is activated manually by a button on the side of the FT203R. (As FT209R).
A range of slide-on Nicad packs or AA-cell cases provides the optimum power source for your needs (As FT209R).

144-146MHz
-10kHz (+5kHz)
Supply: 5·5-13V DC
IF's: 10·695-0·455Hz
Selectivity: ±6kHz
@ -6dB (2:1SF)

430-440MHz
10kHz (+5kHz)
Supply: 5·5-13V DC
IF's: 21·6-0·455Hz
Selectivity: ±6kHz
@ -6dB (2:1SF)

FT209R/FT709R

The FT209R/FT709R with two 4-bit CPU's and a lithium backed RAM offers features far beyond anything yet conceived, in a package smaller and lighter than any previous CPU-controlled transceiver.
Ten memory channels allow storage of either standard +/- shifts, or independent Tx and Rx frequencies for any split/repeater shift on any channel, with touch-key reverse or simplex on either frequency. Scanning capabilities include step-programmable full or partial band memory bank priority scanning etc.
Battery life is greatly extended with a programmable Power saver which activates the receiver momentarily at programmable intervals.
Nineteen soft rubber dual function keys provide greater control than ever, yet operation remains easy: the keypad is carefully arranged, colour-coded and most commands are one-touch operations.
Fat ½" LCD digits are complemented by ten memory and nine special function indicators showing status at a glance.

144-146MHz
25/12·5kHz
Supply: 6-15V DC
IF's: 10·7-0·455MHz
Selectivity: ±7·5kHz
@ -6dB (2:1SF)

430-440MHz
50/25kHz
Supply: 6-15VDC
IF's: 21·6-0·455MHz
Selectivity: ±15kHz
@ -6dB (2:1SF)

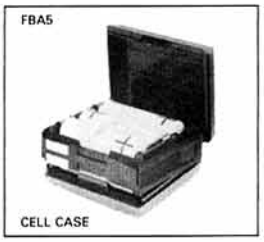
GENERAL SPECIFICATIONS

Good 50 ohm match to linears and antennas. Frequency modulation (FM-F3-G3E) variable reactance linear modulator

Sensitive, quality 2K ohm condenser MIC. ±5kHz max. dev, 16kHz max. bandwidth. Transmitter spurious output -60dB

Sensitivity: 0·25μV for 12dB Sinad.
1μV for 30dB S/N.
AF O/P: 450mW into 80hms @ 10% THD

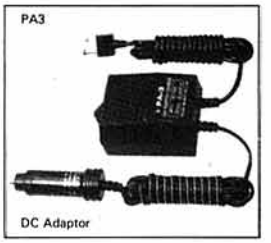
Large range of accessories available. Supplied with YHA 14A/YHA 44D helical antenna and appropriate soft case


FBA5
CELL CASE


FNB3
10·5V NiCd Pack


FNB4
12·5V NiCd Pack


NC9C/NC18C
Slow Charger

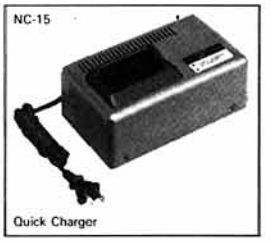

PA3
DC Adaptor


YH-2
Mic Headset (Vox)


MH-12A2B
Speaker Mic


CSC (Series)
Soft Case


MMB-21
Mobile Bracket


NC-15
Quick Charger

MODEL, SUPPLIED CELL, POWER OUTPUT (Hi/Lo), CASES, DIMENSIONS				
FT203R	**FT703R**	**FT209R**	**FT709R**	**FT209RH**
1·5/0·2W* C/W FBA5 CSC6 65W, 34D, 153H mm	1·5/0·2W* C/W FBA5 CSC6 65W, 34D, 153H mm	1·6/0·2W* C/W FBA5 CSC10 65W, 34D, 168H mm	1·8/0·2W* C/W FBA5 CSC10 65W, 34D, 168H mm	2·3/0·3W* C/W FBA5 CSC10 65W, 34D, 188H mm
2·5/0·3W C/W FNB3 CSC6 65W, 34D, 153H, 482gms	2·5/0·3W C/W FNB3 CSC6 65W, 34D, 153H mm, 480gms	2·7/0·3W C/W FNB3 CSC10 65W, 34D, 168H, 512gms	3·0/0·3W C/W FNB3 CSC10 65W, 34D, 168H mm, 535gms	3·7/0·4W C/W FNB3 CSC10 65W, 34D, 168H mm, 512gms
3·5/0·4W C/W FNB4 CSC7 65W, 34D, 172H, 490gms	3·5/0·4W C/W FNB4 CSC7 65W, 34D, 172H mm, 495gms	3·7/0·4W C/W FNB4 CSC11 65W, 34D, 186H, 520gms	4·0/0·4W C/W FNB4 CSC11 65W, 34D, 186H mm, 520gms	5·0/0·5W C/W FNB4 CSC11 65W, 34D, 186H mm, 520gms

FT203R C/W FBA5 ..... £195.00	FT703R C/W FNB4 ..... £260.00	FT209RH C/W FNB3 ..... £275.00
FT203R C/W FNB3 ..... £225.00	FT209R C/W FBA5 ..... £239.00	FT209RH C/W FNB4 ..... £279.00
FT203R C/W FNB4 ..... £229.00	FT209R C/W FNB3 ..... £265.00	FT709R C/W FBA5 ..... £255.00
FT703R C/W FBA5 ..... £229.00	FT209R C/W FNB4 ..... £270.00	FT709R C/W FNB3 ..... £285.00
FT703R C/W FNB3 ..... £255.00	FT209RH C/W FBA5 ..... £245.00	FT709R C/W FNB4 ..... £290.00

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